

FREE/OPEN SOURCE ALTERNATIVE TO PROPRIETARY SOFTWARE IN EDUCATION

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Abstract

During the past decade the role of Information and Communication Technologies (ICT) in education worldwide constitutes an ever more decisive factor in the evolution of the educational process and educational models. To this end, the use of Personal Computers (PCs) running proprietary software is the most common solution. At the same time an increasingly growing trend towards Free/Open Source Software (FOSS) adoption by companies of the private sector as well as public organisations and educational institutions around the world is resulting to proprietary software going open source. Although the prime motivation for deploying FOSS in educational settings seems to be the reduction of costs associated with licensing and ownership of commercial products, several other advantages that arise from FOSS deployment may be of even greater benefit. This paper examines the rationale for using FOSS in education, especially at school level and discusses the possible benefits and problems of this alternative. It also reviews the current state as well as the trends concerning the adoption of FOSS in schools and proposes ways to promote its use.

Introduction

Information and Communication Technologies (ICTs) are used to accommodate or enhance the traditional in-class learning or for substituting it. The value of software as a means of enhancing the learning procedure has been widely recognized (Salinas, 2007; Taha, 2005). There exist many pedagogical aspects of software utilization. Among others, these include visualization of abstract notions, simulation of procedures, contribution in stimulating pupils and providing them with an environment to experiment (with no cost or danger).

The introduction of ICTs in the educational system has the potential to radically change the educational framework, by introducing new learning tools and methods such as learning platforms and personalized

learning (in terms of both content and method), self-review frameworks, learning motivation software, to name but a few. A current long-term goal of European Union's educational policy is to facilitate, through the widespread use of ICTs, a lifelong learning environment, which will enable all European citizens to choose the place, the method and the time to learn.

Many countries have altered the educational approach and have embedded ICTs in the teaching process. However, the fact that many teachers are ill educated in this field obstructs the further accumulation of this technology. Furthermore, ICTs require the support of technical personnel for being integrated in school labs. The high costs of fully equipped computer labs and educational software development hold back the procedure.

At the same time, computer software that is voluntarily developed and cost-free — known under the term Free/Open Source Software (FOSS) — is increasingly gaining attention. The fact that FOSS is constantly improving in terms of user friendliness, functionality and availability along with the prime motivation that it is available free of charge lead many individuals, organizations and companies to its deployment. Recently, the perspective of using FOSS in educational settings has attracted researchers' interest which resulted in ongoing discussions and studies concerning several aspects of the FOSS alternative in education (Shockey & Cabrera, 2005).

The next section of the paper describes FOSS in more detail. The section entitled FOSS in Education discusses the rationale for adopting FOSS in education, as well as the factors that inhibit this adoption. Finally, the last section of the paper proposes ways to promote the use of FOSS in schools.

Free/Open Source Software

Numerous debates have taken place over the definition of Free/Open Source Software (FOSS). The term “free software” was introduced by Richard Stallman back in 1983, when he started the Free Software campaign and created the GNU license (GNU Project, 2007). Since then, many other FOSS licenses have appeared in software that is

offered at no cost and is freely distributable (Open source vs. closed source, 2007). End users are permitted to use the software, change it, improve it according to their needs, deploy it or even sell it without spending for a commercial license. This has led to the adoption of FOSS by individuals, companies, organizations and public sector.

Awareness on the benefits of FOSS implementation in the public sector is growing among the government authorities of Europe from the beginning of the decade, as is implied by the growing adaptation of FOSS software. In 2001 26.9% of the servers were operating on FOSS, while the prediction for 2003 was 32.5%, the corresponding figures for desktops being 2.9% and 6.7% respectively (these include the education sector) (European Commission, 2001). In 2005 FOSS was used on 40% of the servers and 16% of desktops, while a clear potential for increasing usage was observed (European Commission, 2006). The European Commission, acknowledging the significance of FOSS usage and development issued, as of January 2007, the first FOSS license, called European Union Public License - EUPL¹ (<http://ec.europa.eu/idabc/en/document/6523>).

Despite this growing trend in FOSS adaptation, the education sector is still far from implementing FOSS on a wide scale. In mid 2006 it was estimated that less than one percent of the schools across Europe use FOSS more than they use proprietary software (Open Source Academy, 2006). This comes as no surprise, considering the fact that FOSS content is absent from the current curricula. Furthermore, most schools across Europe do not employ ad hoc specialists for the management of technology issues, but they rather use teachers for this task.

At the same time, a powerful lobby of proprietary software companies is allowed to intervene in the decision making process of the educational system, both at European and national level.

The financial benefits of implementing FOSS are widely acknowledged, though argued against by the proprietary software companies. Yet the decision-making authorities do not systematically utilize the conclusions reached towards the promotion of FOSS in education. The ongoing use

¹ Which, despite its being a step forward for the promotion of FOSS, was nevertheless met with skepticism by the open source community, regarding mostly its revoking process and its compliance with the GPL.

of continually upgraded software leads to the depreciation of the hardware equipment and locks the users in a budget-consuming circle: along with the software licensing fees much is spend on hardware renewal.

FOSS in Education

Many reasons contribute to the increasing interest of researchers in the perspective of adopting FOSS in education (Lin & Zini, 2006). The cost of the necessary educational software is negligible, as end users can obtain free copies of the software. They can download new versions of upgraded FOSS, minimizing the upgrade costs as well.

The process of developing FOSS ensures high quality software. An important number of developers modify FOSS, rapidly remove bugs, improve software and make it available to the public. The resulting software is more reliable and the whole community benefits. Furthermore, the sharing of ideas, theories, studies and research form the open philosophy of FOSS.

Moreover, the use of FOSS discourages software piracy and is an alternative to illegal copying. Using FOSS, a wider variety of software is made available to students. They can study and modify the source code and possibly produce innovative solutions.

Furthermore, FOSS is often superior to proprietary software in terms of security and performance (Wheeler, 2005).

Today's students will be tomorrow's ICT's users. The importance of educational software market leads the computer industry to outpull the market by promoting motivations, such as licensing proprietary software as FOSS and product discounts.

An effective strategy to implementing FOSS should encompass ways to address the various inhibiting factors posed in the current educational environment. These factors have been identified in numerous studies. Attwell (2005) refers to the "legal status of OSS in a number of countries and particularly in Germany", the insufficient support and documentation on OSS, as well as the need for developing strategies for

migration to FOSS. French (2003) stresses the importance of four factors: the vague understanding of FOSS from potential users, the false assumption that FOSS presupposes a steep learning curve, the educators' assumption that students should be taught the software that dominates the "real world" and the presence of powerful software industry lobbies, underlining that "the majority of forces mitigating the velocity at which schools adopt FOSS lie in false assumptions and misunderstanding."

ICT implementation in education is largely depended on state policies, which concern the role of ICTs in the educational process. The relative educational curricula are formed according to these policies. The absence of FOSS in these curricula can be attributed to many factors among which are the lack of consistent guidelines and experienced/well informed personnel, the absence of FOSS related courses in the training programs of IT staff, the underestimation of software "lock-in".

Current ICT schoolteachers have been trained in a system dominated by proprietary software. This fact, combined with the lack of incentives and technical support/training from the state, results in an educational environment where the same ICT pattern is replicated. Despite the fact that many teachers have the opportunity to use FOSS, this nevertheless depends completely upon their initiative and personal effort. And while some good results can be achieved on a laboratorial basis, it is much more difficult to implement the technology to other faculties at the same time. This would require a much more coordinated effort as well as training funding.

Promoting FOSS in Education — Conclusions

Promoting FOSS in education has many advantages. However, lots has to be done to reach this aim. Although FOSS in general has gained a large share of the market among individuals, enterprises and organizations, its penetration in education is very small. This section of the paper proposes ways to promote the use of FOSS in schools.

Integrating ICTs and especially FOSS in the school environment is not easy, since people must have technical expertise in the field. Most teachers do not. This complicates the task of deploying FOSS. Teachers

must obtain technical training and be proficient in using computers for advancing their instruction. They must realize the ways ICTs can help them and be aware of the numerous new capabilities they have for delivering knowledge. Considering ICTs in general and FOSS in particular, as another mean for teaching students and placing them among traditional ones, such as books and the blackboard, is the desirable goal of this endeavor. Seminars could help towards this direction. Teachers that have no experience in ICTs should get hands-on training in the specific FOSS they will need in their classes. Experienced teachers, with strong pedagogical, as well as technical background, should be used as the trainers of the former. This is the only way for introducing a new, more advanced spirit of teaching to technologically ineligible teachers, which constitute the majority of the educational community.

Obtaining technical training and the knowledge of how to employ it in the educational procedure, requires lifelong efforts. The pace to follow advances in ICTs and FOSS is tremendous. Establishing networks of knowledge in the field of educational FOSS is a handy utility for keeping teachers informed. An “Educational FOSS Network Of Knowledge” will attract teachers with interests in news about ICTs, advances in the area, new software and many more. They will share ideas and success stories and the initial enthusiasm of utilizing ICTs and FOSS in education will stay intact.

Employing ICTs and FOSS in schools requires the proper technical equipment. Computer labs should not be used just for teaching computer-related courses, but for applying ICTs (through FOSS) in the educational procedure of all courses. Classes should be equipped with at least one computer and projector (for the teacher) and some workstations for the students. The ultimate goal is to have one workstation per student. The One Laptop Per Child — OLPC project (see <http://www.laptop.org>) has set the standard: Every student should have an affordable laptop -probably donated by the government — which will be used as an educational instrument in school and in home.

Installations of computers in labs and classes must be handled by skilled personnel, hired in schools for this specific task. Applying ICTs in the daily school life means that technical problems (broken servers or

workstations, problems with connecting to the Internet, etc.) should be resolved as fast as possible. Installation of new FOSS and the administration of the labs should be performed in coordination with teachers, whose role should involve only the pedagogical effort.

Educational institutions can not adopt ICTs and FOSS without the involvement of the state. Guidelines for the implementation of FOSS in education must be set and enforced. The mandatory use of FOSS whenever possible could be one of them. Legal issues about the use, deployment, exploitation and development of FOSS must be clarified by the government. The production of high quality material (e.g., new educational FOSS) should be considered as important as having well written books.

Nevertheless, the role of volunteers, which are the essence of FOSS, should not be excluded. Utilization of volunteers must be welcomed and motivations should be offered. Their work and experience has created the FOSS movement and creating volunteers groups for educational FOSS will be a significant milestone in this effort.

References

- Attwell, G. (2005). What is the significance of Open Source Software for the education and training community? Proceedings of the *1st International Conference on Open Source Systems — OSS 2005* (pp. 353–358). Genoa, Italy.
- European Commission, DG Enterprise. (2001, June). *An IDA Study: Study into the use of open source software in the public sector, Part 2 — Use of Open Source in Europe*. <http://ec.europa.eu/idabc/servlets/Doc?id=1973>
- European Commission. (2006). Open source in the public sector in Europe — Usage and development. *Synergy*, 5. Retrieved March 26, 2007, from <http://europa.eu.int/idabc/servlets/Doc?id=23833>
- French, B. (2003). *Open source software in American public schools: Leveraging open source to reduce total cost of ownership and IT capital spending*. School of Information Management and Systems, UC Berkeley. Available at <http://66.102.1.104/scholar?hl=en&lr=&q=cache:-rB2b11p3gsJ:www.sims.berkeley.edu/~french/hwk/bill-french-is290-17+oss+schools>
- GNU Project. (2007, March 19). In *Wikipedia, The Free Encyclopedia*.

- Retrieved March 28, 2007, from
http://en.wikipedia.org/wiki/GNU_Project
- Lin, Y., & Zini, E. (2006). An empirical study on implementing FLOSS in schools. In J. Berleur, M. I. Nurminen, & J. Impagliazzo (Eds.) *7th Human Choice and Computers Conference*. Maribor, Slovenia.
- Open Source Academy. (2006, March). *News archive: Open Source Software (OSS) to increase its presence in schools*. Retrieved March 27, 2007, from
http://www.opensourceacademy.gov.uk/news_and_events/news/open-source-software-oss-to-increase-its-presence-in-schools
- Open source vs. closed source. (2007, March 26). In *Wikipedia, The Free Encyclopedia*. Retrieved March 28, 2007, from
http://en.wikipedia.org/wiki/Open_source_vs._closed_source
- Salinas, M. F. (in press). From Dewey to Gates: A model to integrate psychoeducational principles in the selection and use of instructional technology. *Computers & Education*.
- Shockey, K., & Cabrera, P. J. (2005). Using open source to enhance learning. In *Proceedings of the 6th International Conference on Information Technology Based Higher Education and Training - ITHET 2005* (pp. F2A-7 – F2A-12). IEEE Computer Society.
- Taha, A. T. (2005). Design and integration of low-cost technologies and software to create interactive learning and support environments which augment traditional learning. *Proceedings of the Fifth IEEE International Conference on Advanced Learning Technologies - ICAALT '05* (pp. 302–304). IEEE Computer Society.
- Wheeler, D. A. (2005, November). *Why Open Source software/Free software (OSS/FS)? Look at the numbers!* Retrieved March 28, 2007, from
http://www.dwheeler.com/oss_fs_why.html

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