

# Techtalk: Cloud Computing and Developmental Education

By Douglas R. Holschuh and David C. Caverly

Techtalk in Volume 33 has been addressing the digital divide in technology, first through the use of mobile phones and then through the development of digital literacies with digital storytelling. This third and final column in the series looks at bridging both the hardware/software divide and the digital literacies divide through the educational use of cloud computing.

## The Advent of Cloud Computing

The history of personal computing could be summed up as a race to provide larger and larger amounts of data storage that can be manipulated at faster and faster speeds in smaller and smaller devices. Over the years, data has moved from floppy disks to hard drives to USB thumb drives and most recently to solid-state RAM drives. Likewise, computers downsized from the desktop to the laptop and even smaller with netbooks like the HP Mini and tablet computers like the new Apple iPad. This idea has had a strong impact in changing the way users work, play, and socialize.

Concurrently, the computer network that used to link only college campuses, businesses, and government agencies began to spread as well, and it eventually made its way to individual computers. Personal computers began to connect to this larger network, the Internet, through wired connections like phone modems and cable modems and then through wireless connections, which facilitated the move to smaller, more mobile computers. Over the past decade and a half, these personal machines, with their local data storage and processing power, have merged with the Internet, and a computer infrastructure was created where it is often difficult to discern where the individual computer ends and the network begins.

Both of these ideas, shrinking computing devices and increasing network access, have converged in recent years to bring us handheld mobile devices like iPhones, smartphones, and tablet computers that connect to the Internet over always-on cellular connections. Now the network really is everywhere, or at least everywhere there is a cell-phone signal.

Cloud computing is the natural extension of this always-on connection, and it posits a view of computing in which all data and all the applications to create and manipulate that data exist in the “cloud”; that is, on the Internet in various online services. If you are putting your photos on Flickr ([www.flickr.com](http://www.flickr.com)), writing documents using Google Docs ([docs.google.com](http://docs.google.com)), posting your thoughts to a blog, collaborating with coworkers in a wiki, socializing with Facebook ([www.facebook.com](http://www.facebook.com)), or tweeting from your phone using Twitter ([www.twitter.com](http://www.twitter.com)), you are already using the cloud (although true cloud computing would see all computing, not just some, occurring in this manner).

To access the cloud, all that is needed is an Internet connection and a way to view the Internet, most likely a web browser or other “app” that connects to the Internet. With cloud computing, it no longer matters what local hardware (laptop, desktop, smartphone, netbook) or what operating system (Windows, Mac OS X, Linux) is being used. It is a view of computing that supersedes any past battle in the personal computing world, whether that battle was Windows versus Macs, Netscape versus Microsoft, or proprietary software versus open-source software. With cloud comput-

ing, none of these divisions matter; data and applications are available everywhere. As John Gage at Sun Microsystems said years ago, “The network is the computer” (PCWorld, 2009). The choice of how to access that network is up to the individual.

## Implications of Cloud Computing

So, what does this mean for developmental students and educators? The first, and perhaps most important, element when addressing issues inherent to the digital divide is lowered costs, both for software and hardware. Why pay for Microsoft Office when you can use the free, web-based office suites offered by Google or Zoho ([www.zoho.com](http://www.zoho.com)) or even Microsoft itself (which will begin offering a browser-based version of their Office applications with the release of Office 2010)? If all you need to do is resize a photo, why pay for Adobe Photoshop, when you can use Adobe’s Photoshop Online ([www.photoshop.com](http://www.photoshop.com))? Why use Endnote when you can keep track of references in Zotero ([www.zotero.org](http://www.zotero.org)) a free plug-in for the Firefox browser that works with both Microsoft Office and the free, open-source OpenOffice ([www.openoffice.org](http://www.openoffice.org))?

Additionally, it is not just applications that are being offered for free, but data storage as well. With cloud computing, instead of saving everything to large local hard drives, faculty and students can instead save everything they create in these services to the services themselves. Presentations created in Zoho can be stored in your account directly on Zoho’s web site, photos uploaded from cameras can be stored directly on photo-sharing services like Flickr or Smugmug ([www.smugmug.com](http://www.smugmug.com)). Because the applications and the data are stored on the web, they can be accessed with far smaller and often far cheaper devices than ever before. A netbook—a small, inexpensive (from \$250 to \$500), low-powered laptop with limited storage capacities—is just as useful as the fastest desktop computer. Even a smartphone can be powerful enough to access many of these cloud services. In fact, data can be seamlessly shared between any number of devices without the hassle of transferring the documents from one device to another. From the office, from a campus computer lab, from a coffee shop, or from a park, the latest version of a document or project is always online and always available.

This constant availability also lends itself to the sharing of both documents and document creation over the Internet. If several students are collaborating to coedit a document (Caverly & Ward, 2008), they can do that by all logging into Google Docs and working on the same document instead of passing a Word file over a USB drive or email. Wikis, such as PBworks ([www.pbworks.com](http://www.pbworks.com)), Wikispaces ([www.wikispaces.com](http://www.wikispaces.com)), or the one built into most campus learning management systems, are another powerful tool for coediting documents, allowing multiple users to edit the same documents while keeping the latest version (as well as a chronology of revisions) on the web at all times. These web applications eliminate the need for faculty and students to have specific software to edit the document (and the hassle of converting from one file format to another). The only software everyone needs is a free web browser like Firefox, Safari, or Internet Explorer.

## Potential Drawbacks to Cloud Computing

Of course, no technology is without its negatives, and with cloud computing perhaps the greatest drawback is the very real possibility that students and faculty will not be able to be online everywhere and at all times. The network is close to ubiquitous, but holes exist, more so as you leave major metropolitan areas and college campuses. Even if the Internet is available, there is always the possibility of a service being down, and large companies like Google (Raphael, 2009) and Facebook (McCarthy, 2009a) have had major outages in the past year, leaving users of their services

without access for short periods of time. There is also the danger that one of these services will lose data, although it is far more likely that an individual computer user will lose data than, say, Google, with their multiple servers and consistent backups.

There are also security, privacy, and ownership issues when it comes to using an online service, and it is important to know how the service provider will both protect and use customer data. For example, Google targets Gmail users with advertising based on the content of their e-mails. They are not actually reading these e-mails, but Google does aggregate the data to help provide the ads that allow them to offer the service for free (Google, 2010). Ownership of uploaded data can also be an issue (i.e., do online service providers own your data in any way?), and large services like Facebook have struggled to devise good content-rights terms for the data posted to their service (McCarthy, 2009b). If students or faculty are to use any of these services for their personal use or, more importantly, for campus use, it is essential to know how these issues will be handled.


### Conclusion

Cloud computing offers many possibilities to developmental educators for its use, whether for communicating with students through social networking services like Facebook, sending out updates via Twitter, providing online tutoring, or having students collaborate on their writing using a wiki. Many students are already well versed in this world of online applications, and they are already using them to create and store their data. The more educators can leverage this to their advantage, the better. In addition, it opens up a world of low-cost computing to a larger socioeconomic

population of students. Cloud computing may really be computing for the masses, offering the very latest in technology while leveling the playing field more than ever before.

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