

Number 1

Rethinking the Role of Technology in Education

ABSTRACT: This article, the first in a series on educational technology and student-produced media, proposes a technological framework for teaching and learning. This framework is a triangulation of three principle categories of educational technology: classroom devices, personal devices, and the Internet. Each category is in a constant state of development and expansion; interconnections among the three categories have potential to transform teaching and learning, in part through increased interactivity of students with technology and the incorporation of student-produced media in instruction.

KEYWORDS: cell phone, computer, educational technology, interactive white board, Internet, Net Generation, smartphone, student-produced media.

Today's young people have been called the "YouTube Generation" and the "Net Generation" for good reason. They are "wired" (and as often wireless) and adept at digitally cocooning when left, literally, to their own devices. The current generation in schools is defined by its use of technology, something that educators increasingly realize must be taken into account when planning what and how to teach. Researchers Mitzuko Ito and colleagues in a 2008 report put it this way: "Our values and norms in education, literacy, and public participation are being challenged by a shifting landscape of media and communications in which youth are central actors."¹

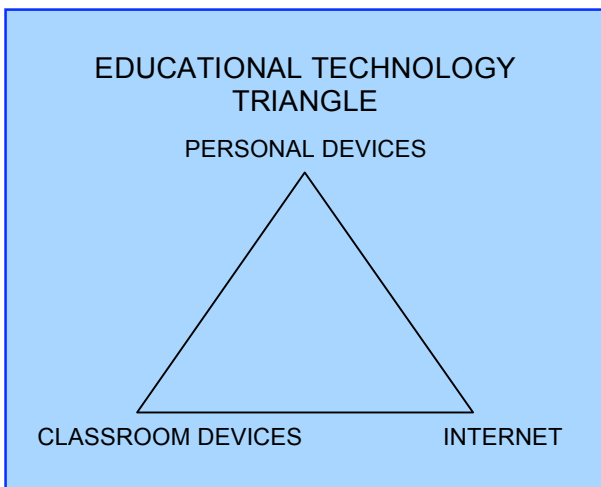
According to research done by the National Center for Education Statistics (NCES) in 2003² (published in 2006), 91 percent of children and adolescents between ages three and eighteen used computers, and 59 percent used the Internet. For high school students, 97 percent used computers and 79 percent used the Internet. These were the statistics seven years ago. When it comes to technology use, the percentages invariably go up, not down. Consequently, students now in classrooms are undoubtedly even more digitally connected than their classmates were in 2003.

The purpose of this article—the first in a series—is to suggest a framework for rethinking the role of technology in education. This is a broad—indeed, almost overwhelming—topic that will be explored in nuanced detail as the series unfolds.

One way to begin this rethinking process is to cluster educational technology into three principle categories: classroom devices, personal devices, and the Internet. These categories are interconnected, but they can be described individually in ways that are useful in the context of thinking about the role of technology in teaching and learning. These component categories form what I call an educational technology triangle (*see figure on next page*). The base of this triangle rests on classroom devices and the Internet. Increasingly, however, personal devices—whether belonging to students, teachers, or both—are

"A Vision of K-12 Students Today"

This video written and produced by B. Nesbitt puts faces to the Net Generation on **YouTube** or **SchoolTube**.



becoming an important component of education, in spite of controversies that often surround the use of personal devices in educational settings.

Classroom Devices

Little purpose is served by tracing transitions from earlier technology to current manifestations—for example, penned business letters giving way to typewriting on manual typewriters, then electric typewriters, and thence to computer word-processing. Educators of long experience simply need to set aside history and examine what is current, or at least now

possible, in classroom technology. The word *device* in this sense incorporates both hardware and any software necessary to use it.

It is rare today not to find at least one computer in any given classroom. This is true from personal observation in schools at all levels and in various socioeconomic settings from rural localities to the inner city. Unfortunately, it is still fairly common to find only one, teacher-dedicated computer in many classrooms. With the increasing use of email not only for communication within the school or district but also between teachers and parents, this type of use is significant (*see below*). But such use has an indirect, rather than a direct, effect on instruction.

It is noteworthy that the ease of using email has particularly tended to increase communication between teachers and parents, according to researcher Blair Thompson at Western Kentucky University.³ Thompson's research suggests that five topics predominate: students' grades, scheduling issues, health problems, student behavior, and student socialization. The teacher's dedicated computer also is likely to be used for other essentially management functions, such as keeping an electronic grade book. So, while intra- and interschool and home-school communications and recordkeeping are important to effective instructional management, they do not address the key question: Is the computer used to activate student learning?

If a teacher uses his or her dedicated computer to construct lesson components, this use is a step in the direction of learning mediated by technology. But simply developing traditional items such as quizzes, tests, and worksheets does not represent a substantive change from the days when teachers ran off these paper-and-pencil components on the school's ditto machine. On the other hand, if the teacher involves students in using the computer, then the potential for active learning increases.

This potential is even more likely to be realized if dedicated student computers are readily available—meaning, in the classroom, not down the hall in a computer lab. Currently the ultimate student computer resource—bearing in mind that “ultimate” doesn't last very long when the subject is technology—is a laptop for every student. Laptop portability can mean that students not only will use the computers at school but also can take them home.

A growing number of school districts are moving in this direction—in spite of the relatively high cost and some notable policy ramifications—because the payoff in increased student learning (and family involvement) is high. For districts that have committed to providing laptops to students, there also has been a significant change in *how* student improvement is achieved. Researcher Janet Trombley, for instance, studied Project Laptop at Summit High School, an ethnically, culturally, and socioeconomically diverse public school in which students come from homes that speak thirty-nine languages. Trombley concluded,

By ensuring equity and access to computer technology at school and at home for students and teachers, Project Laptop is not only ‘leveling the playing field’ but raising it as well by eliminating the technology disparity between the ‘haves’ and ‘have nots.’ Teacher training and support enables the integration of technology to become a seamless component of the curriculum.⁴

Thus, “ultimate” in this instance refers not merely to high-end technology for teachers and students but, more important, to technology that is “a seamless component of the curriculum.”

When laptop computers first came onto the market, they were the only portable computer profile available. New profiles have now emerged, such as the less costly netbooks, or mini-laptops. Handheld devices, such as smartphones and Apple’s iPod Touch (and its new big brother, the iPad), which have been considered largely personal devices, are merging with the traditional computer category as these devices come loaded with ever more computer-like applications (or apps).

In today’s technologically rich classrooms, the computer also has moved up front, supplanting the once ubiquitous chalkboard (which first gave way to no-dust whiteboards) with interactive whiteboards, or IWBs. The IWB technology upscales the computer display and concomitant functionality to classroom size. These devices allow for a wealth of applications, from projecting traditional screen content—documents, websites, images, PowerPoint presentations—to student-produced media, such as mock senate hearings and local news broadcasts. Imagine students sitting in front of a blue screen to present a report to which the students’ own visuals have been added as a backdrop. The resulting program might be shown to their class on the IWB or through a network of linked laptops. This classroom-based program—live or recorded—also need not be confined to the originating classroom or even to that school; it can be shared across town or across national borders, for example, by using **Skype**, the UK-based Internet communication (phone/video-phone) service.

This example brings introduces the other base of the educational technology triangle: the Internet.

The Internet

The World Wide Web, almost everyone would agree, offers a trove of treasures for teaching and learning. However, some educators, parents, and policy makers also view it as a Pandora’s box.

There is no doubt that the Internet has become the go-to resource for many people, whether it’s personal use (finding out what’s showing at the local movie theater or whether to take a raincoat) or work- or study-related. For example, where prior generations of students would have first consulted a multiple-volume print encyclopedia to start their research on a given topic, today’s students go online. Many go first to the most popular digital encyclopedia, **Wikipedia**, where they can access free content on almost any imaginable subject and, if desired, in several languages.

Some traditional print encyclopedias—for example, **Encyclopedia Britannica**—also have moved online, but their content usually is not free, which can be a limiting factor. However, the free content of Wikipedia also can be problematic because this resource is “openly editable,” meaning that anyone can contribute material. While the Wikipedia providers attempt to exert some control over content quality, there is no question that at least some reference material must be verified, rather than taken at face value.

This example raises a central issue in the educational use of the Internet, which is identifying valid, reliable, authoritative content and disregarding or, in some cases, blocking content that is incorrect or potentially harmful. Part of this issue naturally falls to teachers, who must take on the challenge of teaching students to be critical consumers—an extension of the traditional responsibility for teaching students to be critical consumers of newspapers, television programs, advertising, and so on.

Another part of this issue has become the purview of policy makers, namely, ensuring (or attempting to ensure) that students are not exposed to the seamier side of the Internet. An example of this exercise at the federal level was passage in 2000 of the **Children’s Internet Protection Act (CIPA)**, which constrains schools and libraries to certify (in order to receive certain types of funding) that they have set in place technological measures, for example, to “block or filter Internet access to pictures that are: (a) obscene, (b) child pornography, or (c) harmful to minors (for computers that are accessed by minors).”⁵

Both the policy ramifications of integrating the Internet into teaching and learning and the vast array of resources are fodder for future articles in this series. But the bottom line is that the Internet has affected and will continue to affect how students learn, both in school and on their own. This fact has raised another issue, that of the Internet and other digital media displacing (detrimentally, by inference) traditional forms of studying.

A Kaiser Family Foundation research report, titled *Generation M: Media in the Lives of 8-18 Year Olds*, looked at comprehensive statistics for young people’s use of various media, including the Internet, and concluded that there was “no evidence for a displacement effect.”⁶ Indeed, this study noted that the displacement question dates back to the advent of television in the 1950s, and researchers have consistently failed to find a significant effect. The *Generation M* researchers suggested, “The results raise a red flag against too easily concluding that time spent with media is synonymous with time taken from other activities.”⁷

Of course, such research has not quelled controversy. The British *Telegraph*, for instance, reported with some hyperbole in February 2010 that the Internet “encourages users to dart between pages instead of concentrating on one source such as a book.” Consequently, the writers contended, “This new ‘associative’ thinking leaves the majority incapable of ‘linear’ disciplines like reading and writing at length because their minds have been remoulded to function differently.” The article went on to say that “within three years, hundreds of thousands of British teenagers will require medication or hospital treatment for mental illnesses caused by excessive web use, psychologists warn.”⁸

The consequences of Internet use are not likely to be so dire, but articles such as this one in the *Telegraph* illustrate the ongoing controversy surrounding technological media of all sorts used in education.

Personal Devices

Finally, the third and most controversial component of the educational technology triangle comprises personal devices. The most prominent among these devices are cell phones and their higher-tech cousins, smartphones. It’s worth singling out these devices for two reasons: 1) they are virtually ubiquitous and 2) they have potential for increasing student engagement in active learning in a variety of ways. (The second article in this series will focus on using phones for teaching and learning.)

The original *Generation M* study published in 2005 found that 39 percent of eight- to eighteen-year-olds had personal cell phones; among high-schoolers the percentage rose to 56.⁹ By a subsequent study, *Generation M²*, published in 2010, the overall percentage had risen to 66, and among high-schoolers 85 percent had cell phones.¹⁰ As the authors of the 2010 study put it: “Today, the image of a teenager with a cell phone glued

Student Project Idea

Ask students to survey their classmates to determine how many students use various types of technological devices such as:

- home computer
- laptop or netbook
- iPod Touch, iPhone, or iPad
- cell phone or smartphone
- digital camera

to her fingertips—either texting away furiously, listening to music, playing games, or watching videos—has become almost iconic.”¹¹

Some schools have capitalized on the pervasive presence of cell phones by using them for educational purposes. For example, at Chester Middle School in the Hudson Valley principal Ernie Jackson challenged reading and social studies teacher Mel Wesenberg to find ways to teach poetry by cell phone. As a result, students who “used their cell phones to boil down the main points of the stanzas got 80 percent of the questions about the poem correct on a state test.”¹² By contrast, students taught the same material in the traditional way scored only 40 percent correct. As Chester School District technology director Ryan Reed put it, “The thing is, it’s here, it’s evolving, and you have to accept that”—and he has been rewriting the district’s three-year technology plan accordingly.¹³

But while some schools are recognizing the educational potential of using such personal devices for teaching and learning, many others are still fighting to keep them out of education. For example, the school board in Broward County, Florida, voted in April 2010 to ban students from using cell phones for calling or texting during the school day. According to the news report, “The ban includes students’ lunch break and passing times between classes, although students can use their phones to search the Internet or listen to music at those times.”¹⁴

These examples barely touch on the complex issues inherent not merely in incorporating cell phones into curriculum and instruction but in negotiating which types of personal technology merit inclusion in teaching and learning and how best to manage their use.

Triangulation

Fitting together various forms of technology from the three categories is a challenge aptly termed *triangulation*. But it holds enormous potential for ramping up teaching and learning in new, engaging, exciting ways for both students and teachers.

Imagine, for example, an instructional unit in which students explore their home community, incorporating elements of language arts, social studies, art, and science. One group of students might look into history and geography, searching the Internet for articles about their community’s development over time and exploring its geographical layout using **Google Maps** or **Google Earth**. Another group might interview longtime residents using portable audio-video recorders and produce a documentary by using computer software, such as **iMovie**, and then sharing their program by uploading it to YouTube’s education-oriented clone, **SchoolTube**. Yet another group might document the community’s historic architecture or environmental features, such as parks and green space, using digital or cell phone cameras and then incorporating their photographs in a **PowerPoint** presentation, complete with a narration based on their own script. The imaginable possibilities for bringing together the components of the educational technology triangle are unlimited, but their realization may be constrained by other factors, such as policy and availability of certain forms of technology.

In the articles that follow, the main focus will be on possibilities, many of which can be achieved, challenges notwithstanding.

Questions to Ponder

What forms of technology would enhance student engagement and active learning in your school or classroom? If such technology is not yet available, how might you work toward acquiring it?

If your principal challenged you to teach something using cell phone technology, could you do it? What factors would facilitate meeting this challenge? What obstacles might get in the way?

Online Resource Notes

URLs for items shown in **bold** are as follows:

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“A Vision of K-12 Students Today,” written and produced by B. Nesbitt, on YouTube at http://www.youtube.com/watch?v=_A-ZVCjfWf8. Also on SchoolTube at <http://www.schooltube.com/video/fa0b3c89cb0a49ada518/A-Vision-for-k12-Learners-Today>.

Page 3

Skype at <http://www.skype.com/>.
Wikipedia at <http://www.wikipedia.org/>.
Encyclopedia Britannica at <http://www.britannica.com/>.

Page 4

Children’s Internet Protection Act at <http://www.fcc.gov/cgb/consumerfacts/cipa.html>.

Page 5

Google Maps at <http://maps.google.com/>.
Google Earth at <http://earth.google.com/>.
iMovie at <http://www.apple.com/ilife/imovie/>.
SchoolTube at <http://www.schooltube.com/>.
PowerPoint at <http://office.microsoft.com/en-us/powerpoint/default.aspx>.



ABOUT THE AUTHOR: Donovan R. Walling is a longtime teacher, administrator, curriculum specialist, and education publisher, who has worked in schools in the United States and abroad. For thirteen years he directed the book publishing operations of Phi Delta Kappa International.

He is a frequent contributor to the education literature. His most recent book is titled *Writing for Understanding: Strategies to Increase Content Learning* (Corwin Press) (<http://www.corwin.com/booksProdDesc.nav?prodId=Book232389&>). He also writes two blogs: Arts in View (<http://artsinview.blogspot.com/>) and Writing Tips for Teachers (<http://writingtips4teachers.blogspot.com/>).

¹ Mitzuko Ito and colleagues. (2008). *Living and learning with new media: Summary findings from the digital youth project*. Cambridge, Mass.: MIT Press, p. 4. <http://digitalyouth.ischool.berkeley.edu/files/report/digitalyouth-WhitePaper.pdf>.

² Matthew DeBell and Chris Chapman. (2006). *Computer and Internet use by students in 2003: Statistical analysis report*. Washington, D.C.: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. <http://nces.ed.gov/pubs2006/2006065.pdf>.

³ Blair Thompson. (2008, April). Characteristics of parent-teacher e-mail communication. *Communication Education* 57:201-223. See the National Communication Association website at <http://www.natcom.org/index.asp>.

⁴ Janet Trombley. (2006). *Project Laptop: Achieving equity and access to technology in a public high school*. Integrating productivity tools in primary and secondary education. (Horizon website). <http://horizon.unc.edu/projects/monograph/K12/edited/Trombley.html>.

⁵ *Children’s Internet Protection Act*. (2009, September 22). Washington, D.C.: Federal Communication Commission. <http://www.fcc.gov/cgb/consumerfacts/cipa.html>.

⁶ Donald F. Roberts, Ulla G. Foehr, and Victoria Rideout. (2005, March). *Generation M: Media in the lives of 8-18 year-olds*. Menlo Park, Calif.: Henry J. Kaiser Family Foundation, p. 52. <http://www.kff.org/entmedia/entmedia030905pkg.cfm>.

⁷ Ibid., p. 51.

⁸ Student brains ‘rewired’ by the Internet. (2010, February 11). *Telegraph.com.uk*.
<http://www.telegraph.co.uk/technology/news/7205852/Students-brains-rewired-by-the-internet.html>.

⁹ Donald F. Roberts et al. *Generation M.*, p. 13.

¹⁰ Victoria J. Rideout, Ulla G. Foehr, and Donald F. Roberts. (2010, January). *Generation M²: Media in the lives of 8- to 18-year-olds*. Menlo Park, Calif.: Henry J. Kaiser Family Foundation, p.18. <http://www.kff.org/entmedia/8010.cfm>.

¹¹ Ibid.

¹² John Sullivan. (2010, April 26). Texting poetry inspires kids to learn. *Times Herald-Record/recordonline.com*.
<http://www.recordonline.com/apps/pbcs.dll/article?AID=/20100426/NEWS/100429736>.

¹³ Ibid.

¹⁴ Dylan Brooks. (2010, April 21). Broward continues cell phone ban in schools. *CBS4/South Florida News*.
<http://cbs4.com/local/schools.broward.broward.2.1647271.html>.