Open Source Software and Education: A brief review of the literature

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Ph D thesis Research

The main critical success factors for the implementation of open source software in a New Zealand High School.

The Literature Review is part of my thesis: to survey the literature concerning the place of open source software in education: specifically High School use of open source software.
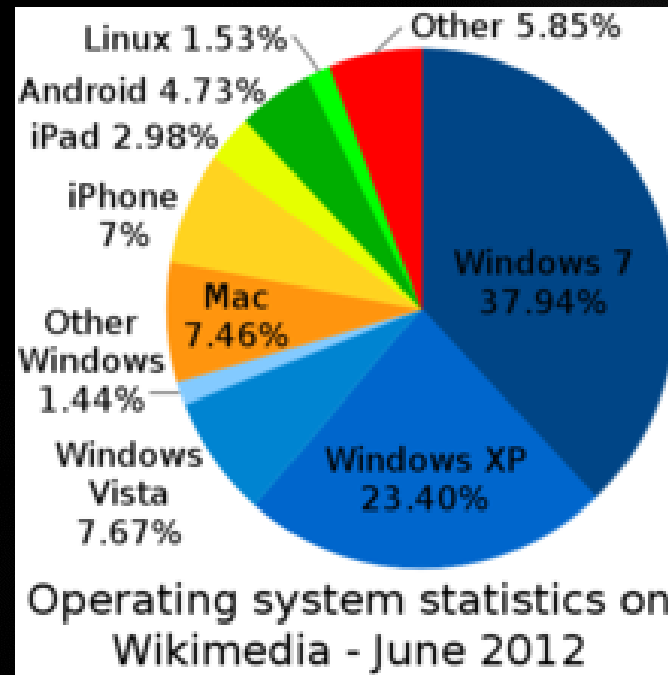
Have you used Open Source Software?

Moodle

80% of internet servers use Linux (Apache)

Firefox web browser

Android phones (68% of worldwide market share in 2012) http://www.businessweek.com/ap/2012-08-08/android-extends-dominance-in-smartphones-worldwide

What about computer operating systems?

Operating system statistics on Wikimedia - June 2012

Microsoft is still the KING!

69%(25%-35% pirated)

Microsoft gives Ed institutes a discount worldwide: $80 mil for NZ Education. (I wonder why?)

How many schools in NZ use open source software exclusively?

2

Albany Senior High

Warrington Primary

Albany Senior High

- NZs first senior high school
- Real world, authentic learning
- Exclusive use of open source software in school
- Constructivist pedagogy
- Open learning spaces
- Wed project day: freedom to create
- Open staff offices: including principal
- Learning commons
- Exclusively open source software
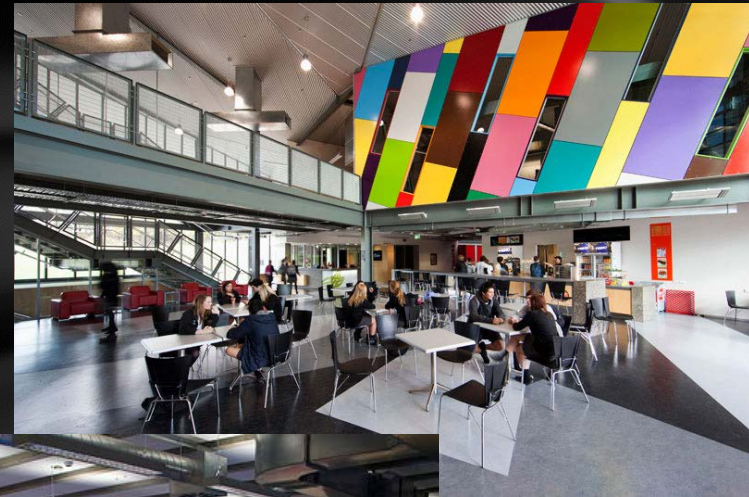
Warrington Primary School

- **A school that is thinking globally**

- **Open source software used exclusively throughout the school**

- **Home/school use of software**

- **Community of Practice both within school and into the community**

WWW
Warrington Well-being Way
Collaborative, Blueskin Bay FM, Paddock,
BBOSI Computers, Kitchen, Matariki,
Blueskin Library Book Car and Club,
Non-Toxic Cleaners, Face to Face Programme,
Progressive, Open Education, EOTC, Spray Free,
Year 7/8s, Surf Group, Technology Shed,
Rabbit Island, Open Source, Dance/Drama Space,
Envirethical

So what is Open Source Software?

- It is about freedom.....not money/price.

- Follow scenario may help your understanding.

Herding cats and open source........?

Mmmmm

More later.............................

Car One (Microsoft Roadster)

Bonnet locked (only authorised garages have key)

Petrol: Only runs on Microsoft Petrol available from MS service stations

Colour (colour chosen by Microsoft) Cannot change

Accident (only Microsoft Panel beaters can repair)

Security (high stealing rate: need an expensive car alarm: use always)

Car breaks down ☹ (Only Microsoft garages can help: need key)

Car accessories (only Microsoft accessories allowed)

After 10 years: no support offered at all........

Absolutely no modifications allowed ....ever.......

Car stops for no reason at all occasionally: need to switch off engine and reboot.

Price: set by Microsoft: NO DISCOUNTS

There is also another family of cars called Macs....similar story ☹

Open Source Motoring

Car Two (Open Source Brand)

What ever design you like: (thousands of designers)

Bonnet unlocked (DYO service or Garage)

Petrol (Linux free to buy, universally available)

Colour (what every you like: free painting)

Accident (Low accident rate: free to repair)

Security (Very secure: undesirable for thieves)

Car breaks down(people on side of road will help for free)

 Car accessories (free to get, thousands available online)

Lifetime support for car…on-going. The design is being continually improved by a community.

Customisation: you can customise your car whenever you like ☺

6% of all cars yet the purchase price is $0

What makes software open source?

- Free redistribution

- Source code available to modify

- Derived works: you can modify and release

- No discrimination against persons or groups

- No discrimination against use

- Distribution of license (goes with software)

- Must not be specific to a product

- Must be technology neutral

Open Source Software Terms

OSS (Open Source Software)

FLOSS (Free Libre Open Source Software)

FOSS (Free Open Source Software)

Linux (Named after Linus Torvalds who created original kernel)

Unbuntu, Debian, Puppy, Edubuntu, Knoppix, openSUSE (distributions)

Shareware (is not open source)

Freeware (is not open source)

Cost savings per student.......

It's more about freedom than cost, but..

Proprietary Software:
- MS Vista ($449)
- MS Office ($449)
- Norton Antivirus ($129)
- Blackboard ($80)
- E-portfolio ($25)
- Inspiration ($72)
- Photoshop ($1300)
- Final Cut ($2000)
- Maya ($4500)

Total: **($9004)**
Every 3 years

Open Source Software:
- Ubuntu ($0)
- Open Office ($0)
- Clam AV ($0)
- Moodle ($0)
- Mahara ($0)
- Freemind ($0)
- Gimp ($0)
- PiTiVi ($0)
- Blender ($0)

Total: **($0)**

Open Source Software

- Free as in freedom, not free as in beer.

- Free Software: also open source, freedom to run program, free to study code and modify, freedom to distribute and improve program.

- Companies such as Red Hat, compile software compile open source and sell and supply services for software.

- Many clubs worldwide support and develop software.

- Linux (main operating system used by FLOSS programmers)

- Many Open Source websites available where software can be downloaded.

How is Open Source developed

- Programmer sees a need for the software and using code writes basic program.

- Posts code on the internet

- Interested programmers (many amateurs download code and improve software)

- Upload improvements back on to website. Community vets improvements.

- Community approach to development of software. Often thousands of programmers.

- People download software for free and install and use program.

- Usually runs on Linux software (there are lots of versions of Linux (Ubuntu, Debian etc......) Also available for Windows and Mac.

- Baazar model of development

- Programmers form a community of practice

Attributes of Open Source for Ed

- Encourage Innovation
- Alternative to illegal copying
- Thousands of programs available to download
- Local customisation, examples of High School writing code
- Learning from Source code
- Reliability
- Runs well on older computers
- Long term use stability
- Open Philosophy
- Use at home and school
- Lower Costs
- Developed and used by a community: from local Linux club to IBM.

Step One: Consult existing lit reviews…

Current academic scholarship on open source and education

- **Ummmm there's not much…**

- **Focus on the IT part, not the educational part**

- **Focused on Higher Education**

- **Focus on the community of practice comparison: OSS and Ed.**

- **Open source vs. Proprietary Software comparisons**

- **Many thousands of installations in developing countries schooling systems.**

Literature Themes

Innovation Need to Change

What is Open Source, FLOSS, FOSS , Free Software

Open Source vs. Proprietary Software

Open Education Resources

Change Innovation in Education

Community of Practice – Wenger

Open Source in Schools

Mahara, Wikis, Moodle in Education

The Future of Schooling

Open Source Case Studies (most shallow focused on technology)

FLOSS in developing countries

ICT in Education (is it making a difference?)

ICT: Home/School connection

Case Studies: Indiana inACCESS (Affordable Classroom Computers 4 Every Secondary Student)

- Previous to ACCESS students had 35 min computer access per week

- ACCESS achievements

- 1-1 access for every student (18,000)

- Affordability ($500 per computer, hardware and software)

- Sustainability (free upgrades and longer use of hardware)

- Repeatability (same model used in many high schools)

- Software: Star Office, Firefox, GIMP, CMAP, Scribus and any other open source program that school wishes to use

- No mention of teacher professional development ☹ in planning

Michigan High School inACESS

- Low decile area: high drug and gang activity

- Low income area: only 30% of students have broadband

- Mix of ethnic backgrounds of students

- 3rd highest student expulsion rate in state in High Schools

- Linux used on classroom computers 1:1 ratio

- Children surveyed about school computer use

- 2/3 of students were unsure about what operating system they were using

- No learning curve for use of the Linux computers in the classroom

- Majority of students were using XP operating system at home

- Positive about their improvements in school grades

Michigan High School inACESS

Students perceptions of benefits of computer use in classroom

Positives

- Don't loose work

- Can complete work at home via Moodle

- Typing easier to read than handwriting

- Freedom to cooperate with peers

- Easier to research

Negatives

- Easy to go off task

- Internet sites blocked

- Login problems

Michigan High School inACESS

Teacher Perceptions of open source 1-1 computing

- Some teachers were not aware that the school was using Linux

- Generally Linux was perceived to have worked well

- Need for more professional development on specific software e.g.. Moodle

- Teachers surprised that many students were unaware of Linux used in the classroom

- Wanted single operating system through the school

- Felt the computers were intuitively easy to use

- Complaints about logins, internet blocks access to drives etc....(same as students)

- All teachers had windows XP system at home yet adapted to Linux ok.

Michigan High School inACESS

Conclusion

- Improved collaboration and faster feedback to students

- Computers facilitated more self directed learning

- ICT is seen as an expectation rather than option

- Web based learning seen as becoming important: Moodle

- Login issues and bandwidth need sorting

- Need for staff development (low training requirements overall)

- Linux is almost transparent for students: they just get on and use the computers

- Linux has enable a 1:1 ratio of computers to students

- Price per computer gone from $1000 to $290

Norris School District

- Surveyed Teachers: showed classroom computers mostly used for Web/internet applications, word processing and presentations.

- For a new school purchased Linux based computers for classrooms.

- Teachers and students taken to Linux machines: key is communication of expectations (what they are getting and what its good for)

- Use of Open Office which is compatible with MS Office. It has been a slow transition for teachers however they have adapted over time.

- Macs still used for video and photo applications in a specialist lab.

- Like freedom to try new software with no licensing fees

- Use a local firm to for technical support.

Rudolf Steiner High School
Lorien Novalis Australia

- No use of technology in pre-school or primary classes.

- High School students use ICT creatively, ethically with deep knowledge

Why choose Open Source Software?

- It is about sharing as opposed to a global duopoly (MS and Apple)

- Avoids student lock-in of commercial software

- Secure, stable and license free

- Free and Freedom of use

- Configurable

- Students have to leave their Microsoft apple comfort zone

- Virus free

- Thousands of applications available to use

- Creative Commons and Copyleft

Rudolf Steiner High School
Lorien Novalis Australia

- No Wireless free environment: have to use cables in network

- No laptops because or ergonomics and use of low radiation screens

- Steiner philosophy guided all aspect of computer installation and use within the school

- Christian names used for logins and network presence to reduce likelihood of anonymity on the network: accountability

- iTALC classroom management software used: teacher control and monitoring of computer suite screens

- Software: Mandriva, Firefox, Open Office, GIMP plus open source software as needed.

- Network: Red Hat Enterprise Linux, Squid, eTALC, ZIMBRA & KOHA (library management)

Grant High School Australia

Trial of Open Source Software for learning and teaching.

- Whole school migration to open source software

- Use of recycled business computers in the classroom.

- Open Office used throughout the school: CDROM copy given to students and teachers to take home

- Gimp graphic design software used in class.

- Audacity used for podcasting and audio use.

- Parents very supportive of move to open source software

- Teachers happy to use Open Source office software if glitch free

- Students also happy to use open office both at school and home

- School leadership: Cost was a major factor in moving to Open Source

- Variety of software choice is in the interests of students at school

Open Philosophy of open source software matched school direction

Open source use in other countries

- India has indicated it wishes to move whole country to Linux as platform of choice

- Linux used in many schools in Africa

- Brazil: has legislation concerning use of open source software

- Peru: Open source to be used in all govt systems

- Germany: Open source used in all govt departments

- Norway: Open source used in all govt departments

- China: starting to use Linux in schools

- Linux now used in many developing countries

- New Zealand/Australia: limited use in schools: used in business applications

Freedom Toaster…

Are you a cat herder?

Want to try Open Source apps? Download a portable app.

A portable app is a computer program that you can carry around with you on a portable device and use on any Windows computer. When your USB flash drive, portable hard drive, iPod or other portable device is plugged in, you have access to your software and personal data just as you would on your own PC. And when you unplug the device, none of your personal data is left behind.

No Special Hardware - Use any USB flash drive, portable hard drive, iPod/MP3 player, etc.

No Additional Software - Just download, run the portable installer and go

No Kidding - It's that easy

Portable Application for a usb

Set your PC free.
Your favorite apps,

carried on a portable or cloud drive,

work on PCs everywhere you go.

The Future…