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The Educational Technology Front in 2011

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Today's K–20 educators are more adept at using technology resources than at any time in the past.

Simultaneously, educators are ever more wary about technology resources because of the risk that the technology may fail at some critical moment in class, the risk that privacy issues may cause problems for their students, and the risk of unintended consequences for teachers who experiment with new technologies. For example, asking students to use some of the many new free or low-cost applications means that educators must be aware of advertisements for products that may be offensive or distracting, information that may be misleading, and malware that may compromise school or student computers. Further, part of the reason educators are able to enjoy so many of these resources is because they have been available free or for low-cost, but the promise of continued availability of these resources is tenuous at best.

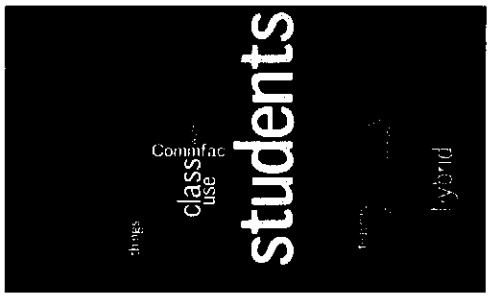
Despite these potential hazards, educators who are willing (along with their students) to undergo some risk can be richly rewarded in wonderful new class activities that are engaging, rich in meaning to individuals, and potentially life-changing. Let's look at some of these rich new technologies that are currently in use and some of the new technologies that likely will soon be available to educators.

Current Technologies

Educators make use of desktop and laptop computers in the classroom that may be connected and configured to work with SmartBoards (http://smarttech.com/) and other interactive white boards, "clicker" systems for just-in-time formative feedback, document cameras for high-quality 3D image projection, and countless other hardware resources. These technologies can improve visualization techniques while also expanding opportunities to create interactive lesson plans and otherwise enhance student engagement with learning materials. Further, many of these activities can be recorded real-time and saved for distribution and examination later. For example, many document cameras now come with software that allows instructors to record audio and video directly to computers attached to the document camera. This audio and video content can be shared with the class at a later time for review. Educators are also becoming adept at using free video conferencing tools such as Skype (http://skype.com).

Additionally, educators can make use of software applications (apps) on the Internet that enable students to form collaborative groups and documents in the form of wikis, journals and blogs, collections of materials gathered outside of the classroom, and much more. Examples include:

- Wikis—Expertiza (http://sourceforge.net/projects/expertiza/): Wiki tools such as Expertiza allow for classroom group document creation, and even crowdsourcing for textbook creation. Teachers can use tools such as Google Docs, PBwiki, or WetPaint to enable students to create group toolkits, creative writing projects, or aggregated community resources.
- Concept maps—Mywebspiration (http://mywebspiration.com): Concept maps (also known as mind maps) are excellent ways to help students brainstorm and to visually organize content into groups, see relationships quickly, and form outlines for essays. Popular similar tools include http://freeplane.sourceforge and http://www.mindomo.com/.
- Image editing—Picnik (http://www.picnik.com): Online tools for photo editing and sharing are powerful and fast. For most people, these online photo tools are superior alternatives to high-priced applications such as Photoshop. Popular similar tools include http://photobucket.com/ and http://picasa.google.com/.
- Screencasting—Jing (http://www.techsmith.com/jing/): For anyone charged with instructing others on how to use computer applications, voice-annotated screencasts can sometimes be the difference between success and failure. Jing is a free web tool that lets users create short videos of screen activities that include synchronized voice narrations. Also included are helpful animations such as highlighter popups that help viewers following along with the narrator. Full-feature tools such as http://www.techsmith.com/jing/ and http://www.techsmith.com/jing/ (for Mac users) can be purchased for longer, more complex videos that can include still shots, title overlays, and other video editing features.
- Digital video editing—Jaycut (http://jaycut.com): For educators seeking simple, free or inexpensive online video editing tools, the choices were quite limited until recently. Jaycut is a free online digital video editing program that lets users upload and edit video clips. Users can draw on video clips, voice-annotate videos, and many functions usually only found in higher end video editing programs. Many faculty utilize video sharing tools such as YouTube (or school-safe alternatives such as SchoolTube). YouTube will allow some simple, rudimentary editing as well.
- Data visualization—Many Eyes (http://www-958.ibm.com/software/data/cognos/manyeyes/): Many Eyes provides access for educators to use a wide variety of visualization resources, including tag clouds, bubble graphs, charts, etc. that make understanding large data sets a snap. Education and psychology researchers recognize that students learn most richly when information is presented in multi-modal formats that appeal to each individual's learning style. The majority of students learn best when information is presented both visually, in the form of conjoined graphics and text, and audibly, which allows students to recognize relationships between groups and data and to recognize important patterns (Horn, 1998). Http://wordle.net is perhaps one of the most popular of these resources. Pictured here is a tag cloud, one way to help readers visualize data, generated from Chapter 4 of my dissertation:



  - Here's another example of visualization that is not quite within everyone's reach yet, but is clearly of value: http://www.flixxy.com/200-countries-200-years-4-minutes.htm
- Browser apps—Chrome Web Store (https://chrome.google.com/webstore): Google apps are available for use for anyone who can use Google's Chrome web browser, and many of these apps are free or very low-cost. For example, there are a number of apps for math games and exercises, apps that provide "sandbox" space for users learning to code in HTML or CSS, apps that provide access to PBS educational content, and much more. These apps provide access not only via comput-

ers, but also through Android tablets and Android mobile phones. Similar resources are available for Apple, Palm, HP WebOS and other platforms on computers, tablets, and mobile phones.

- Simple mobile apps—Evernote (http://blog.evernote.com/2011/02/16/evernote-and-ideapaint-turning-simple-walls-into-intelligent-writing-surfaces/): Simple image capture, link and note sharing apps can be downloaded onto many of today's cell phones and used to share information quickly with other students. In this case, Evernote is used in combination with Ideapaint, which is white board paint that can be applied to many surfaces to broaden and enhance the availability of learning spaces. Another popular similar app is Catch (https://catch.com/).

Technologies on the Verge of Widespread Adoption

In addition to the many resources already listed that are available to educators now, educators will soon be able to use new technology resources that may revolutionize the way we communicate and share data for learning. For example, as mentioned, data visualization techniques will allow for creative new ways to shape and morph data, providing us with the ability to see new patterns and connections. Many of these techniques already exist but are either too expensive or too complex for everyday use at present, but these inhibitors are quickly changing. This section outlines a few of these key developments.

New Hardware Capabilities/Challenges

The Horizon Report (http://wp.nmc.org/horizon2010/), a collaboratively produced annual report on learning trends, suggests that new technologies will provide us with new capabilities very soon. Two primary areas include gesture-based computing and mobile learning, both dependent on newly emerging hardware. New mobile capabilities mean that students and faculty will be able to find, create, and share data visually, dynamically, intuitively, and ubiquitously. While they may look very promising, we will need to beware of vendors who will attempt to force too-early adoption of hardware technology tools that are more flash than substance. Mobile technologies can't be fully adopted by students unless

we are sure our students all use fairly high-end, data-capable mobile cellphone devices (or we are willing to subsidize them) that are similar enough for faculty to prepare standard mobile course materials at reasonable cots for them. Gesture-based devices, popularized first in the gaming industry through products such as the Wii and Kinect, enable users to interact with computers without using special input hardware such as keyboards or mice, removing yet another hurdle for access to and control of data while also providing nuanced new ways to shape human-computer interactions.

Using a combination of these new capabilities, one can envision a classroom in which instructors can guide groups of students through the process of questioning and researching using very large touch screens, shared tablets, or some combination of both, that allow for collective information pattern construction. For example, an instructor might ask students to answer a question that has special meaning and relevance for the class, such as where tap water comes from. The class could work together to gather information from the Internet, collect it in a shared virtual space, and create a story based on this newly gathered information. The class might include authentic resources from anywhere in the world, including direct contact with people outside of class. Individually, students could use blogs or tools like Twitter to reflect and share thoughts and ideas that could be folded into the story as the process evolves. The story could be in the form of text but may include image, audio, and video files as well, and once the project is done, it could be shared with others around the world. Because of the affordances of technology, the story need not end at the end of the class; it could continue as long as the participants wanted and become an ongoing thread in a student's life.

The Semantic Web—Students as Bricolear Learners

Even now, educators and their students often need to work closely with information literacy experts to ensure that students understand how to search for and evaluate resources that are credible and relevant. Students tend to fulfill their

research paper requirements in the simplest and quickest way possible—"bricolear," grab whatever information is immediately handy—which often means that they are not searching literature rigorously or creatively enough to satisfy faculty expectations (Donohoe, 2000). This is due in no small part to the ease of access to a preponderance of resources, good and bad, on the Internet. For their part, faculty do not always model methods for digging more deeply below the surface for good resources, and they tend to be overly suspicious of online and/or multimedia resources. For example, some faculty will accept only books as source materials, even when the identical material is available in digital form online as a PDF. We need better methods for enabling faculty and students to find and evaluate sources. For this reason, we need a better version of the Internet in which sources are easier to identify and are also identified in a nuanced context that can be identified, saved, and shared by users. Many are calling this re-envisioning of the Internet "the semantic web" (Berners-Lee et al., 2001).

Social Learning

Second Life, Facebook, Twitter, and other social applications are beginning to be used as a means by which learners can connect with one another to share ideas and resources more easily. Educators are already using blogs, wikis, and dozens of other web-based applications that allow students to work individually or in groups to create or gather resources available wherever students find them. One of the primary benefits is that these social apps allow instructors and students to track one another's progress easily and often, at no direct cost. Educators will want to pay close attention to the next iteration of social learning in the form of entrepreneurial, "just-in-time" social learning networks. These ventures may challenge educators to defend traditional face-to-face learning modes while simultaneously encouraging us to adapt to a more flexible, less schedule-dependent, life-long hybrid learning mode. One exciting example is the work done on "fab labs" (fabrication labs) at MIT's CBA, or Center for Bits and Atoms (http://cba.mit.edu/), which describes a program in which users of any age, location, or background can use a lab complete with the materials and instructions they need to create inventions quickly and easily. CBA director Neil Gershenfeld frequently describes examples involving enthusiastic eight-year-old girls from locations such as Kenya using these CB-created fab labs to create simple, useful inventions that they can use immediately–no expensive years of classroom theory required, no barriers to access needed.

Conclusion

Clearly, educators face an amazing new world of educational possibilities thanks to new technologies. As we have seen, many of these tools rely on new advances in hardware and especially on new advances in web apps which have been designed for mobile devices. These web apps have the potential for replacing many of the expensive (and therefore out-of-reach) desktop applications that have made activities like image and digital video editing possible. Further, they can make it far easier for students to share multimedia and many other kinds of learning artifacts with others inexpensively and securely. The technology is coming. Will educators be prepared to take advantage of it, and if so, how effectively?

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