

Open Technologies in Education

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In today's global marketplace, the explosive growth of digital communication has fostered new opportunities for world-wide collaboration. Modern email, file sharing, instant messaging, and web sites provide the means by which a new generation of “e-citizens” connect, share, work, learn, and grow. This “digital lifestyle,” in which sharing of everything from media, to content, to code is free and easy, and where e-citizens simply “expect” everything to be connected, has spawned another revolution in the software industry: open-technologies.

Open technologies are fast revolutionizing the way we think, work, and live. “Open,” in this context, means that these technology resources, and the means by which they are created and/or used, are provided to the user with complete documentation, and are relatively free of restrictions on their use, modification, and redistribution. The open, well-documented nature of these resources typically generates a collaborative development environment, in which developers and users from all over the globe work together to solve problems, meet needs, and enhance solutions to levels of functionality that were simply unthinkable a decade ago.

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Our students today not only understand the idea of collaboration, but have come to accept, even expect it as the way the world functions. Because of today's technologies, the typical social and geographic barriers to global interaction that may have been an issue a decade ago have never really existed in their lifetime. They are not simply using such technologies as the web, email, instant messaging, video conferencing, and cell phones, but, having grown up alongside them, have integrated them into their daily lives. This natural tendency toward collaboration, enabled by technology, has had a profound affect on the way today's students think, study, learn, and create, and consequently makes it quite natural for them to embrace the concept of open technologies.

Unfortunately, the use of open technologies in K-12 education has not caught on as well in the United States as it has in other countries. Fear, uncertainty, and doubt run rampant in the office of today's K-12 technology decision maker, often driven by the marketing efforts of those whose profits are based on a proprietary, licensed business model. Increasingly, though, school technology leaders are beginning to weigh the hefty license fees associated with operating systems, software applications, and instructional content currently in use against a growing number of open alternatives, and are choosing to invest in open technologies.

What are “Open Technologies”

Open technologies are typically divided into three categories: open source software, open standards, and open content libraries.

The most widely known open source software today is “Linux,” or the Linux operating system. This is something of a misnomer, as what we often refer to as simply “Linux” is, in fact, a large combination of open source software and applications, packaged together into what is referred to as a “distribution,” and delivered to the user as a neat and tidy package (on CD or for download.) These distributions typically include such applications as productivity suites (ie word processor, spreadsheet, and presentation software,) graphics, internet, and networking software, in addition to the operating system itself.

Nearly all of the software applications included with a Linux distribution are available independently of it, for installation on a variety of operating systems, including Microsoft's Windows and Apple's Mac OS. Each of these tools are fully functional, free alternatives to much of the expensive, proprietary software we install on desktop computers today. Some widely used open source software applications include Mozilla Firefox, OpenOffice, and the GIMP (or Gnu Image Manipulation Program.)

Open standards are clearly defined and publicly distributed protocols and processes for using and communicating with particular software applications. These standards allow that application to freely interoperate with other applications, regardless of their designer. A common example of this is the Internet Message Access Protocol, or IMAP. Every modern email server is capable of communicating using the open IMAP standard, which means that you can use email software created by anyone to access your email. Microsoft Outlook, Apple Mail, Mozilla Thunderbird, Novell Evolution, Eudora, and many others all speak IMAP, and all interoperate quickly and easily with any IMAP compatible server. Most of the open standards that we use today are largely the result of the collaborative efforts of the open source software movement, in which interoperability is key.

In the education space, the Schools Interoperability Framework (SIF) is the premier example of an open standard. This protocol framework essentially defines the standard means by which student and teacher data moves between applications, and establishes an interoperability between those applications that would be otherwise impossible. The implication of open standards is that without their establishment, there would be no incentive for software vendors to build interoperability into their products. SIF is an excellent example of educators working together to drive technology creation and create functionality that would not have come to exist had it been left to vendors to create.

The third category of open technologies is open content. The most widely used collection of open content is Wikimedia (www.wikimedia.org), an online collection of free resources, divided into eight categories (at the time of this writing.) These include an encyclopedia, dictionary, books, images, and several other collections. The total collection is truly astounding, especially when you consider that it was developed entirely by volunteers and public contributors. Additionally, collections such as the New York Public Library's Digital Gallery (digitalgallery.nypl.org/nypldigital/), with over 415,000 images, further legitimizes open content as a viable, effective information resource.

Common Barriers to Open Technology Adoption

There are a number of concerns that will inevitably surface when considering the use of open technologies. As with any software implementation, careful planning and analysis are key to a successful outcome. Even though open technologies are free, or nearly free to acquire, there can be significant training and support costs associated with implementing them which must be carefully considered. A common mistake is to consider these costs in the short term, rather than to amortize them out over a three to five year period. When long term costs are considered, open-technologies are often far less expensive than their proprietary counterparts. Total cost of ownership (or TCO) is a moving target, which must be evaluated individually by an organization, according to their specific needs and wants.

Support is typically the most significant concern for K-12 technology decision makers. On the surface, open technologies might appear to be largely unsupported. In fact, technical support options are plentiful and widely available across the range of open-source projects - and many are free. The collaborative nature of open-source solutions lend themselves to the establishment of “communities of support,” which can be obtained through online knowledgebases, independent technical support forums, and direct contact with the actual development team. If a more clearly defined, single point support program is required, several paid support programs are available from companies such as Red Hat and Novell. Consider both free and paid options with each technology deployment, and compare them to your current use of technical support.

In regard to open content, there has been a great deal of discussion recently centered around resources such as Wikipedia, with the primary concern being the lack of editorial oversight and academic rigor. While, to a certain degree, this may be true, recent academic reviews and content studies would suggest that content quality is, in fact, better and more thorough than works which are subject to such oversight. Perhaps more importantly, resources such as this offer us the opportunity to teach such skills as critical thinking and responsible research to our students.

Conclusion

Open technologies represent an opportunity for educators to meet students with the resources and tools they need to succeed in today's global marketplace. With technology budgets continuing to shrink, and our students' technology demands continuing to rise, America's schools must look for alternatives to proprietary, closed source software and content models, and work together to build the resources necessary to train and encourage our students into the 21st century. Why give our students just a few expensive tools to work with - when we can offer them the world!

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Open technologies at the Saugus Union School District

The Saugus Union School District is one of the most aggressive open-source adopters in education technology today. With open-source projects ranging from basic applications to IT infrastructure, SUSD has truly done it all. One of our more high profile projects took place in 2004, when we implemented a migration of nearly every server and system (52 in all) from Novell NetWare to Linux and open-source solutions.

So what would motivate such a move? While most would assume cost savings, in our case the primary motivator was flexibility (although cost certainly played a significant role in the decision making process.) Our Novell NetWare systems were beginning to show their age, as vendor support throughout the industry was clearly waning (arguably, for several years,) and we had determined that it was time for a change. We were evaluating our options when Novell announced its move to Linux and open-source. In a way, this helped to legitimize the platform for us, which inspired us to evaluate open-source as a serious option. When our analysis was complete, it was quite clear that Linux and open-source solutions were the most secure, flexible, scalable, high-performance, and cost-effective tools available.

Of course, making such a move is challenging, regardless of the platform to which one chooses to move. There are costs associated, regardless of the actual acquisition cost of the software, and these must all be considered before any work is done. Perhaps the most important of these is training. In our case, we had to first determine the roles of each member of our staff in the migration and support process, locate the appropriate training and certification programs, and invest our time and money in them.

Where to get help (ie support) is another important factor. With open-source solutions, the support paradigm is completely different from that of the traditional, proprietary model. This is something that must be learned and experienced to be utilized effectively. Luckily for those of us in education, the community model meshes very nicely with the way most of us think and work.

When the project was complete (and we had a moment to catch our breath - we did it all in about four weeks,) we were extraordinarily pleased (and sometimes, surprised) with the outcome. Our systems were faster than ever, even on the oldest hardware. We were able to support our teachers, staff, and students more effectively. Our technology was more flexible and capable than ever before, and we were able to "turn on a dime" when a new opportunity or idea came along. And, as with many others in the open-source community, we were able to smile when that latest security vulnerability surfaced, knowing that it wouldn't affect our systems.

Moving forward, we are ever looking into new ways that open-source can help us do what we need to do more efficiently and effectively. On the support front, we are now using a free, open-source solution called VNC (for Virtual Network Computing) on all of our workstations. This enables us to remote control any Windows, Macintosh, or Linux workstation and provide technical support, from any location in the district. We are using Ethereal on our servers and workstations to capture and analyze network traffic. And we are using an application called KixTart to distribute and install software on end user workstations, without human intervention.

Another boon for the district has been open-source desktop software. We really like the OpenCD, which includes a variety of free/open-source applications in an easy to install format, including productivity, education, and entertainment software. We now use (and recommend) OpenOffice on our workstations, which includes word processing, database, spreadsheet, presentation, and drawing software - all compatible with Microsoft file formats. This not only saves us more than \$50 per workstation in licensing fees, but allows us to give the software to our students and staff to take home. Students can now use EXACTLY the same software at home as they do at school, so we no longer have version compatibility issues, etc. with files that are transported between the two.

A final area that we have been investing in is web applications. At present, we use a variety of open source tools, including online web forums for teachers and students, streaming video servers for sharing student produced videos with the community, an easy web site builder for the teachers and staff, and other applications. Our latest initiative is a web-based social networking site, which will allow our teachers and staff to securely communicate and share with each other and the community, using such hot technologies as blogging, podcasting, shared files, etc. We are evangelizing the site pretty heavily, encouraging teachers to share ideas and content, build our library of instructional resources, and ultimately to grow as educators. If we can harness the kind of fervor that Myspace generates within our (adult) community using this tool, we think we'll have a big hit on our hands.

None of this would be possible without open-source software and solutions. We simply could not afford to buy all of the functionality we now enjoy. Even if we could, I am convinced that a bevy of proprietary, non-integrated solutions would not work as well, or integrate as seamlessly as what we are using now. Now imagine all this, and an extra \$50,000 per year in license fee savings, and just think what you could do...

For additional information on SUSD technology, visit <http://www.saugus.k12.ca.us>