The purpose of this article—the first in a series—is to suggest an initial framework for thinking in new ways about technology in education. I will explore this broad topic in detail as the series unfolds, hopefully giving readers ideas and strategies to enrich teaching and learning.

To begin, let’s cluster education technology into three categories: classroom devices, the Internet, and personal devices. These categories compose what I call a tech-savvy triangle. These elements are interconnected, but describing them individually may be a useful first step in thinking about how to make technology integral to curriculum and instruction.

The base of the triangle consists of classroom devices and the Internet. Increasingly, however, personal devices—whether they belong to students, teachers, or both—are becoming an important component of education, despite controversy about using personal devices in schools.

Today’s young people have been called the “YouTube Generation” and the “Net Generation” for good reason. They are not only wired (or wireless) but also adept at digitally cocooning when left, literally, to their own devices. This generation is defined by its use of technology, something that educators 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 actor (Ito et al, 2008).

Classroom Devices

“Devices” include hardware and the software to run them. The most prevalent device is a computer. It’s rare not to find at least one computer in any given classroom, from rural to inner city. Usually it is equipped at minimum for word-processing, recordkeeping, and email. The increasing use of email for communication within a school or district and between teachers and parents makes this function particularly significant. In fact, using email increases communication between teachers and parents, according to researcher Blair Thompson (2008) at Western Kentucky University. His research suggests that five topics predominate: students’ grades, scheduling issues, health problems, student behavior, and student socialization. But such email use has no direct effect on instruction.

Using the computer to construct lesson components is a step toward teaching and learning mediated by technology. However, simply using a computer to make traditional quizzes, tests, and worksheets does not represent a substantive change from the days when teachers ran off these paper-and-pencil components on
computer display and its functionality to classroom size. These devices allow 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 are added as a backdrop. The resulting program might be shown to their class on the IWB or through a network of wifi-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) service.

The Internet

Almost everyone would agree that the Internet, the second element in the base of our tech-savvy triangle, offers a trove of treasures for teaching and learning. However, some educators, parents, and policy makers also view it as a Pandora’s box.

The Web has become the go-to resource for many people, whether it's for personal use (finding out what's showing at the movies or whether to take a raincoat) or for working or studying. Prior generations of students would have consulted a multiple-volume print encyclopedia to start researching a given topic, but today's students go online. The most popular digital encyclopedia is Wikipedia, where users can access free content on almost any imaginable subject (the Internet itself, for instance) 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 teach students to be critical consumers—an extension of their traditional responsibility for teaching students to be critical consumers of news, advertising, and so on.

Another part of this issue falls to policy makers, namely, ensuring (or attempting to ensure) that students are not exposed to the seamiest side of the Internet. An example of federal policy is the 2000 Children's Internet Protection Act (CIPA), which constrains schools and libraries to certify (in order to receive certain types of funding) that they have in place technological measures 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),” (2009).

Both the policy ramifications of integrating the Internet into teaching and learning and the vast array of available Internet resources are fodder for future articles in this series. But the bottom line is that the Internet has profoundly affected and will continue to affect teaching and learning.

**Personal Devices**

The third and most controversial element of the tech-savvy triangle comprises personal devices. Most prominent 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 many ways.

The 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 (Roberts, Fochr, & Rideout, 2005). By the subsequent study, Generation M², published in 2010, the overall percentage had risen to 66, and among high-schoolers 85 percent had cell phones (Rideout, Fochr, & Roberts, 2010). As the authors of the 2010 study put it: “Today, the image of a teenager with a cell phone glued to her fingertips—either texting away furiously, listening to music, playing games, or watching videos—has become almost iconic,” (Rideout, Fochr, & Roberts, 2010).

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 83 percent of the questions about the poem correct on a state test.”1 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 (Sullivan, 2010).

Some schools are recognizing the educational potential of using such personal devices for teaching and learning. But others are still fighting to keep them out. 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 a 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” (Brooks, 2010).

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

**Working the Triangle**

Integrating various forms of technology from the three categories in the tech-savvy triangle is a challenge. 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 possibilities for bringing together the components of the tech-savvy triangle are unlimited, but their realization may be tempered by other factors, such as policy constraints and the availability of certain forms of technology. In the articles that follow, the focus will be on possibilities—many of which can be achieved, challenges notwithstanding.

Questions to Ponder

The following questions are largely rhetorical—questions to generate ideas ... or other questions:

- 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? Would policy changes be necessary?
- 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?

Future Topics

To keep these articles relevant, I invite readers to suggest topics or questions that might be addressed as the series unfolds. Please email them to me at donovanwalling@yahoo.com. I can't provide individual responses, but I'll be happy to consider all ideas for future articles.