Special Edition

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Open Source Software Means More Choices

While politicians and chief information officers debate the issues, technology leaders are contemplating the possibilities of less expensive, more flexible, stable, and secure software. Educators across the region are beginning to question what advantages open source software might afford them.

Already, many K–12 districts are gaining benefits from open source operating systems like Linux and applications like Apache and OpenOffice.org. But even advocates agree: open source software is not "magic pixie dust." Every school is unique and decisionmakers need to sort the reality from the rhetoric.

NETC's Open Options Project was created to research this vast new frontier and give educators the tools and other resources necessary to make decisions about open source software. The Open Options Web site (www.netc.org/openoptions) includes survey data and interviews with early adopters, as well as the cautionary arguments born out of the firsthand experiences of advocates and foes. The following are highlights from the Open Options Project research on open source software.

What Is Open Source Software?

Open source software is any computer program with the source code openly accessible to the user. When source code is openly accessible, anyone is legally free and technically able to use, change, and/or redistribute the software without cost. Proprietary software, on the other hand, which is used by most schools, is licensed to users for a fee. It is illegal to change or make copies of proprietary software like Microsoft Windows, File Maker Pro, and Adobe Photoshop.

Originally, all software was open source. Computer companies made money by selling hardware and service. But, beginning in the late 1970s, companies such as Microsoft and Sun based their profits on proprietary software licenses, which are structured like patents. The creator/inventors are rewarded for their ingenuity with exclusive rights to change or sell the software.

Why Open Source Now?

Technically savvy users have found the proprietary model increasingly limiting. Programmers, wanting the freedom to modify the applications they use and to share software, in much the same way that they might modify their car engine and share their new design, started creating open source alternatives to proprietary software. Programmer Linus Torvalds created Linux, a powerful operating system compatible with proprietary UNIX, that is now marketed as an alternative to Microsoft Windows. The table on Page 2 shows some common proprietary programs and their open source alternatives.

Clearly, the open source community is trying to create alternatives for popular purposes. Some open source activists are very idealistic, urging people to discard all proprietary software. Most are more pragmatic in how they create and use software. For instance, it is not necessary to run the operating system Linux to use open source programs like Mozilla, OpenOffice.org, and GIMP. Mozilla and OpenOffice.org, as well as GIMP and Apache, are available in versions for Microsoft Windows and Apple Macintosh.

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Many early adopters in education gradually switched to open source, starting with one or two programs on a trial basis. Perhaps they installed Mozilla on a few student machines, or used Apache for a non-critical Web server. They say that they continue to integrate open source software because it is better and it is free.

Is Open Source Software Really Free?

It is true that open source software can usually be downloaded or copied for free and that users can install it on as many computers as needed, without worrying about license management or audits. However, it is also true, as with any software, that the sale price is only a part of the cost. The Total Cost of Ownership (TCO) also includes hardware and software upgrades, maintenance and technical support, and training. Open source may offer a lower TCO when the money saved on the cost of the software offsets the cost of training.

Of course, proprietary software companies claim their TCO is lower, while open source software companies argue the opposite. Both sides have studies and other evidence to support their positions. Unfortunately, it is not easy to verify whose TCO is really lower. Successful corporate clients like Merrill Lynch and Amazon.com claim huge savings in TCO by using open source software. But the key players in the software industry, like Sun Microsystems and Hewlett Packard, continue to sell and support both proprietary and open source software.

Is Open Source Really Better?

A major advantage of open source software is its transparency that allows anyone to "look inside" to find and correct errors and vulnerabilities. As a consequence, the open source community strives for reliability and security, quickly finding and fixing bugs, and managing security risks. Also, because transparency makes the standards and formats open to everyone, it is easier to share information between different programs. Transparency promotes "modularity" in the design of software, so that the user picks and chooses the modules that satisfy the needs of the application. The worth of open source software programs is measured by their quality, not their brand name. For example, there are currently two major competing, comparable graphical desktop environments, KDE and GNOME, running under Linux.

Transparency and modularity create a market in which buyers do not have to choose the same vendor for sales, service, and support. Since vendors cannot "lock in" customers, they have to succeed through their quality of service, support, and responsive leadership. Meanwhile, national governments from Germany to China are considering open source, for its TCO, transparency, and other possible advantages.

Open source software developers recognize that migration from proprietary systems can be difficult, so open source products are designed to work with existing proprietary software. OpenOffice.org can open and save files in Word, Excel, and PowerPoint formats. Soon, there may be open source alternatives to Microsoft Outlook.

Purpose	Proprietary Software	Open Source Software
Operating system	Microsoft Windows	Linux
Web browser	Internet Explorer	Mozilla
Office suite	Microsoft Office	OpenOffice.org
Image editor	Adobe Photoshop	GIMP
Web server	Microsoft IIS	Apache

Anyone can collaborate and contribute to open source software. Schools can participate in mainstream open source projects or develop software for their own needs. In Oregon, a classroom teacher wanted to create a school-friendly version of mainstream Red Hat Linux. He worked with a programmer from his local ESD to create the K12 Linux Terminal Server Project (K12LTSP), which is now used in dozens of schools. Red Hat, Inc., and the local Linux users group support the K12LTSP project.

Some advantages of open source may prove irrelevant to schools that do not happen to have a software expert in the building. But through deliberate, sensible experimentation many schools may find the open source model attractive.

Pros and Cons of Open Source for Educators

Why educators like open source

- Cost
- Escape from license management, audits
- Peer support and collaboration
- Security
- Flexibility
- Reliability
- Re-allocating older equipment
- Using donated/recycled equipment
- Challenge and ownership of problems

Possible roadblocks

- Unfamiliarity, fear, or lack of experience
- Training or re-training costs
- Integration with existing technology can be difficult
- Certain applications or "killer apps" aren't open source
- Comfort of using name brands
- Inertia or resistance to change
- Migration problems

What Are the Advantages to Educators?

Open source software may offer less expensive, more reliable access, which is essential for integrating technology into teaching practice. Already, the open source community has a thriving subpopulation of educators and volunteers eager to help schools with their adoption and adaptation. These part-time programmers, and frequently the open source vendors who understand the financial constraints that schools must work through, offer support and technical assistance to ease the process.

Using open source, schools can provide quality software for less money that does not require newer, more expensive computers to run it. Schools can install or upgrade software systems without costly licenses. When combined with a hardware donation and recycling program, open source software may create the possibility of technology for schools that would be unable to afford it otherwise. Open source may also mean access for all students, even outside school, since the software may be installed on innumerable computers. Source code accessibility and software portability is of particular benefit to computer science students.

Open source is becoming a rapidly growing alternative to proprietary software, especially at the back end on networks and servers. In fact, open source Apache is the dominant Web server software. Because of its prevalence, open source should become part of career-related learning in computer science and technology courses.

What Are the Drawbacks for Schools?

Open source software may be more difficult to install. Because of the wide variety in PC hardware, greater skill may be required to configure the open source operating system and software. If improperly installed and configured, software like Linux can give users too much access to critical components. It would then be easier for a student to "break" the software accidentally or to bypass security measures. These drawbacks are not unique to open source software but companies like Microsoft and Apple have had more time and resources to make their software safer and more secure for a wider range of user expertise. In fact, these established software companies argue that sales of proprietary software drive innovation and ensure better products in the future.

Troubleshooting or upgrading open source software may involve Web research or consultation with more experienced users. Ultimately the open source solution may require less money but take much more time, effort, and communication. Also, many of the curriculum-oriented software applications currently in use in K–12 classrooms will only run under Windows or MAC OS. Schools may simply prefer the relative simplicity of buying proprietary solutions.

Do These Vendors Just Give Away Their Software?

Some people find the open source business model perplexing. Companies like Microsoft and Hewlett Packard have prospered by selling proprietary software, so how can an open source software company profit by giving away its intellectual property?

When Netscape decided to "open source" its Navigator Web browser, technology leaders looked to Eric Raymond to understand this new model. Raymond's famous essay, "The Cathedral and the Bazaar," describes open source as "a collaborative bazaar" where everyone can help improve and distribute the software. He believes that innovative open source programmers are rewarded for their work with fame and better jobs, while open source vendors profit through their service and technical support contracts. Some people even prefer to pay for open source software to get the increased ease of use and reliability of the product sold by vendors. Anyone can download Red Hat Linux for free, but many users prefer to buy the inexpensive CD-ROMs to

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Glossary

Free Software: Similar to open source software, with one significant difference: you can do anything you want with it, except sell it.

K12LTSP: K12 Linux Terminal Server Project: An open source operating system created for schools by Eric Harrison and Paul Nelson.

Linux: The most popular open source program is this operating system created by Linus Torvalds.

Open Source Software: A computer program with accessible source code, which anyone legally and technically can change and/or redistribute for free.

Operating System: Essential software to control a computer; e.g. Microsoft Windows, Macintosh OS, Linux.

Proprietary Software: A program that is illegal to change and/or redistribute, also called closed source software.

Spyware: A hidden piece of software that spies on the user or steals information.

UNIX: A powerful class of operating systems. Linux is UNIX-compatible.

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get the higher quality service and support that Red Hat provides its paying customers.

Open source permits vendors of proprietary systems to use the freely available code in closed source products. Apple Computer builds its premium operating system, Macintosh OS X, on open source Darwin. AOL/Netscape uses open source Mozilla to create Netscape. Sun gives away its open source OpenOffice.org, but sells a more robust version as StarOffice.

Dozens of open source software vendors have already carved out their niche by targeting specific vertical markets with customized versions of Linux. Buyers in particular industries with specific application needs can buy reliable packaged open source products. More and more proprietary applications now run under Linux and there are thousands of free open source programs that have been written to run under Microsoft and Apple operating systems. As more users choose Linux, more software will be created or ported.

Summary

Open source software is growing in popularity as a maturing alternative to costly licenses and vendor lock-in. With experienced oversight, open source software may be less expensive and more stable, secure, and specialized. However, schools should carefully weigh all the advantages and disadvantages based on where they want to spend time and money.

For tools, resources, and the results of our survey of open source users across the country, visit NETC's Web site, "Open Options: Making Decisions About Open Source Software for K–12" at www.netc.org/openoptions. ■

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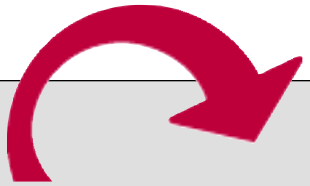

About Open Options

Open Options is an independent research project serving K–12 educators. We're not advocating for open source software. Our goal is to provide pragmatic information and decisionmaking tools.

We want to honor educators' efforts to meet their stakeholders' needs—with or without open source. We don't try to duplicate other resources for technical implementation.

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Northwest Educational Technology Consortium
101 SW Main Street, Suite 500
Portland, Oregon 97204
Telephone: 503.275.9500, Ext. 658
Toll Free Message Line: 800.211.9435
Fax: 503.275.0449
E-mail: netc@nwrel.org
NETC Web site: www.netc.org

NETC Director: Dr. Seymour Hanfling
Editor-in-Chief: Basha Krasnoff
Contributing Writers and Editors: Kym Buchanan, Kirk deFord, Gary Graves, Don Holznagel, Judy Van Scoter
Copy Editor: Eugenia Cooper Potter
Desktop Publisher: Paula Surmann

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