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Emerging Classroom Technologies: Application of the 2010 Horizon Report to K-12 Education

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“The illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn.”

-Alvin Toffler
American author and futurist Alvin Toffler’s sage advice is perhaps even more relevant today, at the dawn of this digital and technological century to which Toffler refers, than it was when he first dispensed it at the close of the twentieth century. This is particularly true when considering the emerging technologies that will be commonplace in American K-12 classrooms by the end of this decade. Teachers who are unwilling to learn, unlearn, and relearn new classroom technologies will soon find themselves to be pedagogically illiterate in the classroom of the twenty-first century where such technologies and online tools are ubiquitous.

While some sources, such as the popular online list of the “Top 100 Tools for Learning,” compiled by the Centre for Learning & Performance Technologies, attempt to keep educators abreast of the latest in online tools or technologies, they are snapshots of “what is,” i.e., popular technologies already being utilized today. [1] These sources may be of assistance to classroom teachers in identifying online technologies that could potentially serve to enhance the teaching and learning process in their respective classrooms. They are not, however, a predictor or barometer for “what will be,” i.e., technologies that are on the horizon. Indeed, classroom teachers should continue to learn more about the technologies and online tools that are currently available to them, however they should also keep one eye on where technology is going, in order to stay one step ahead of the technology curve.

This approach is the same one advocated by former professional hockey player Wayne Gretzky, “The Great One,” who when asked how he was able to sustain such an incredibly high level of
performance over his twenty-one year NHL career, replied simply, “I skate to where the puck is going to be, not to where it has been.” To assist in keeping one eye on where the digital puck is going, each year the New Media Consortium and the EDUCAUSE Learning Initiative publish the Horizon Report, which provides colleges and universities with a summary of technologies that are likely to impact post-secondary teaching and learning over the next one to five years. [2] This year’s Horizon Report identifies six emerging technologies that are expected to “enter mainstream use on campuses within three adoption horizons,” as follows:

The near-term horizon assumes the likelihood of entry into the mainstream for institutions within the next twelve months; the mid-term horizon, within two to three years; and the far-term, within four to five years. [3]

While the 2010 Horizon Report provides academic faculty and IT staff with critical information on the technologies and practices that will be impacting the teaching, learning, and creative processes at their respective colleges and universities in the near future, i.e., where the puck is going, it does not address K-12 education. The purpose of this article is to apply the findings of the Horizon Report to the K-12 classroom, providing classroom teachers with the same critical information on where the digital puck is going over the next five years as it relates to their classroom and pedagogical practices. The same three-tier adoption schedule and six categories of emerging technologies found in the Horizon Report will be adopted; however, the focus will be on K-12 education.

Near-Term K-12 Horizon (School Year 2010-2011)

The Horizon Report identifies two technologies which are likely to enter into “mainstream use for teaching, learning, or creative inquiry” within the next year. [4] The two technologies and practices on the near-term horizon are mobile computing and open content.

Mobile Computing

The Horizon Report defines mobile computing as “network-capable devices students are already carrying” (e.g., smart phones, iPod Touch, netbooks). [5] The portability of these devices and easy wireless access to the Internet makes mobile computing devices ideal pedagogical conduits for a variety of teaching and learning activities in K-12 education. The challenge is for K-12 teachers to seize opportunities to integrate mobile computing in the teaching and learning process. Five such opportunities to use mobile computing and learning are outlined in Carly Shuler’s book Pockets of Potential: Using Mobile Technologies to Promote Children’s Learning, as follows:

1. **Encourage “anywhere, anytime” learning**
   Mobile devices allow students to gather, access, and process information outside the classroom. They can encourage learning in a real-world context, and help bridge school, afterschool, and home environments.

2. **Reach underserved children**
Because of their relatively low cost and accessibility in low-income communities, handheld devices can help advance digital equity, reaching and inspiring populations “at the edges” — children from economically disadvantaged communities and those from developing countries.

3. **Improve 21st-century social interactions**
   Mobile technologies have the power to promote and foster collaboration and communication, which are deemed essential for 21st-century success.

4. **Fit with learning environments**
   Mobile devices can help overcome many of the challenges associated with larger technologies, as they fit more naturally within various learning environments.

5. **Enable a personalized learning experience**
   Not all children are alike; instruction should be adaptable to individual and diverse learners. There are significant opportunities for genuinely supporting differentiated, autonomous, and individualized learning through mobile devices. [6]

One of the best examples of mobile computing and learning is the International Children’s Digital Library ICDL iPhone App, which makes available to users one of the largest collections of digitized children’s books currently available (see Figure 1).

![Figure 1 – International Children’s Digital Library, iPhone Edition](source)


Another example of mobile computing and learning is the Center for Children and Technology and Center for Science Education’s research project “Super Sleuths,” which is designed to integrate mobile computing (i.e., Nintendo DSi) in science and literacy education. At the 2009 Institute of Education Sciences Research Conference, researchers distributed the following schematic illustrating the manner in which researchers are using Nintendo DSi as a pocket-sized laboratory in order to develop middle school students’ scientific reasoning skills (see Figure 2).
Figure 2 – Possible Worlds: Portable Game Systems as Pocket-Sized Laboratories


Open Content

The Horizon Report defines open content as “customizable educational content” that is made “available for free over the Internet.” [7] The pedagogical nature of the open content design allows for K-12 students to not only gain knowledge of the content of the material under examination but also to refine their research and evaluation skills as they analyze the online open content resources. Although most of the Open Educational Resources (OER) is designed for college and university faculty and students, a growing number of sites are beginning to integrate K-12 education OER materials and resources. Some of the most popular OER sites for K-12 teachers are as follows:

Conxions includes a large collection of Open Educational Resources for K-12 and university educators, arranged in easily accessible clusters or modules.

Teachers Without Borders provides P-12 teachers with a myriad of international OER materials and resources, including early childhood education content and tools.

Open Educational Resources Grapevine is a wiki designed as a portal to a variety of open educational resources (OER) for K-12 and university educators.

Mid-Term K-12 Horizon (School Year 2011-12 to 2012-13)
Next, the *Horizon Report* identifies technologies which are likely to “see much broader use across academia over the next two to three years.” [8] The two technologies and practices on the mid-term horizon are electronic books (eBooks) and Simple Augmented Reality (AR).

**eBooks**

The *Horizon Report* points out the electronic books, or eBooks, have been available in various formats for nearly forty years. The past year, however, has witnessed a revolution in the design and marketing of eBooks from Amazon.com’s Kindle to Apple’s iPad. Indeed, we have reached a point in the history of book publishing where nearly all new books are now available in electronic format. [9] In addition, the most popular tomes of the past generation and nearly all of the classics are available to eBook readers. The multi-billion dollar textbook industry, however, has not been aggressive in pursuing the K-12 eBook market. Therefore, K-12 teachers who want to adopt electronic textbooks in their respective classrooms often find themselves in uncharted territory. To this end, *Education Week*’s Rhea Borja has developed a list of suggestions or tips to assist K-12 educators in the eTextbook adoption process, as follows:

1. Get the administrative green light. Does the administrative leadership in your district or school understand the positive impact virtual textbooks can have on learning?
2. Identify an on-site advocate and expert. You need a teacher, librarian, or other nonadministrative staff member at each school to keep classroom teachers focused and to train and support them in e-textbook integration.
3. Build a technical-support team. Teachers need classroom hardware and software support so they can focus primarily on creating and teaching academic content, rather than troubleshooting technical problems.
4. Showcase the results of using e-textbooks. Teachers need to see how digital books can help improve instruction at a faster rate than traditional texts.
5. Share ideas and lessons learned. Are other schools or districts using virtual textbooks? What have they learned?
6. Solicit feedback from district curriculum experts. They can look beyond the bells and whistles and measure the usefulness of the e-textbooks’ interactive features. [10]

**Augmented Reality (AR)**

The *Horizon Report* defines simple augmented reality as “blending (augmenting) virtual data—information, rich media, and even live action—with what we see in the real world, for the purpose of enhancing the information we can perceive with our senses.” [11] While AR has had its greatest impact in fields of entertainment and marketing, it is beginning to make inroads in education, thanks in large part to the application of augmented reality gaming to K-12 subject or content areas such as history, geography, and anthropology. [12] A couple of the most popular AR apps for K-12 teachers are as follows:

*Google Sky Map* uses an Android phone’s orientation sensors to provide students with a map...
of the stars and constellations. Sky Map even uses the phone’s compass, GPS, and accelerometer to move the map as the student moves his/her hand across the night sky.

*Wikitude World Browser* provides students with information about landmarks and other points of interest in an area through data overlays that appear on a smart phone as the student moves his/her camera view over the surroundings.

**Far-Term K-12 Horizon (School Year 2013-14 to 2014-15)**

Finally, the *Horizon Report* identifies technologies which are “[not] yet commonly found in campus settings, but the high level of interest and the tremendous amounts of research in both areas indicates that they are worth following closely.” [13] The two technologies and practices on the far-term horizon are gesture-based computing and visual data analysis.

**Gesture-Based Computing**

Gesture-based interaction with technology has been commonplace for decades, however for most of that period it has been largely restricted to a keyboard, controller, and mouse. In the past few years, however—with the introduction of the Nintendo Wii, in 2006, and Apple iPhone, in 2007—we have witnessed a revolution in gesture-based computing, where now gesture-based interfaces does not even require handheld devices, using instead cameras and motion sensors to track our body movements. [14] While today the most popular forms of gesture-based computing are designed for gaming and simulation/training purposes, there is a growing interest in applying these technologies to K-12 education. Perhaps one of the best examples of such application is the collaboration between Nintendo and the National Association for Music Education to integrate Wii consoles and music software into secondary school music classes. [15] Another example of application of gesture-based technology in the K-12 classroom can be found in Bayside Middle School (Virginia Beach, Virginia) integration of Nintendo Wii consoles and Wii Fit software in physical education classes for special education students. [16] These are but two examples of gesture-based technology integration in the K-12 curriculum; however they have yielded extremely encouraging results. In the coming years, the integration of other gesture-based technologies, such as the Microsoft Natal system, in K-12 education should serve to provide classroom teachers in other subject areas with even more possibilities for incorporating such technologies into their pedagogical repertoire.

**Visual Data Analysis**

The *Horizon Report* defines visual data analysis as “a way of discovering and understanding patterns in large data sets via visual interpretation.” [17] An emerging field for K-12 education, visual data analysis traces its genesis to college and university researchers and scientists who developed such technologies to analyze voluminous amounts of data generated from their investigations and studies. [18] Examples of visual data analysis technologies and sites that have application to K-12 education include the following:
Visual Complexity is a site for educators who are interested in visualizations of complex concepts and networks to use as heuristics in the classroom to facilitate understanding and enhance the learning process.

Worldmapper is a geographic visualization site K-12 social studies teachers will find of great utility, in particular for the animated maps that combine geographic and demographic data, in some cases along chronological timelines.

Conclusion

While these emerging technologies hold tremendous promise for the classroom, we should also exercise caution when attempting to predict the potential impact of the “latest technology” on K-12 education. Even one of the greatest minds of the twentieth century, Thomas Edison, was unable to avoid the trap of exaggerating the impact technology would have on education when he proclaimed, in 1922, “I believe that the motion picture is destined to revolutionize our educational system and that in a few years it will supplant largely, if not entirely, the use of textbooks.” [19]

Consistent with Wayne Gretzky’s advice, however, to skate to where the puck is going, K-12 educators will still benefit from examining further these six technologies—many of which are already widely used in American society in different forms and for different purposes—to see which hold the greatest promise for their classroom. To be sure, the technology a high school chemistry teacher may find to be of pedagogical value in his/her classroom may be quite different from the technology a middle school language arts teacher needs to facilitate student learning in his/her classroom. The question in not whether technology will continue to play a role in K-12 education but, rather, what types of technologies will serve to chart the course K-12 teaching and learning takes over the next decade.

Endnotes


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(New York: The Joan Ganz Cooney Center at Sesame Workshop, 2009), 5.


[18] Ibid, 29.


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20 THOUGHTS ON “EMERGING CLASSROOM TECHNOLOGIES: APPLICATION OF THE 2010 HORIZON REPORT TO K-12 EDUCATION"
temat
on January 30, 2014 at 7:11 AM said:

I also, want a followup to this repair. It truly is fascinating. I when had a repair made on a cast iron exhaust manifold for just a 1932 Packard.

naija social network
on January 30, 2014 at 11:34 AM said:

Thanks, I've just been searching for data about this subject in your long time and yours stands out as the greatest I've came upon so far. But, what about the conclusion? Are you specific on the supply?

africa
on January 30, 2014 at 1:57 PM said:

This extremely answered my drawback, thank you!

toilet reviews
on February 1, 2014 at 12:00 AM said:

After looking at a handful of the blog articles on your web page, I honestly appreciate your technique of blogging.
I saved it to my bookmark webpage list and will be checking back soon. Please visit my website as well and tell me your opinion.

plotka
on February 1, 2014 at 1:56 AM said:

Hey extremely cool web site!! Guy .. Beautiful .. Superb .. I'll bookmark your blog and
eat the feeds also...I am satisfied to discover so numerous interesting information here within the post, we’d like develop a lot more ways in this regard, thanks for sharing. . . .

Lódz
on February 1, 2014 at 2:18 AM said:

good work, i adore reading your post. Keep the great work.

9ja
on February 3, 2014 at 1:52 AM said:

Pretty section of content. I merely stumbled upon your web site and in accession capital to say that I get in fact enjoyed account your blog posts. Any way I will be subscribing inside your augment and even I accomplish you entry persistently rapidly.

plotki
on February 3, 2014 at 1:57 AM said:

One much more thing I wish to talk about is that as an option to trying to accommodate all your on-line degree lessons on times which you end jobs (since the majority people are tired after they get home), try to have most of your instructional classes on the week-ends and only a couple courses in weekdays, even if it approaches a little time away from the saturday and sunday. This really is beneficial simply because over a saturdays and sundays, you will be far more rested in addition to concentrated in school work. Thanks significantly to your several points I have figured out in the site.

band saw reviews
on February 3, 2014 at 9:12 PM said:

I've learn some good stuff here. Definitely value bookmarking
for revisiting. I wonder how so much attempt you place to create this sort of wonderful informative web site.

**best pressure washer**

on **February 3, 2014 at 9:55 PM** said:

hey there and thank you for your information – I’ve certainly picked up anything new from right here.
I did however expertise a few technical issues using this site, since I experienced to reload the web site a lot of times previous to I could get it to load properly.
I had been wondering if your web host is OK? Not that I’m complaining, but sluggish loading instances times will sometimes affect your placement in google and could damage your high-quality score if advertising and marketing with Adwords.

Anyway I am adding this RSS to my e-mail and could look out for much more of your respective fascinating content.
Make sure you update this again soon.

**clothes steamer reviews**

on **February 4, 2014 at 12:29 AM** said:

When I originally commented I clicked the “Notify me when new comments are added” checkbox and now each time a comment is added I get three e-mails with the same comment. Is there any way you can remove people from that service? Appreciate it!

**rifle scope reviews**

on **February 4, 2014 at 1:24 AM** said:

Thanks for sharing your thoughts about fairfield real estate.
Regards
espresso machine reviews

on February 4, 2014 at 2:28 AM said:

Hi! I know this is somewhat off topic but I was wondering if you knew where I could get a captcha plugin for my comment form? I’m using the same blog platform as yours and I’m having problems finding one? Thanks a lot!

best vacuum for hardwood floors

on February 4, 2014 at 3:06 AM said:

Excellent website. A lot of useful info here. I’m sending it to some friends ans additionally sharing in delicious. And certainly, thank you in your effort!

best crossfit shoes

on February 4, 2014 at 4:08 AM said:

Hi there everyone, it’s my first visit at this web page, and paragraph is truly fruitful designed for me, keep up posting these articles.

humidifier reviews

on February 4, 2014 at 4:35 AM said:

Hi, i think that i saw you visited my site so i came to “return the favor”.I’m trying to find things to enhance my website!! suppose its ok to use a few of your ideas!!
best garbage disposal
on February 4, 2014 at 5:29 AM said:

Hi, i believe that i noticed you visited my site
thus i came to go back the want?.I'm attempting to in finding
things to improve my website!! guess its ok to make
use of a few of your ideas!!

cork board ideas
on February 5, 2014 at 10:34 AM said:

Oh my goodness! Impressive article dude! Many thanks, However I am having troubles
with your RSS. I don

Grisel Mcwatters
on February 6, 2014 at 12:09 AM said:

Allereerst laat mijn familie waarderen bevel van een persoon in deze materie. Ook al is dit
zeker gloednieuw, toch al snel na het registreren van uw site, dit intellect heeft uitgebreid
gëxploedeerd. Laat ons allemaal om greep van iemands rss te helpen in contact te
blijven met op alle mogelijke berichten Oprechte begrijpen nemen maar zal het
doorgeven aan bewonderaars en mijn persoonlijke leven leden helpen

Joe Teper
on February 6, 2014 at 2:12 PM said:

hi vrienden, is dit een geweldige plek en ik heb veel geleerd tot nu toe. Houd op het
goeie werk