

## Getting Open Source Software into Schools: Strategies and Challenges

by Gary Hepburn and Jan Buley

This article focuses on the sociopolitical aspects of implementing open source software (OSS) in schools. Supporters of such implementation make a compelling case for OSS based on the clear advantages it offers over commercial applications—advantages such as its low cost, its freedom from cumbersome usage restrictions, and its ethical value in promoting a more democratic form of technological practice (e.g., BECTA [2005](#); Hart [2003](#); Hepburn [2004](#), [2005](#); Open Options [2005](#); Tong [2004](#)). However, while these benefits make the transition from commercial software to OSS attractive, actually making the change is a complicated process. Below we will briefly describe some approaches that may be used when integrating software change; we will then indicate several sociopolitical factors that may act as barriers to such change and discuss how these barriers may be addressed in the decision-making process. Our intention is to provide suggestions for leadership and research to support schools as they consider moving to OSS-based computing environments.

### Implementing Open Source Software

A wide variety of OSS is available for download, most for little or no cost. OSS applications exist for a wide range of operating systems including commercial platforms such as Windows and the MacOS as well as [Linux](#), the nonproprietary flagship of OSS and a capable desktop alternative. Further, the comprehensive variety of functions afforded by OSS applications, which include everything from office suites to Web editors to graphic programs, is comparable to those afforded by commercial applications currently used in schools ( [Table 1](#)). The rapid growth of OSS development has thus reached such a point that the continued use of commercial applications can no longer be taken for granted as the best option for educational institutions; open source systems now offer such institutions much of the same technological benefits without the added licensing cost.

Schools can harness the potential of OSS, provided they carefully plan for its implementation. This planning should account for the time-consuming technical process of changing a school's computing environment as well as the sociopolitical challenges that accompany such a change. Before exploring these challenges, we will outline three approaches for introducing open source software into schools.

1. *Open Source Applications on Windows.* OSS counterparts can be installed in place of commercial software and successfully run on the existing commercial operating system, such as Windows or MacOS. This approach significantly reduces software costs and releases schools from commercial software restrictive licensing agreements that limit how the software may be used.
2. *Linux and Windows.* The Linux operating system can be installed on a school's computers alongside Windows (or the MacOS). The hard drive of the computer is divided, allowing space for both operating systems and their applications. When a user boots the computer, she or he may choose the OSS or commercial operating system to use. This approach saves little or no money since it still retains the existing commercial software. Further, this approach provides little motivation for users to try the less familiar OSS option.
3. *All Open Source.* The most technically straightforward way to introduce OSS is to replace all commercial operating systems and software with Linux and open source applications. In this rapid conversion to OSS, the [cost savings](#) are dramatic.

When selecting an approach to implement OSS, schools must consider the impact of the approach on the school's computer users as well as on the technical and training staff. Despite the financial and ethical reasons for immediately implementing an all open source computing environment, this approach requires dramatic change in user habits and support requirements. To avoid the stress of an immediate all open source approach, a gradual approach may be considered. One successful strategy can be to use the open source applications on Windows approach—alone or in combination with the Linux and Windows approach—as a first step towards eventually adopting the all open source approach as an endpoint. This intermediate stage would provide users more time to adapt to the new OSS environment; it would also provide technical and support staff more time to troubleshoot and configure new OSS packages and help users make the transition to OSS. This gradual process could make the final move to all open source relatively simple and stress-free.

## **What Is Stopping Us?**

To identify the pace of change appropriate for a school, educational leaders should also consider the sociopolitical barriers to changing the computing environment. In our work promoting OSS and supporting schools interested in using it, we have observed several factors that can be obstacles to its implementation. These sociopolitical barriers indicate areas in which more work needs to be done by leaders to help schools plan their transitions to OSS; they also represent areas in which researchers can focus and perhaps gain a richer understanding of the dynamics of change in educational technology. These factors are by no means mutually exclusive—they are strongly interrelated and all are likely to be relevant to almost any instance of OSS implementation.

### *Awareness of OSS*

One clear factor that continually arises in our discussions with inservice and preservice teachers, administrators, teacher educators, and sometimes even technology leaders is that few in the educational community are aware of what OSS is and the potential it holds for education. In fact, most educators have not heard of OSS and most of those who have only possess a vague notion of what it is. The problem with this lack of awareness is obvious: There is little possibility of significant adoption of OSS without a greater understanding of the technology. Educational leaders must become aware of the OSS option in order to initiate and facilitate any movement toward making this option available to teachers and students. Even when leaders do become more knowledgeable about the OSS option, teachers must also become familiar with the reasons for using OSS and the vast array of high quality software available so that they can be enthusiastic and confident supporters of its use in the classroom.

In this context, the role of educational researchers and scholars remains indispensable for promoting greater awareness of OSS and establishing practical precedents for its widespread adoption. A number of cases of successful OSS implementation and its associated benefits have been documented in professional newsletters, the popular press, and elsewhere (e.g., Canada's SchoolNet [2003](#); Cutter Project [n.d.](#); Gedda [2006](#); Leete [2006](#)). In turn, the recent report from Becta ([2005](#)) has taken a significant step forward by bringing together several OSS case studies and adopting a more rigorous research methodology to assess their results. Reports like these have the potential to convince educational leaders and others in the education system that there is a clear rationale for OSS, that there is a growing knowledge base of actual implementation efforts, and that OSS consequently needs to be considered as a viable option for institutions. The problem is that this vital information is often not reaching educators. Governments and educational researchers have to take up the role of collecting, analyzing, and disseminating the data so those who need to learn more about OSS can do so.

The role of researchers in turn may be understood as part of a three-tiered effort for improving OSS awareness in the educational community. Such research can make the case for OSS by identifying strategies for successful implementation. Educational leaders can then use this research in combination with preservice education to develop training programs for teachers. Finally, through inservice and preservice education,

teachers can become familiar with OSS in general as well as specific OSS applications that are the most useful for teaching and learning activities.

### *The Politics of Payment*

Perhaps the most compelling argument for implementing OSS is its potential to reduce a school's software costs drastically. This argument, however, can sometimes be less persuasive in schools where computing costs are distributed over three levels of school administration. In the schools we work with most directly, software costs are covered at the provincial level by the Department of Education, at the district level by the school board, and on the local level by the schools themselves. For example, the province may purchase site licenses that allow all the schools in the province to use particular commercial software packages; in turn, the school boards often choose to license other software packages for use in their schools; finally, individual schools may choose to license any additional software that they would like to have even though the province or board did not purchase these licenses. The net effect of this situation is that people working at any one of the three levels are not directly impacted and are often unaware of the full cost of purchasing software licenses. Although there is a great deal of money spent on software within the system, no one group feels the full burden of the expense.

To address the issue software costs carefully and thoroughly, all levels must understand the overall impact of expensive software and the benefit of reducing those costs. Studies like the one carried out by Becta (2005) promote such an awareness by taking into account the full costs of software licenses at the schools studied as well as other technology-related costs; in turn, such studies should be expanded in scope so that the cost savings of OSS can be assessed further at the systemic level as well as the local level of the individual institution. With appropriate dissemination, research in this vein can provide educators with all the rationale they need to begin exploring OSS. The dissemination of such research needs to be carried out broadly with a special emphasis on government leaders who are responsible for ensuring that public money is well spent. These leaders can ensure that research and reports find their way into the hands of those who need to see them. The cost savings that result from using more OSS within the system can impact more than just technology; this money can be directed toward other necessary programs and resources to enhance learning. Demonstrating such associated benefits in cost-benefit studies of OSS can also go a long way towards convincing key decision-makers to take steps towards implementation.

### *The Dynamics of Change in Schools*

Donald Murray (1989) argues that what is certain about teaching and schools is change; educational technology is no different. The complexity of these changes requires that they be approached on a system level. Unfortunately, the complicated environment between the various levels and the groups involved make systematic change difficult no matter how well justified it may be. Those of us who would like to see more OSS in schools need to appreciate this and be patient. It is helpful to think of OSS implementation as a gradual process rather than one that happens quickly.

Change at any level requires some degree of vulnerability, and supporters of OSS in schools must be prepared to address the vulnerability of groups at every level of the educational system. For example, school principals are sometimes worried about how their hardworking teachers will adapt to new software. Within the school system, a great deal of effort has been devoted to getting teachers ready to use educational technology in the classroom. Many principals are reluctant to make additional changes to the software since this may discourage teachers, regardless of whether those changes make sense in the big picture. Furthermore, principals sometimes worry about whether school boards would be willing or able to provide technical and training support if such changes are to be made. Concomitantly, those at the board or government levels may be hesitant to integrate changes that may not be readily adopted in schools. In our research we have discovered that teachers and administrators are often reluctant to be put in positions where they themselves are the questioners. Too often, particularly in the areas of technology, educators are afraid of the unknown and do not want to appear foolish in front of their peers and students (Lapp et al. 1998).

Making changes to a school's software stirs up such fears and we need to be cognizant of this. At the same time, we need to support risk taking and acknowledge the time investment required for educators to become familiar with a new software environment.

Insuring that groups at every level of the educational system understand why change is needed is a necessary first step. Once that is done, it is crucial to ensure that all groups are included in the process of planning, undertaking, and evaluating OSS implementation—through technology committees, for example—to ensure that their respective concerns continue to be addressed and that they remain fully invested in the process. Furthermore, instructors who have to bear the burden of such change must be encouraged and supported as they do so by such measures as the allotment of training time, expanded access to support staff, and formal recognition for their accomplishments. While some measures of faculty support could require expenditures that initially compromise the cost savings of OSS in the short term, such measures should be regarded as investments that will eventually be offset by the long-term savings afforded by the new technology. Finally, researchers will need to be involved in studying these strategies in order to determine their relative value in making the implementation process a smooth and successful one for all involved.

### *Understanding Software Choice as an Ethical Consideration*

Software is often seen as ethically neutral, a resource that is simply present rather than one that is the result of choices—choices that impact people within and beyond schools. However, many have argued for the adoption of OSS in schools on ethical grounds (Hart [2003](#); Hepburn [2004](#), [2005](#); Open Options [2005](#)). Claims that using OSS would strengthen the ethical positioning of schools emphasize OSS's role in promoting digital equity, eliminating commercial messages from school environments, and promoting the development of an educational commons. Because OSS is free or low cost and because open source licenses ensure that anyone has the right to use, redistribute, and modify the software freely (OSI [n.d.](#)), the way in which such software may be used makes it more democratic than commercial software. Scholarly leadership can be helpful in developing and promoting the idea that schools have an obligation to promote an egalitarian learning environment and in encouraging educational leaders to apply a critical perspective towards software to the same extent that they do towards other educational resources.

### *Technical Personnel*

Most school systems currently have a reasonable level of technical support. The personnel responsible for providing this support are crucial to keeping the software working well and ensuring that software changes go smoothly. Given that few educators and administrators are familiar with the technical details related to changing a school's software environment, the opinions of the technical support staff may have a great influence on decisions related to implementing OSS. However, because schools have been heavily dependent on commercial software, the support personnel may have limited experience with OSS. As a result of this inexperience, support staff may be somewhat reluctant to suggest or endorse a plan to use OSS as it may require considerable retraining. When considering the use of OSS software in schools, it is important to find technical support staff who are not only knowledgeable of the school's current hardware and software systems but who are also experienced in OSS and fully prepared to work with it. This may require continued training and/or making experience with OSS a qualification for new hires.

### **Conclusion**

Those of us familiar with OSS can see the clear benefits it holds for education. The dramatically lower cost of the software along with greater freedom in how it is used and how it is shared make it a valuable resource for schools. With OSS and its related know-how readily available, acquiring and installing OSS is the easy part. The real challenge is in helping educators, administrators, and technical support personnel realize the huge potential OSS holds for teaching and learning and in planning an appropriate implementation approach that addresses the sociopolitical barriers we discussed earlier. Future research on how to plan and implement

OSS in schools effectively will not only heighten awareness of OSS, but will hasten its adoption.

## References

- British Educational Communications and Technology Agency (BECTA). 2005. Open source software in schools: A study of the spectrum of use and related ICT infrastructure costs. Coventry, UK: BECTA.  
[http://www.becta.org.uk/corporate/publications/documents/BEC5606\\_Full\\_report18.pdf](http://www.becta.org.uk/corporate/publications/documents/BEC5606_Full_report18.pdf) (accessed August 26, 2006).
- Canada's SchoolNet. 2003. Considering changing your school's computer system to open source software? One school's conversion to Linux has been a complete success.  
[http://www.schoolnet.ca/today/article\\_2003-06.asp](http://www.schoolnet.ca/today/article_2003-06.asp) (accessed August 26, 2006).
- Cutter Project. n.d. Orwell High School case study.  
[http://www.cutterproject.co.uk/Casestudies/orwell\\_high\\_school\\_cutter\\_case\\_study.php](http://www.cutterproject.co.uk/Casestudies/orwell_high_school_cutter_case_study.php) (accessed August 26, 2006).
- Gedda, R. 2006. Sydney school teaches with Linux monopoly. *Computerworld*, March 21.  
<http://www.computerworld.com.au/index.php/id;407925021;fp;2;fpid;1> (accessed August 26, 2006).
- Hart, T. D. 2003. Open source in education. [http://portfolio.umaine.edu/~hartt/OS in Education.pdf](http://portfolio.umaine.edu/~hartt/OS_in_Education.pdf) (accessed August 26, 2006).
- Hepburn G. 2004. Seeking an educational commons: The promise of open source development models. *First Monday* 9 (8). [http://www.firstmonday.dk/ISSUES/issue9\\_8/hepburn/index.html](http://www.firstmonday.dk/ISSUES/issue9_8/hepburn/index.html) (accessed September 30, 2006).
- Hepburn, G. 2005. Open source software and schools: New opportunities and directions. *Canadian Journal of Learning and Technology* 31 (1). <http://www.cjlt.ca/content/vol31.1/hepburn.html> (accessed September 30, 2006).
- Lapp, D., J. Flood, and D. B. Martin. 1998. Teachers online: Using personal visual literacy skills to enhance professional teaching knowledge. *The Reading Teacher* 51:702-705.
- Leete, G. 2006. Switching art students to GNU/Linux. *NewsForge*, March 22.  
<http://business.newsforge.com/article.pl?sid=06/03/09/2238246> (accessed September 30, 2006).
- Murray, D. 1989. *Expecting the unexpected: Teaching myself—and others—to read and write*. Portsmouth, NH: Heinemann.
- Newman, J. 1991. *Interwoven conversations: Learning and teaching through critical reflection*. Portsmouth, NH: Heinemann.
- Open Options. 2005. Making decisions about open source software for K-12.  
<http://www.netc.org/openoptions/> (accessed on September 30, 2006).
- Open Source Initiative. n.d. Open Source Initiative. <http://www.opensource.org/> (accessed September 30, 2006).
- Tong, T. W. 2004. Free/open source software: Education. New Delhi, India: Elsevier.  
<http://www.iosn.net/education/foss-education-primer/fossPrimer-Education.pdf> (accessed on September 30, 2006).

## COPYRIGHT AND CITATION INFORMATION FOR THIS ARTICLE

*This article may be reproduced and distributed for educational purposes if the following attribution is included in the document:*

**Note:** This article was originally published in *Innovate* (<http://www.innovateonline.info/>) as: Hepburn, G., and J. Buley. 2006. Getting Open Source Software into Schools: Strategies and Challenges. *Innovate* 3 (1). <http://www.innovateonline.info/index.php?view=article&id=323> (accessed April 24, 2008). The article is reprinted here with permission of the publisher, [The Fischler School of Education and Human Services](#) at [Nova Southeastern University](#).

*To find related articles, view the webcast, or comment publically on this article in the discussion forums, please go to <http://www.innovateonline.info/index.php?view=article&id=323> and select the appropriate function from the sidebar.*