A "Cloudy" Forecast for Educational Technology

Leading & Learning
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- I am writing this article without the aid of a word processor.
- I am using several computers in several locations to write this article without using a flash drive to move the file.
- I will share this article with the editors of *Leading & Learning* without sending it as an e-mail attachment.
- I will save my electronic draft in place where even if my laptop is lost, the external hard drive where I keep my back ups fails, and the next version of *Office* decides not to open earlier file formats, I will have access to the content.
- And I am able to do all of these things at no cost.

Anyone who has used *GoogleDocs*, a set of online productivity tools that allows the creation of documents, spreadsheets, presentations and surveys, has experienced *cloud computing*. While still in its early stages of adoption by schools, cloud computing is a trend to watch since it has the potential of offering staff and students better services at a lower cost than current technology deployment models.

What is cloud computing and what are its advantages?
Cloud computing relies on applications and file storage that reside on a network – either a local area network, a district intranet or on the Internet itself with minimal resources stored on the local computer's hard drive. (A cloud graphic is often used to represent the Internet on network diagrams, hence the name.) Terms associated with cloud computing include virtualization, ASP (Application Service Provider) and SaaS (Software as a Service.) If you have ever stored a file online, edited a photo with an online tool, or used a web-based e-mail program, you have already experienced cloud computing.

There are several real advantages to cloud computing. Since both applications and one's files reside on a network rather than on a specific computer, one can work on any project, anywhere regardless of the computer being used. Given a computer with Internet access - whether it is on one's desk at school, on one's lap at home, in any computer lab or coffee shop in the world, or at Grandpa's house - one can work without worrying about transporting files on flashdrives, keeping track of the latest version of a document, or having the right software to open a file. Files are easily shared and collaboratively edited in a cloud-base application as well.

Unlike most software that resides on computer hard drives, web-based applications that perform a wide-array of productivity tasks are provided at no cost to the user. While not as comprehensive as *Microsoft Office* or *Adobe Photoshop*, these tools often have a surprisingly full feature set and are compatible with commercial programs.

Cloud computing requires less powerful computers such as netbooks (see below). A school district's computing costs can be lowered using these inexpensive computers just to access the cloud. The netbooks are inexpensive, file storage is free, and basic applications are free. Money that would have been spent on student workstations in labs, big file servers, and expensive software can now be used to pay for increased bandwidth, greater wireless coverage or, maybe, just maybe, lower class sizes.

1:1 student to computer plans are more feasible using cloud computing. With a low cost netbook and the cloud, student computers are virtually interchangeable, so if a device needs repair or is left at home, another machine can be easily substituted. The only applications needed on a netbook are a full-fledged web browser and anti-virus and spyware programs. At some point, I predict that K-12 schools will ask parents to provide basic computing devices for their children as a part of the school supply list. As a parent, I was asked to purchase a $100 graphing calculator for my son when he was in high school six years ago. How big a stretch is it

to ask parents to provide a $250 netbook computer today?

As Cara Ereben in *eSchool News* writes:

… cloud computing is efficient, automated, and delivers standardized resources--all of which can result in significant cost savings. Several U.S. colleges, universities, and K-12 school districts are already reaping the benefits of switching to a cloud-computing model.

Netbooks and how to they maximize the use of cloud-based computing.

As a technology director, my long standing complaint has been that there isn't a computer available that's just right for kids and schools - inexpensive, reliable, light-weight, and easily maintained with long battery life and high degree of functionality. But that device may finally be here. Or maybe I should say, that species of device might be here: the netbook.

A "netbook" according to Wikipedia is:

… a category of small-sized, low-cost, light weight, lean function subnotebooks optimized for Internet access and core computing functions (e.g., word processing) — either directly from applications installed on the netbook itself or indirectly, via cloud computing.

In late 2008, eight of the ten best selling computers on Amazon were "netbooks." Popular models are currently available from Dell, HP, Asus, Intel, Workhorse, and Acer. More models from more manufactures are on the horizon. Most netbooks share these characteristics:

- Light weight – 2-4 pounds.
- Small screen – 7-10 inches.
- Static memory or a small hard drive.
- Somewhat smaller than full-sized keyboard.
- Wireless Internet connectivity.
- Web-cam, microphone, and speaker.
- USB ports and memory card slot.
- Price of less than $400.

Netbooks run WindowsXP or some flavor of the open-source operating system Linux. They often come bundled with an open-source productivity suite like *OpenOffice* and an open-source web browser like *Firefox*.

While these devices do allow students to work offline writing papers, using spreadsheets and designing slideshow presentations, they are designed to be used in a "cloud computing" environment with the bulk of the work done online.

Since both student work and applications are stored online, a single image with a basic operating system configuration makes the machines interchangeable.

How can teachers take advantage of cloud-based computing today?

Before advocating for cloud computing for my staff and students, I decided to see if I could "live in the cloud" as a computer user myself for the past few months. My personal move hasn't been all that difficult, even for a geezer like me. These are my top computer uses and how I have moved my tasks to the cloud:

1. **Netbook**. Rather than using a full scale laptop computer, I've been using a 10" ASUS 1000HA laptop that cost about $350. The smaller keyboard and screen size took some getting accustomed too, but I can work on the computer for long periods of time. The speed is acceptable, the battery life is good and the wireless connectivity is fast.
2. **E-mail.** Both my school Exchange and my personal Gmail accounts already have robust online e-mail clients. My biggest challenge has been moving all my saved e-mail from my hard drive-based Entourage/Outlook client to my online Gmail account and then tagging all that old e-mail so I can find it again. (I have a folder mind, not a tag mind, I'm afraid.)

3. **Web searching and bookmarking.** I already have a delicious.com account so I'd just imported the bookmarks I'd saved in my browser.
4. **Word processing, presentation creation and spreadsheet use.** After years of using *Office*, the move to *GoogleDocs* for my day-to-day productivity has been surprisingly easy. In fact, getting away from *Office*'s "feature creep" has been refreshing. While *Docs* is fine for writing short pieces, it's not practical for writing a book. (But how many of your students will be writing books?) The presentation program lacks animation, transitions, and in-program image editing. But for 95% of my work and for storing my files, *GoogleDocs* works just fine, thank you. The work I create is compatible with *Office* as well.
5. **Photo storage and editing.** I've been storing my best photographs on a commercial storage site for years and editing them with *Photoshop Elements*. But *Flickr* and *Picasa* are online applications that work just fine for this amateur's editing and storage needs. *Picasa* gives *iPhoto* a run for its money as a photo organizer. And *Picnik* allows me even more photo editing abilities.
6. **Web page editing and webmastering.** My personal blog, wiki, and website are already completely managed via an application service providers who use online tools for management and editing. As does our school website. As do the professional association websites I help manage - Kiwanis, our lakes association, and our state library/tech association.
7. **School specific tasks.** All gradebooks, reporting systems, and communications in our district are web-based, as are our accounting and other management systems. Period.

As cloud computing gains maturity and acceptance, our district is looking at finding an appropriate "enterprise" solution that will provide a common set of tools and storage to all staff and students. While it is certainly possible now for each individual to obtain access to the tools I've been using, as an organization we need to have some standardization. Google Apps Education Edition <http://www.google.com/a/help/intl/en/edu/index.html> and Microsoft's live@edu <http://get.liveatedu.com/> are such enterprise systems and they are both being provided to K-12 schools at no cost.

Challenges of cloud-based computing.
So what is the down-side of this approach to providing computer resources to oneself and one's staff and students? Why shouldn't everyone fly to the cloud right now? There are some questions that need serious consideration:

- **What happens when there is no Internet access?** GoogleMail and GoogleDocs can now be used off-line in conjunction with GoogleGears - a browser applet. Work off-line and your documents will be synced when the next Internet connection is made. Bandwidth limitations may be challenge for some districts with a small pipe to the Internet.
- **Am I abetting Google's/Microsoft's world domination? Might there someday be a charge for these now "free" services someday?** Definitely on world domination question. Just accept it and get over it. If you feel uncomfortable using Google or Microsoft, there are alternatives like Zoho. The sustainability of the revenue model is anybody's guess. Profits now come from advertisements and selling more fully-featured versions of applications or larger storage spaces.
- **Are my files secure?** This is probably the deal-breaker for many skeptics of this trend. As a devout belt-and-suspender kind of guy, I'd encourage local backup copies of all important files be kept of online documents. But Jeffrey Kaplan in *CIO* writes: "Although service disruptions experienced by Google ... get plenty of attention, those types of incidents don't happen very often, and they don't last as long as many enterprise outages. And there hasn't been a major compromise of a SaaS operation reported yet, even as we continue to read regular accounts of security breaches in traditional IT environments."
- **Are my files private?** Can we trust Google and others not to peek at our stuff? This is another major concern. But in an online seminar by Google on their Google Apps

Education Edition, a slide read:

- *Google does not own your data*
- *Google does not share your data*
- *Keep your data as long as you want*
- *Remove your data when you ask*
- *Enable you to take your data elsewhere*

I would certainly study the privacy settings of any online program I use - who gets access to what is getting more granular all the time. My own insurance against problems associated with unwarranted data access is living a completely sin-free life. But I know that won't work for everyone.

- **Are there some things just too cumbersome to do online?** I recognize that if I were editing video, I'd need a full blown computer. I can't play or make CDs or DVDs. Any big data crunching/data processing tasks will still need big computing power. Cloud computing is not for every computing need.

The future of netbooks and cloud-based computing.
It's a good time to consider the impact of cloud computing and netbooks on our classrooms, libraries, and school systems. With such a low (and dropping) cost, I'd bet dollars to doughnuts that even in these tough economic times, quite a number of students will be getting their hands on netbooks.

Now is the time to consider:

- Does your school have a policy about student owned devices? (Parents will not allow a simple ban on them, anymore than they allowed schools to ban cell phones.)
- Does your school have the reliable, adequate and secure wireless infrastructure to support dozens, if not hundreds, of student-owned netbooks?
- Will your teachers have the training, resources and strategies to use netbooks to improve student learning?
- Is your district exploring cloud-based enterprise solutions like Google Apps Education Edition or Microsoft's live@edu?
- What happens when students not only don't need schools to provide them with computers, but with Internet access either? As students gain access to EDVO - broadband wireless Internet access carried on cellphone signals and privately purchased - may make schools irrelevant in any part of providing access to computing functionality.

I believe the term being used is "disruptive technology." Google it. But remember - every cloud does have a silver lining!

Resources:

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