

Educating Tux: case studies of Linux deployments in high schools around the world

By David M. Williams

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Linux has a lot to offer cash-strapped education departments. It's free, for one thing. It is naturally secure with distinctly non-privileged accounts and it is easily centrally administered. The experiences of schools that have gone this route are varied but generally positive. Let us investigate some and see what lessons there are.

Previously on ITWire we presented the remarkable tale of Strathcona Baptist Girls Grammar School. This school successfully implemented a large-scale Linux deployment across 350 workstations. The ability to spend on hardware was bolstered by a reduction in software and maintenance expenses as a direct consequence of switching to Linux (Red Hat, later Fedora). The school reported a distinct decrease in administration work, a large reduction in downtime and no virus problems. You would think it was a resounding win.

Yet, six years later the school reverted back to MS Windows. The reason for the change back was not technical nor was it financial. Instead the school's staff pressed for Windows due to their own familiarity with it. Tragically, the same people who claimed unfamiliarity with Linux were similarly lost in the new Windows world of Vista and Office 2007.

Strathcona is not unique in its experience as a school that has sought alternate operating systems and computing environments to tackle costs (and, dare we say, student mischief).

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Happily, their later experience of encountering pressure to revert is not as common. Here are some, and lessons that other schools – or indeed businesses – can learn.

One extremely positive experience came from the Lorien Novalis School in Glenhaven, Sydney. This school has 350 students and 38 staff covering K-12. Interestingly, the decision to migrate was proposed by senior students rather than a

decision formulated by faculty. The previous generation of Apple Macintoshes were due for replacement and the suggestion came to give Mandrake Linux a try.

There did not appear to be any initial strong impetus behind change beyond exploration but four years later the school weren't looking back and in particular were embracing the open source ideological mantra of software freedom. To their way of thinking, open source software had a great deal in common with school education, both being about cooperation and sharing knowledge.

One very helpful factor in the school's Linux experience has been lower hardware requirements, with two well used servers being the primary workhorses until finally in 2004 a new HP Proliant server was sourced. This said, the school were prepared to spend money to purchase Mandrake support and manuals and to reward and encourage the work of open source organisations.

One other matter which clearly influenced the success of the project was surprisingly in stark contrast to the conventional wisdom of tightly locking the standard desktop environment down. At Lorien Novalis students were encouraged to tinker.

Here, the students felt an ownership over their Linux lab and had a freedom to tinker, undoubtedly aiding adoption and acceptance. Although some legacy Windows and Macintosh computers remained, due to custom software needs, the school is working to migrate these to Linux and free and open source equivalents also.

Meanwhile, at the Greater Houlton Christian Academy in Maine the case for Linux was gripping. The school's budget was, as usual, tight and computing expenditure was limited.

The school had previously benefited from surrounding businesses donating hardware, but by 2001 these were reaching the end of their usable life. New computers had to be purchased but felt disgruntled by the Microsoft Windows OEM agreement which prevents licenses being transferred from one machine to another. The Academy knew it had to be honest and fulfil its licensing agreements, although there was also some fear of exposure to heavy fines should they be audited by the Business Software Alliance (BSA).

The disappointment at having to re-purchase operating systems licenses along with several other unstated "revelations" about vendor lock-in were sufficient to make the school look elsewhere. Previously, savvy staff had checked out Linux but didn't believe it was ready, at that time, for the desktop. By 2001/2002 it had moved on significantly and could be considered a viable option.

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During that period the school purchased new barebone machines and installed Mandrake Linux on each one as well as all the servers and the bulk of staff computers. A rich suite of open source applications that had relevance to education were installed. This even included a collection of classroom aids developed in-house in the Python programming language. This language is now even taught to the students.

Five years later, the Greater Houlton Christian Academy is as pleased as ever. They are continuing to use their exact same hardware but due to successive enhancements within Linux and a switch to Gentoo they believe they are seeing greater performance than they began with.

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One deciding factor in the successful adoption appears to be the in-house technical experience the school possesses, as well as their passion flowing into lessons. Along with basic programming the curriculum now includes elements of open source values. Accordingly, this enthusiasm has infected students with many regularly requesting Linux CDs so they can convert their own home computers.

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standard and were facing ever increasing costs to keep current.

Not only this, but the school found a great deal of its technician's time was taken up rebuilding or cleaning PCs where security had been breached (AKA where students had mucked around).

By 2004, the situation was critical. To upgrade to Windows XP would require replacing over 50 PCs just so the basic requirements were met. A capital expense of over 25,000 pounds was not viable and the school realised their software licensing costs exceeded 13,000 pounds per year. The Deputy Head recognised that the existing ways had to be changed if they were to make better use of school resources.

A local technology firm was engaged and they recommended a complete open source infrastructure. The requirements were relatively complex: four classrooms of about 30 workstations each, distributed printers, smaller clusters of workstations and wireless staff laptops all had to work seamlessly.

Orwell were concerned for teaching quality and evaluated OpenOffice, The GIMP and other applications, finding them to meet and exceed the standards they imposed. They also felt doubly impressed that these packages could be used at home by students without any concerns of licensing violations or burdening families with software costs.

The adopted solution was a thin client one, meaning the PCs boot across the network and run Linux Terminal Server software. By using terminal services the expenditure required on workstations was drastically slashed. By making the PCs thin clients their hard drives could be removed which in turn decreased noise, power consumption and another point of failure.

Two clustered application servers drive the terminal server environment, allowing students to log in from any workstation at all and yet be at their exact same customised and individualised desktop.

This thin client approach also ensured deployment time was absolutely minimal; in fact, Orwell record the whole installation as working within a week. Had they not switched to Linux, they say, they would have had to cut back their hardware and application software spending. Instead, software licensing is now no longer a factor whatsoever.

Duplicating the experience of the previous schools, students have willingly flocked to the new platform without any difficulty. Funding is being allocated to other needy programs without the computing environment suffering. And, so far, student attempts to break the network have not been successful.

Orwell believe that had they continued the Windows route they would have required additional technicians to cope with the maintenance burden they had. Under Linux their technician has been greatly freed up and in fact the school estimates a single technician could easily administer between three and five similarly set up schools by himself or herself.

Heading over to Asia, the awful issue of money again raises its head. In the Philippines many schools cannot afford computer facilities. After the 1997 Asian financial crisis business and government began looking into open source software for the potential value it offered. At the same time, the government launched a program aiming to provide one PC for each public high school. This ultimately began in 2000 but by 2005 it was discovered many computers were not being used because nobody knew how!

Ultimately, one innovative vendor – whilst preparing tender documents to supply for 1,000 schools – proposed Fedora Linux. By this time, the funding now allowed for a server and ten desktops per school. However, the reviewers were perplexed as to why someone would give away software for free. An arduous bureaucratic process followed but finally the company was awarded the contract and delivered 10,000 computers by December 2007. In fact, they supplied an additional 3,000 computers on top too – given to a further 300 schools – because they had saved so much money by using free software.

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This project is still underway and the success is yet to be measured but by all means the financial savings have been dramatic and Linux has directly contributed to making computers accessible to school students in that nation.

So, all around the world Linux is helping our educational establishments. The message about cost savings is consistent without exception. Indeed, the stories have pleasing conformity that school pupils are unfazed by non-Windows environments and in every case have embraced the platform delivered. To their credit, each school also emphasised that quality was essential in the teaching tools used. Fortunately, their standards were met by the range of FOSS software available.

However, having knowledgeable staff appears to be a contributing factor to the success or otherwise of an implementation. Those schools which are still progressing strongly were the ones where strong advocates came from inside the faculty.

For more information on what Linux can do for you and your school, visit
<http://www.linux.org.au/linux>

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