

IBM White Paper: The Power of Open Source and the Open Approach in K-12

Executive Summary

Open source technologies are part of a movement profoundly revolutionizing the way technology is done, known as the *open approach*. The open approach encompasses *open source, open standards, and open architecture*. This movement promises to transform technology delivery in K-12 education, and to free up resources and funds for a stronger focus on services and applications that support educational objectives.

Open source software is software licensed and distributed under agreements that provide for its source computer code to remain in the public domain. Open standards are publicly available specifications for performing a specific task. Open architecture is a type of computer architecture that allows users to upgrade their hardware in all of the computer's components. Together, these three are a powerful combination.

K-12 schools often feel "locked in," but they should be able to choose the most effective combination of available software that will deliver the best long-term business value at a fair price. The open approach helps enable this flexibility.

IBM is championing the open approach by contributing source computer code; open standards specifications; intellectual property, and energy to forging alliances. It is supporting partners to develop applications that can help schools on both the server side and at the end-user level. Its endeavors range from e-Portfolio, an IBM-enabled open source application for education, to an initiative that will allow royalty-free access to IBM's portfolio of some 45,000 patents for software developers who are seeking to create new education applications around open standards.

In sum, the open approach – open source, open standards, and open architecture – will be instrumental in the next generation of applications for student learning and for the efficient management of schools that will fully support achievement.

Open source is reshaping the delivery of technology

Open source is no longer something that is known or understood by only a small number of geeks. Open source technologies are part of a movement profoundly revolutionizing the way technology is done, known as the ***open approach***. This movement promises to transform the delivery of software and services in K-12.

Currently, K-12 schools often feel “locked in,” due to limited software options, expensive licensing fees, and upgrades that are costly in time and money. Instead of relying on a single technology platform or a few proprietary software vendors, K-12 schools and their counterparts in higher education should be able to choose the best combination of available software – open or closed, locally or remotely hosted – that will offer the best long-term business value at a fair price.

Follow the open approach!

IBM is a champion of the open approach and strongly recommends that K-12 school decision makers and technology planners embrace it. The open approach encompasses open source, open standards, and open architecture, which are a powerful combination. This approach is not simply about technologies – it’s about new ways of communicating, collaborating, and exchanging information. Ultimately, it creates the flexibility to choose different pieces of your technology delivery that will suit your needs and budget, not some predetermined set of components. Let’s examine the distinct meanings of these three terms – ***open source, open standards, and open architecture.***

Open source software refers to software licensed and distributed under certain agreements that provide for its source computer code to remain in the public domain – as opposed to a private company that keeps it secret. This allows the freedom to redistribute, test, and modify it. Any redistribution must be in accordance with its license agreement. This allows it to be continually tested, debugged, and improved by a community of developers and volunteers. Examples of open source solutions that have widespread use are the MySQL database, the Linux operating system, and the Moodle course-management system.

Open standards are publicly available specifications for performing a specific task. By allowing others to obtain and implement the standards, the compatibility between

Applications work together smoothly

various software and hardware components can be increased. Currently, many schools remain “data-rich and information-poor” because systems such as student information, Title I, and special education do not communicate with each other. Open standards will go a long way toward solving this challenge.

Open architecture is a type of computer architecture that allows users to upgrade their hardware in all of the computer’s components. This is in contrast to closed architecture where the computer manufacturer chooses all of the hardware components.

How IBM supports the open approach

In advocating the *open approach* – open standards, open source software, and open architectures – IBM is a strong ally in building this movement within the software industry, within the education community, and with business partners. IBM is contributing source computer code; open standards specifications; intellectual property, and the company’s reputation. Also, IBM is helping to form and to support new open source communities and to build alliances amongst trading partners that will advance the open approach.

New solutions, from the server side to the desktop

The open source movement will have an impact on all layers of K-12 technology, from the back end of school IT infrastructure to end-user desktops and learning systems. For one, an increasing number of schools are using servers that run on the Linux operating system, the most widely known open source application. Schools that are employing Linux report a learning curve but are satisfied with its reliability and cost savings, according to the Consortium for School Networking (COSN). The emergence of Linux as a dependable, viable operating system brought recognition to the open source community. It was IBM’s endorsement that helped create credibility for Linux.

The second layer is the user desktop. A number of schools can already see an immediate significant savings at the client workstation level by employing an open-source computer vs. the desktop computer with proprietary software. Many classroom and office applications that perform all of the usual necessary tasks on a computer are available free, including apps for word processing, spreadsheets,

image processing, database programming, drawing software, etc. A prime example is Open Office, the open source office-applications suite.

Learning systems are the third major area for open source technologies that will include attendance systems, student information systems, transportation programs, and other tools and programs. It's also important to note that some applications are still only available in proprietary software, but open source has come a long way and its use is expanding exponentially.

Like the two prior disruptive technologies in computing and software, open source has both its plusses and its challenges.

The plusses and challenges of open source

The advantages include:

- Cost savings
- Stability and reliability
- Increased security
- No constant, forced software upgrades
- Access and rights to source computer code
- Access to a community of developers
- The fueling of innovation
- Flexibility of choice

The challenges include:

- Perceptions: Some fear that open source is somehow loosey-goosey, and do not know that it has been worked on, debugged, and tested by a committed community of developers
- Resistance: Some are resistant to trying new software
- Lack of personnel trained in some open source platforms and applications in K-12. But this is changing rapidly as IT staff take advantage of a plethora of free and low-cost training opportunities
- Creating an understanding that open source has costs associated with it, whether they are upfront investments in training, or those of upkeep and maintenance

The winners will be those who embrace an open approach

While there is a paradigm shift in the development of software and services, the changes will not happen overnight. And adoptions are slower coming in K-12 than in higher education. Many local school districts are getting into open source, for example, not as grand, sweeping policy decisions, but on an incremental basis, program by program, testing to determine if it's a better, more cost-effective option than a proprietary application and platform. One thing is certain: The winners will be those who prepare for the future and are willing to detach themselves from traditional practices and familiar software.

IBM believes that open source – when part of a holistic “open approach” and open IT standards – will help schools put a stronger focus on educational objectives.

Moreover, open source can help leverage money for technology more effectively. It saves money directly for licensing fees and some software, and funds can be reallocated in services. Open source often requires an investment for training and support. Much in resource guides, tutorials, technical guides, programs, and help is freely available, which will help recoup initial outlays.

Empowering choice in allocating resources

Consider the three legs of an application implementation: 1) hardware and infrastructure; 2) licensing and maintenance for applications, databases, application servers, and operating software; and 3) user support and training, data conversion, customization and integration, and managing the process of change. When open source aids schools in saving money and time in the first two legs, it can free up these important resources for the third, and critical, leg.

By this hybrid approach, schools examine their entire technology delivery and ask which learning alignment components make the most sense as candidates for open source. The approach: Using modular, interoperable, standards-based platforms, whether it's in server side or for end-user applications. A superintendent, in concert with the CIO and key decision makers, will be far more able to ask, “How do I target the budget I've got so that I can leverage it more into education?” A school may opt, for example, to do an open source data warehouse and its own portal that will cost far less than what a current proprietary system requires.

IBM is building alliances and creating the foundations for tomorrow's open source solutions

IBM is committed to open technologies through its contribution of intellectual property, participation in alliances, and its reputation. While these can entail generosity, they are a core component of IBM's business strategy. Making patents available, for example, allows people and institutions to use them – which ultimately both fosters innovation and frees up customers' resources for services such as those that IBM provides.

Following is a sampling of IBM open approach and open source initiatives in K-12:

***** Advancing Open Software Standards in Education**

IBM has unveiled an initiative that will permit royalty-free access to its portfolio of some 45,000 patents for software developers who are seeking to create new education applications around open standards. It has done the same in the health-care industry as well. IBM's effort is aimed at spurring interoperability between software systems, which could help schools better integrate student records, as one example.

The move will fuel greater collaboration and innovation. These include software standards built around web services, electronic forms, and open document formats, all of which could help bolster the efficiency in education and of management of school districts and educational institutions.

Standards-based applications could provide students in remote areas access to teachers, lesson repositories, and information resources currently beyond their reach. For example, IBM holds patents that use web services to link students and teachers anywhere globally based on the compatibility of their teaching and learning styles.

Tools to track educational progress and guide learning

***** Launch of rSmart OSP e-Portfolio, the First IBM-Enabled Open Source Application for Education**

Launched in August, ePortfolio is the product of an rSmart and IBM collaboration. It's used with IBM's scalable middleware, database, servers, and storage, and is an

electronic portfolio through which learners and instructors can track and store digital evidence of learning.

Building on the success of Linux as an open source operating system, IBM chose to work with rSmart in its initial entry into the world of open source application software. rSmart OSP ePortfolio is easy to install and can be readily integrated with other enterprise applications. Students, teachers, and administrators can use the tool. Administrators, for example, can employ the enterprise electronic portfolio system for data-driven decision making and reporting.

***Eclipse, a platform
for application
development***

****** Supporting the Establishment and Support of the Eclipse Platform for Open Source***

Eclipse is an open source environment for creating, integrating, and deploying application development tools. Customers developing software applications need a variety of increasingly complex tool sets for the full software-development life cycle, such as visual editors, browsers that present the information in meaningful ways, and automatic code completion, etc. Developers can be more productive when these tools work together seamlessly, and are helped in doing so by IDEs, or integrated development environments.

Eclipse was created as a common platform to integrate IDE-based products and facilitate their integration. Instead of competing with other Java-tool providers and each company creating its own framework, IBM released the code as open source in 2001. Along with other companies, it announced the formation of an open consortium, Eclipse.org, to manage the platform that was made available under the Common Public License that allows individuals to create derivative works with worldwide redistribution rights that are royalty-free.

Since 2004, Eclipse was reorganized as an independent, not-for-profit organization, the Eclipse Foundation. Today, the Eclipse Foundation has more than 50 member companies, and there have been millions of download requests for the Eclipse platform. This has resulted in savings for each company and ensures a consistent environment for open source development. This can bring about reduced costs for

everyone, as well as supporting collective innovation.

***** Consistent Support of Open Patents**

***Open source
developers and
innovators should
not fear
infringement***

Recently, the threat of litigation has been raised as a weapon against open source development efforts. This situation could worsen as more companies seek to obtain patents on nearly every aspect of software and threaten legal action. IBM is choosing to follow the open approach and go in the opposite direction, and hopefully, to convince others to join in. IBM's decision to provide certain patents to open source developers for use without fear of infringement is a key component of this open approach.

IBM's Vision of Open Source Aligned With and Supporting K-12 Schools

***IBM's vision aligns
with K-12 schools***

In an open source business model, the value is in software as a *service*, not in software as an *asset*. Open source has become the most wide-ranging, fastest-growing, and dynamic field of software development. But it is dependent upon the creation of new communities, new forms of participation, and new support structures. IBM has launched the Open Source Zone within developerWorks to assist developers from all sizes and types of organizations and institutions.

IBM understands that schools want to employ the best mix of software, open or proprietary, to transform learning and business processes. The needs of data-driven decision making and just-in-time individualized instruction demand this even more.

IBM believes that the open source movement is the start of the next major paradigm shift in the computer software industry. However, it's important to view the role of open source in the more holistic form of an open approach. Together, open source, open standards, and open architecture form a powerful combination for the creation of the next generation of applications for student learning and for the efficient management of schools that will fully support achievement.