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Non-Restrictive Technology in Education: The Reboot-to-Restore Concept

WHITE PAPER

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Introduction

Today's world is becoming an increasingly technological one. Computers, once a rarity in an office, are now indispensable items in the workplace. Computer literacy is now a required skill for most occupations.

Educational institutions, where more and more people are learning their computer skills, represent a unique and complex learning environment from a technological standpoint. Educational computer labs must provide the appropriate equipment to instruct students in technological learning that meets the highest requirements, and they must provide state-of-the-art equipment that is consistently operable and available. This is growing increasingly difficult to achieve because of the volume of multiple users in educational labs, the multi-faceted threats facing the educational technology industry, and the ever-growing requirements for what the industry must achieve.

Educational instructors are faced with the conundrum of needing to be more knowledgeable about technology in order to ensure that students are appropriately educated; yet they are having to continually tighten security because of the growing number of threats present both internally and externally.

This white paper discusses some of the technological issues facing education, outlines the typical and traditional responses to these issues, and describes an alternative approach in the form of non-restrictive technology and the reboot-to-restore concept.

Educational Environment Computing Situation

Learning computer skills is a necessity for today's students, but there are several problems that educational institutions must deal with in their day-to-day management of computer labs.

Security Threats

Malware, in the form of spyware, viruses, rootkits, Trojans, and keyloggers have become a pervasive and increasingly unmanageable problem. IT staff often have a suite of products to combat the different forms of malware — anti-spyware, antivirus, and adware programs are installed and run frequently on lab machines. These products require management and maintenance; IT staff spend time ensuring that definition files are updated and that patches are applied when they are released.

The high volume of multiple users on the lab machines in an educational environment means users are accessing Web sites or using removable media that could potentially invite malware into a system. The constant management of malware can result in IT administrators locking down certain sites and programs that have been deemed problematic. While this can mean a decrease in malware, it can also mean that the learning environment becomes more restricted for students.

Malicious Users and Innocent Clickers

Students are growing more computer savvy every day, and can be more knowledgeable than their instructors in certain areas. They are capable of downloading programs that can damage a computer — file sharing and p2p programs, keyloggers, and several other programs that can take up bandwidth and affect the efficiency of the lab and of the system. Conversely, "innocent clickers," who are unaware of the consequences of their actions, can cause serious damage to an operating system.

Between these two types of users, IT administrators are continually fighting user "sabotage" of software and managing changes made to operating systems that cause computer configurations to be inconsistent across an enterprise. This makes things difficult for instructors who need a uniform environment to teach their classes. The amount of time and resources used to manage this problem can be staggering and financially draining.

No Child Left Behind Act

On January 8, 2002, President Bush signed the No Child Left Behind (NCLB) Act. The act was a result of the dismal results of a educational study that showed 70 percent of inner city fourth graders are

unable to read at a basic level on national reading tests; American high school seniors trail students in Cyprus and South Africa on international math tests; and a third of college freshmen need remedial courses before they are able to begin regular college level courses.[1]

President Bush acknowledged that the federal government was partly at fault for tolerating these results, and that the government does not do enough to reward success and sanction failure in the classroom. The NCLB Act increases the accountability for student performance; states, districts, and schools that improve are rewarded, while failures are sanctioned.

The Act stresses the importance of providing technology integration and literacy for all students.[2] It requires that students have access to computers in order to achieve that, and specifies certain knowledge and skills a student must acquire in order for a school to successfully adhere to the Act. It follows that these same students must have access to the correct programs and systems that will allow them to attain this knowledge and skill.

However, this is difficult to offer because of the problems encountered in computer labs as outlined above. Computers can become damaged and unusable, and the downtime involved in rebuilding or re-imaging a machine can mean that access to computers is denied or restricted for long periods of time. The alternative to this is the IT staff locking down machines in order to limit the amount of damage a student or a system can do, which restricts student access in a different way. Both approaches result in a restrictive environment, and can lead to students not acquiring the necessary skills and knowledge to adhere to the Act.

IT Resources

In education, a typical ratio of IT support staff to computers is 1:500.[3] Not surprisingly, IT staff are frequently stretched to the limit, and often spend the majority of their time re-imaging and rebuilding machines to keep them up and running. The rebuilding or re-imaging can happen on a weekly or even daily basis, leaving little or no time to make other improvements to labs, or work on troubleshooting more minor issues. This can result in technological demand outpacing technological support, and helpdesk calls can escalate beyond control.

As a result, IT staff would prefer to lock down the machines to prevent users from damaging the machines so they don't have to spend all their time rebuilding them. This means the IT staff can have more control over classroom policy than teachers do, because the IT staff don't want or don't have time to be constantly rebuilding workstations. Where will the next generation of programmers, IT staff, and computer scientists come from if current students are all locked out of various functions?

Approaches to Security

Lock Down Approach

The most common response to the technological issues facing education, have been restrictive. IT staff lock down computers to prevent any mischief on the part of the students, or as a defense against malware. This response means less rebuilding of machines, but can place severe restrictions on the part of the students' learning environment.

Reactionary Approach

If labs are not locked down, the IT staff is most likely using a reactionary approach to maintain security. The reactionary approach means dealing with computers on an individual basis and using re-imaging or rebuilding as a method of keeping computers uniform and protected.

However, the problems with this approach are many, given the amount of time it takes for the rebuilding process, and the correlating downtime of the machine. This approach is also only a temporary one, and does not deal with the cause of the problems faced by the labs.

The Non-Restrictive Reboot-to-Restore Concept

What if there was a better way? What if IT staff could be assured of not having to re-build damaged workstations but students could still have unrestricted access to computers and be allowed to do whatever they want?

The non-restrictive, reboot-to-restore concept makes this possible. This approach allows students to learn in an unrestricted environment without damage to the computer. Students can freely learn about operating systems and experiment with different programs. They can customize their desktops, delete or create shortcuts, and do virtually anything they want to the computer; the computer's original configuration is always restored upon reboot. Teachers are assured of a uniform environment in which to instruct; students are guaranteed an unrestricted, available, and perfectly functioning machine; and IT staff does not need to spend valuable time rebuilding or re-imaging machines.

Non-Restrictive Technology Benefits

The benefits of non-restrictive technology are many:

- offers an unrestricted learning environment for students with improved efficiency levels
- eliminates obstacles to initiate technology in learning
- gives students the freedom to experiment and learn without penalty or consequence
- enhances system performance due to improved resource utilization efficiencies
- enhances computer performance by eliminating the need for most routine hard drive maintenance
- ensures consistent configurations
- reduces unnecessary anxiety related to allowing users access
- improves the classroom technology experience
- allows user full access to computer without time-consuming management restrictions
- significantly lowers Total Cost of Ownership for technology assets because of a vast reduction in time and cost spent maintaining and rebuilding machines
- eliminates the hidden costs present in the time teachers and other less qualified people spend troubleshooting computer issues

Faronics Deep Freeze

Faronics has been a pioneer of reboot-to-restore technology since 1999. Faronics Deep Freeze offers a non-restricted learning environment for students, uniform labs for teachers, and leaves IT staff free for more valuable and proactive activities.

The benefits offered by Deep Freeze are many:

- offers the ability to standardize workstation configuration, from the programs installed to the placement of icons on the desktop
- allows for permanent, scheduled, or ad hoc updates to the operating system and software
- downtime is reduced dramatically, in correlation with a vast reduction in maintenance costs
- computers no longer have to be rebuilt or re-imaged; eliminates all software-related issues
- computers are returned to their original configuration with a quick reboot
- has a small footprint; little disk space is required
- integrates seamlessly with all third-party management applications
- can be easily controlled and configured via the GUI Enterprise Console
- requires no maintenance; no definition files to update and no patches are needed

Sources Used

1. http://www.whitehouse.gov/news/reports/no-child-left-behind.html
2. http://www.ncrel.org/tech/qkey3/improve.htm
3. http://www.digitalbackoffice.com/TCO.pdf

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About Faronics

Faronics Corporation develops and markets intelligent utilities for absolute control of multi-user computing environments. Faronics' market-leading solutions have dramatically impacted the day-to-day lives of thousands of information technology professionals and computing lab managers, ensuring 100% availability of systems, thus significantly reducing workstation maintenance, and increasing user satisfaction.

As a customer-centric organization, Faronics' products are researched and developed in close consultation with our end users. We value our customer's ideas and suggestions, and depend on this feedback to provide the innovative solutions our users have come to rely on. This approach is the basis for Faronics' industry-leading customer service strategy, continually working to build and maintain lasting relationships with our users.

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