



Open Source Resource?

An Open Source Case Study

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Open source software can be defined as the process and philosophy of creating a program with source code that is openly available, widely supported and free of charge. Open Source differs from typical “off the shelf” software which requires a paid for license fee.



The Open Source concept empowers users and developers to edit, modify and create new features to the code and redistribute the

final product. The open source concept promotes a largely collaborative development method that widely distributes applications (Lakhan & Jhunjunwala, 2008).

This study will specifically analyze open source as it pertains to computer based instruction of students grade K-12 within a public school district. Subject areas include math, english and science as well as consideration applied to multi-media and arts based curricular elements. The primary impact areas for this study are localized but not limited to high school (grades 9-12) student instruction in groups within a lab composed of 10-20 individual students with one instructor.

The current computer labs use the Microsoft Windows XP operating system with a combination of several off the shelf applications. The applications include Microsoft Office, Internet Explorer, and a variety of educational software titles. Students primarily use the labs to conduct research on the internet and type papers, reports and other word processed assignments.

In an effort to reduce the costs of operations within a computer lab and to obtain a more diverse array of applications for student use, the objectives of this study are twofold:

First, through the use of open source and license free applications, obtain software that is free of charge. For example, Microsoft Office license alone are \$200 to \$400 per seat, which adds up to thousands per year; Open Office and Google Apps are free.

Second, increase the adoption of technology use within the classroom at every grade level and subject area by obtaining the most applications relevant to curricular areas as possible. The expected benefits resulting from implementation of an Open source Lab are:



First, community members who may be in lower socio-economic brackets will be able to obtain the same applications in use at the school free of charge. These programs could be used at home by the

student exactly as they are used at school.

Second, the reduced cost of software will allow the school district to update software titles more often and dedicate the funds saved to the purchase of newer more powerful computer hardware or other budgets as agreed upon by the board of education, district administration

and staff. One or more computer labs at MMCSD will be loaded, free of software license charges, with an open source operating system such as Linux. Linux has literally dozens of distributions or “flavors” each with different functions, strengths and weaknesses. The most widely used and supported version of Linux is currently Ubuntu, as per hits per page and download rankings online (Distro Watch, 2008). A specific version of the Ubuntu operating system relevant to education will be chosen such as “Edubuntu.” This version of Ubuntu is packaged with pre-installed educational software and labeled as “Edubuntu” to describe the operating systems intended audience.

The scope of this study will examine the use of an open source operating system and computing applications. Specifically, the study will provide research on the use of the Ubuntu operating system, the Open Office suite, and the Keducational application package. These applications will be used on industry standard computers manufactured by Dell, also on legacy equipment manufactured by Hewlett Packard. Older devices such as the model VL-400 computer, with 128 megabytes of RAM, an 80 gigabyte hard drive, and a Pentium 3 processor will act the baseline for minimum system requirements need to run each application. This study will focus on the use of open source software; therefore, titles that are distributed as freeware and shareware applications will not be examined. In terms of the analysis of particular functionalities within the open source lab, four areas will be examined.

- First, the basic functions of internet research and word processing. As these two functions are typical of any computer lab, program errors, incompatibility issues, and other technical difficulties will be closely observed.
- Second, the compatibility with individual user accounts as run by a central server. Each student is given a unique login and disk space for his or her tenure at Mt. Morris. The operation of this functionality is paramount to daily operations of the lab.
- Third, the use of Open Office and Keducation software within different subject areas will be monitored. The integration of technological tools and software into math, science, English and other core academic areas must be adopted for the project to be deemed successful.
- Fourth, the general technical stability of the computer lab will be recorded. Acting as the final success

indicator, reliability must be analyzed thoroughly. Older and legacy systems are expected to interface with the addition of open source software easily. Close attention will be paid researching any issues that may occur with older computers in use. The overall compatibility with the student home computer will also be observed. Typical operating systems include Windows 98, Windows 2000, Windows XP, Windows Vista and various versions of the Apple / Mac operating system. Business applications such as Microsoft Office, Microsoft Works, iWork and others will be evaluated.



Emphasis will be placed on the study of how file formats interact with the open source setup. File formats such as .doc and .docx will be assessed for compatibility in terms of opening, saving and editing other files types on the computers in the MMCSD labs.

For the purpose of this study typical business and home computing systems will be given study priority. The interaction with devices operating on distributions of Linux other than Ubuntu, and mobile operating systems such as Palm and Windows CE/mobile will not be observed.

This study will be conducted through a pilot program. Four labs have been chosen for the study, which offer services in various computing areas. The business lab, the technology lab, the high school lab, and the junior high school labs have been chosen for this study. Each area offers classroom support in a variety of subject areas including, math, science, english, social studies, business, and industrial arts.

The pilot program will run for one year, with periodic program evaluation meetings held monthly. Teachers who have conducting lessons using the labs will be invited to attend the monthly meetings. Data will be gathered based on the input from teachers, also from any technical issues that are reported. Each request for technical assistance will be recorded and categorized for review. Categories of errors include hardware, software, compatibility and reliability. Each incident of technical error will be documented. The solutions to those issues will also be documented. This information will be stored into an electronic spreadsheet for final review. Evaluation of external trends

External research will be conducted to observe and record similar open source projects and programs being conducted by other organizations.

Relevant information such as current trends involving open source labs, also information regarding technological advances in open source will be given consideration. Regional meetings held monthly will be attended by key MMCS D technical staff and stake holders from 30 other school districts located in the upstate New York region. Through open communication, technical issues, processes, procedures and other technical information will be shared. Publications, journals and other forms of external research will be fully studied and utilized as an ongoing process. Through comparison and contrast, techniques and other systems put into place nationally, and internationally will be given consideration in the final report and evaluation of the open source pilot program.

One of the key benefits to this implementation is the considerably low resource requirements needed. No additional resources will need to be purchased. Open source software will be downloaded free of charge therefore, the necessary resources are largely the upkeep of existing equipment and services. Internet access through a service provider is required for obtaining software. The hardware required to run the software will be composed of the existing infrastructure as well. Older legacy computer systems with differing specification will be used. The minimum system requirement for running Ubuntu are, a computer with a 300 MHz x86 processor, 64 MB of system memory (RAM) , at least 4 GB of disk space, a VGA graphics card capable of 640x480 resolution and CD-ROM drive or network card (Unbuntu.com, 2008). External Constraints

A few known constraints should be taken into consideration for this study. Open source operating systems and applications are typically designed for use on system with the latest and greatest hard ware available on the market. As a central tenant and goal of this program is to fully use the existing hardware at MMCS D, older versions of open source applications and releases specifically designed for older computer hardware should be evaluated.

Additionally, limited network bandwidth constraints are also present a significant factor to overcome. Should technology adoption increase and daily usage levels grow, more bandwidth will need to be allocated for computer labs. At a minimum network shaping and traffic management software may have to be put into place to manage what bandwidth is currently available to optimum levels.



As compliance issues become often more important in public education, audits and security regulations must also be factored into the study. Since open source applications do not require a license, the process by which inventories are kept will need to be adjusted accordingly. Specifically, for auditing purposes a system or database is needed to records accurate records of software titles in use within the district. Information security may also become an issue. As open source applications to not carry with them any guarantee, users are operating at his or her own risk. Sensitive documents must be kept behind a firewall and be located on a server with security software to greatly reduce the risk of data becoming compromised. Since this study is focusing on student applications, significant risks of data loss or theft are not present. Sensitive documents are currently kept on a separate internal network.

However, a complete evaluation of security risks should be considered prior to a full scale launch of open source applications district wide.

New and veteran staff members will require additional training prior to the launch of the study. As MMCS D has a small staff, instances are unlikely where a full time technician available at all times to assist staff using the labs. Training materials may need to be published which provide some insight into the differences in operating open source applications. A reference sheet with frequently asked questions, terminology and basic commands should be made available to every staff member who plans on uses the computer labs. This process also requires the commitment of the staff to learn a new and different system. Meetings and open forums should be held to answer questions and reduce fear and apprehension that may follow the change.

Time and financial constraints could also present troublesome issues. As new equipment is purchased from a state provided organization, delivery dates and equipment setup may be delayed. Accommodations must be made to offer computing access should a lab be closed and unavailable as new equipment is delivered and setup and new software is being installed. The launch of the open source labs will be tiered, with one lab going online at a time, minimizing lab closures and loss of services. Should an open source application require additional hardware such as new computers, additional RAM, or other components additional capital may be required. Although a small upfront investment may be require at the initial launch, the savings from eliminating software license fees may absorb the additional cost. Factors critical to success

The major factors that will act as success indicators will be the adoption and acceptance of open source applications by students and staff. Should this project result in non acceptance, the labs will have to go back to using software that is more familiar and traditional. The adoption of the open source concept may be difficult to grasp. Client involvement is critical to assuring the overall success of the project. Without the total buy-in of the program including the use of these applications and operating systems both at home and within the classroom, the projects main goal of improved accessibility cannot be achieved.

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