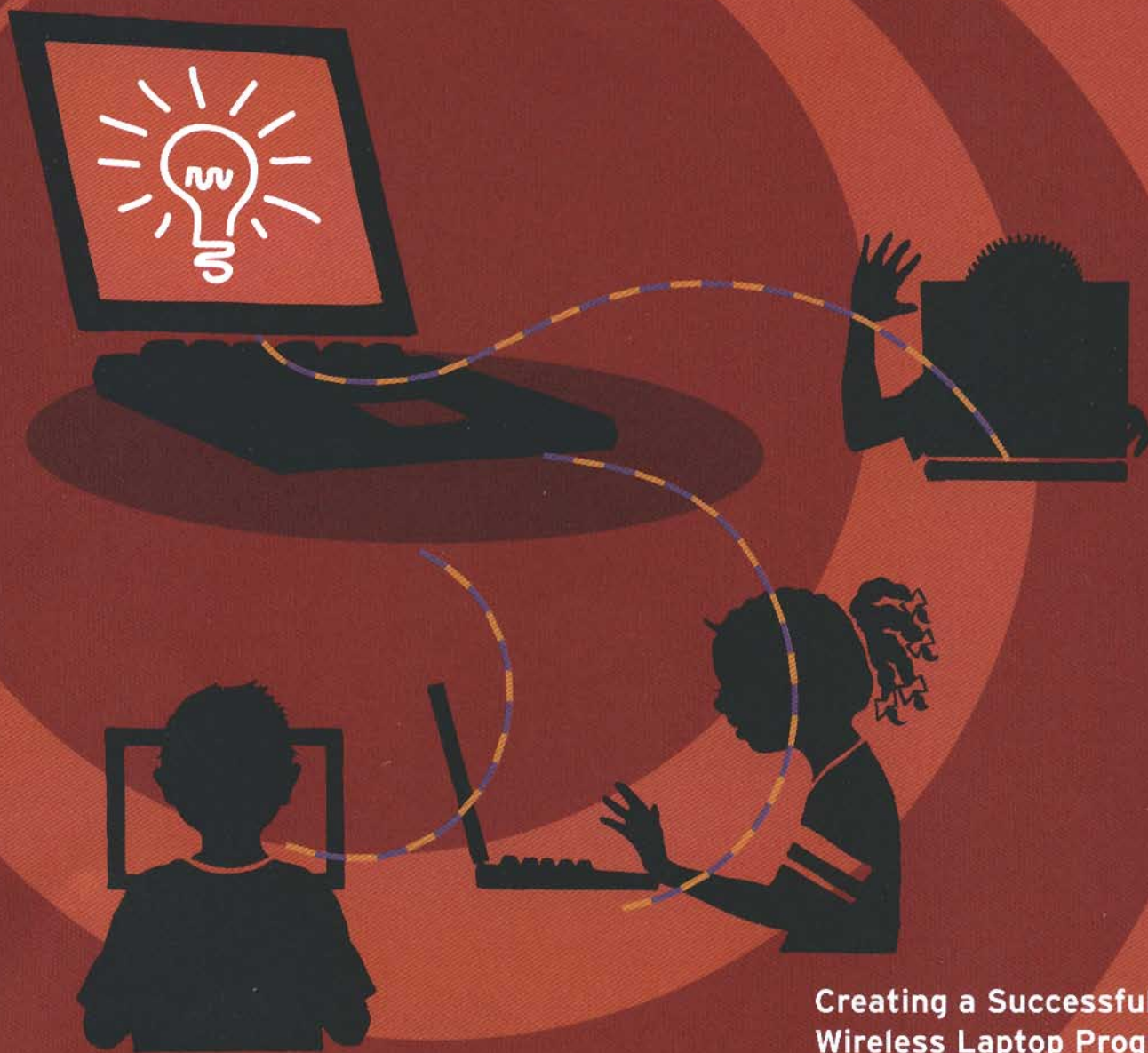# Connected Newsletter™

THE K-12 GUIDE TO TECHNOLOGY INTEGRATION

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Creating a Successful Wireless Laptop Program

Today's schools are looking for ways to make computer technology accessible to all students, promote new ways of teaching and learning for the twenty-first century classroom, and prepare our students to become technology literate for the high-tech world that awaits them. According to the report entitled Learning for the 21st Century, *"students will spend their adult lives in a multi-tasking, multifaceted, technology-driven, diverse, vibrant world—and they must arrive equipped to do so. We also must commit to ensuring that all students have equal access to this new technological world, regardless of their economic background."*

In spring 2001, I received a call from my state congresswoman who asked me to head up a national model laptop program at my school; the program was being sponsored by the federal government. East Rock Magnet School had been selected by the Federal Department of Education as one of five schools in the country to test the impact of laptops in the classroom. The project's main goal is to integrate curriculum, planning, state and national standards, and assessment, all infused with the latest hardware and software. Special attention is focused on enhancing the delivery of instruction to students and on collaboration between students, teachers, parents, and the community. At the end of the grant, a national report will detail the impact of one-to-one e-learning.

The outcome of the project can have significant impact on the utilization of laptops and technology instruction in schools nationwide. Visit the East Rock Magnet School Web Site, where you will find updated references to the national model laptop program, extensive documentation on the grant itself, resources used for the program, as well as corporate sponsors.

Wireless Infrastructure

A wireless Local Area Network (WLAN) is a LAN that does not use conventional Ethernet cabling to connect computers to the network. Instead, each computer connects to the network wirelessly, via radio transmission technology. Basically, there are two ways to create a wireless infrastructure solution:

- A laptop cart has an access point (which connects a wireless network to a wired one) on top of a cart, allowing for portability to various classrooms. Each time the cart is moved, the access point must be plugged into both a network jack and a power source. As soon as this is done, the wireless laptops will connect to the network when powered up. Once the access point is unplugged, connectivity to the network is lost.
- Access points are permanently placed throughout the building, giving 100% coverage. With this method, carts can be brought anywhere in the building and are not confined to one classroom. Of course, this method can be scaled down to make only certain areas of the building wireless.

The advantages of having total freedom in a completely wireless campus surpass the quick fix, instant wireless access method of access points on carts. Most school buildings should cost no more than $7,000–$10,000 for a fully implemented wireless system (when added to an already existing wired infrastructure).

The secret to a quality wireless system is a design from a qualified systems engineer who knows how to create and configure the various wireless zones so that they overlap properly without canceling out any signal strength.

Laptop Essentials

Because of budget constraints, many school systems try to purchase the cheapest laptop system available, which can result in endless problems. Most of the top computer companies will give you a substantial discount, especially when you place large orders. Here are my recommendations:

- Purchase only name-brand computers from the top manufacturers, as they will continue to support their products.
- Get a three-year warranty. Save money by avoiding on-site warranty and use the overnight-shipping repair service.
- A minimum of 256 MB of memory with 512 MB preferred
- Wireless network cards that are built into the laptop unit itself vs. those used by the PCMCIA slot
- A server-based quality virus program that updates your network daily
- Durable laptop construction with magnesium-alloy case and keys
- Batteries are crucial; purchase two batteries (main and multi-bay) to provide approximately six hours of battery life. Some new laptop units today can last up to six hours with one battery.
- A quality mobile cart for storage. Because of their portability, laptops can easily be stolen, so you'll need a sturdy cart and a quality locking system.

Choosing the Correct Cart

A quality security notebook cart is a crucial part of any effective program because it helps deliver all the components of the configuration safely and securely where and when they are needed. The cart should do the following:

- Provide the best security possible with the strongest possible locks and the most secure construction.
- Have electrical charging capabilities with a built-in surge-suppressor.
- Be sturdy and durable by providing fully welded construction.
- Have four swiveling wheels for maneuverability.
- Provide long power cords (at least 15 feet) for accessibility to plugs.
- Be able to secure peripherals (such as printers and access points) to the top of the cart.
- Be easy to reconfigure by providing removable module shelves.

After searching and investigating all the laptop carts available, the Datamation Systems laptop cart was the best for my school and had all the above features. Although it is the most expensive, it was worth it when my top priorities were security, durability, ease-of-use, and excellent support.

Network Setup

It is crucial to have your network infrastructure designed properly with state-of-the-art components. Here are the ideal requirements to make your wireless system work flawlessly and most efficiently. **NOTE:** Your network and servers should be set up no differently than those in a corporate environment. For today's technology environments to function well in schools, they need properly configured equipment and software.

- Use CAT 5 wiring throughout your building.
- If there is more than one wiring closet, connect your wiring closets by a fiber optic backbone with a speed of 1000 MB (1 GB).
- To eliminate traffic congestion on your network, use only quality switches from well-known companies in your wiring closets. A wireless system must have optimal connectivity, or speed degradation can impair the learning environment. When purchasing switches, compare prices and warranties. (There can be a big disparity in prices because some companies have annual maintenance contracts.)
- Access points that are configured strategically throughout the building are far superior to those located on laptop carts. The ability to have wireless connectivity on your laptop anywhere in the building, instead of in a confined area, has numerous advantages. Not having an annual contract for access points can save additional money. Those that are permanently installed take very little maintenance.
- The secret to a quality wireless system is having it engineered and designed by a professional. Before installation, request a diagram that shows the placement and configuration of all your access points and all the wireless zones. After installation, be sure to walk through your entire building with the engineer and a wireless laptop to test all the zones. A properly configured system should have no dead zones.
- Have a high-speed broadband connection to your router for Internet access, which will allow your students to connect quickly. The router separates your network by providing Internet connection to multiple users without being dependent on just one connection. In addition, it will direct incoming network traffic and work as a dedicated firewall. If your staff and students have to wait a long time for Web sites to load, their motivation and interest will diminish rapidly.
- Your network server(s) should be properly configured, have at least a 100 Mps network card, a minimum of 512 MB to 1 GB of memory, and if possible, a double processor. If you have server-based software installed, students will have quick access, which will eliminate bottlenecks and freezing.
- Virus and backup software is a must for all servers. My suggestion is to use server-based virus software that deploys daily to all your desktops and wireless laptops, which will prevent any downtime from a virus infection. Remember, once a virus hits one computer on the network, it travels to every computer on the network and infects them all. Backup software will protect not only your servers, but also any work saved by your staff and students. A full backup should be done weekly and a differential backup needs to be done daily.
- If you can afford it, have Raid 5 setup on your servers. This system is truly fail-proof: instead of having one drive, there are three drives that data gets written to simultaneously. If one drive fails, the other two continue working.

Security: Hard Drive and Desktop

To prevent people from installing, changing, adding, and deleting files, it is imperative that staff and students be restricted from having full access to computers. For additional security, locking down the desktop eliminates icons from being renamed and deleted. Your desktop should be set up to act like an ATM display, whereby students have access to the installed programs for educational use.

For the Windows environment, I recommend using Security Policy from Windows 2000/XP and/or an additional aftermarket security software program. Security Policy should be administered only by an experienced technical person. After reviewing and testing many aftermarket programs, Fortres 101 from Fortres Grand Corporation was the most successful at East Rock. It's easy, affordable, and their technical support is superb. FGC also has a product called Central Control that works in conjunction with Fortres 101. Central Control changes all your security settings from the server, which eliminates configuring each laptop individually.

Imaging Your Laptops

What happens when you get the perfect laptop properly configured on the network with all your settings and software? Wouldn't it be tedious to try to emulate every single laptop by reinstalling software and making all the same configuration changes? The easiest and most efficient way is a method called cloning or ghosting, which means your image is saved from the perfect laptop and copied to all your other laptops (basically an image from the perfect laptop is sent to your server). One of the leading programs for ghosting is from Symantec.

NOTE: Ask one of the technicians from your IT department to handle the following process, because it does get complicated. However, once the CD disks are created, deploying or fixing any laptops with the image is fairly easy.

I prefer creating an image that generates file sizes no larger than 650 MB. From those files, I create my own CDs, and I make sure that the first CD has startup files from your operating system. After all the CDs are created, place the bootable CD (which operates from MS-DOS) into the first laptop to copy all the files. You will be prompted for each of the other CDs. Here are helpful hints to create your image:

- Before creating an image, take a laptop out of your domain and place it in a separate workgroup, such as TESTGROUP.
- Now, create an image to your server. Your software will have an automatic program to hook up your laptop to the server via MS-DOS commands.
- Make CDs and make sure that the first CD loads MS-DOS start-up files. It will usually take three or four CDs before completing the entire image.
- Start imaging your laptops by lining them up on a few long tables (ten at a time works well). As the first CD finishes, send it to the next laptop. Continue this assembly line process and your laptops will be finished in no time.
- Run the SysPrep utility from Microsoft (or a similar utility from one of the software cloning companies). This mandatory process changes the ID on each computer. Be sure that you do not eliminate this step.
- Rename laptops so that each laptop has its own specific name, take it out of the workgroup, and then add it back to the domain.

Usernames, Passwords, Login Scripts & Personal Drives

Each laptop user should have a username and password to login to your network. It is advisable not to assign generic ones for all students to use. Having unique usernames and passwords allows special parameters for each user. The username can have many variations, such as "First Name.Last Name" or "First Initial.Last Name." Your school or school system should have a naming convention to keep things consistent. Each password should be at least six characters, preferably a combination of letters and numbers. A free program to create passwords easily is Quicky Password Generator from Quicky software.

Once usernames and passwords are created on your server, it is important to establish their parameters: set time restrictions for logging into the server (e.g., Monday–Friday, 7:00am–5:00pm); don't allow password changes; limit the amount of disk space; or assign login scripts. Login scripts simplify network administration by setting up each user's workstation environment when logging onto the network. A login script can be written for various groups of students and staff. They are deployed as each user logs on. The login script can automatically set the date and time on each laptop for uniformity; display messages (e.g., "The First Marking Period Ends Friday"); execute programs or menus (e.g., update virus tables); and share drives on your servers that use server-based software. The possibilities are endless and can be suited to the needs of your school.

A great feature in any laptop program is to create personal drives (P drives) for all your users. Basically, instead of saving to a floppy disk or the hard drive, each user saves files to a personal drive located on the school's server. This does take some extra setup time and additional cost, but it is worth it if you can afford it. The concept of creating a network like a corporate environment is again employed. This is a great advantage when a laptop's drive crashes or a laptop is sent in for repair. Then, when a user logs onto any laptop or any desktop, those files will always be available because they reside on the server and not on the computer. A great program for implementing P drives for each user is Quota & File Sentinel from NTP Software.

Special Considerations

A laptop is much more delicate than a desktop computer, which means that if it is dropped, it may not be salvageable. Even though your school may have a three-year warranty, a computer that is dropped is not covered unless additional (expensive) insurance coverage is added. In my opinion, I would not begin laptop training with students younger than grade 3; students in grades K–2 do not have the dexterity to maneuver mouse pointers, mouse touch pads, and laptop keyboards. Applying the cognitive development theories of Piaget and the stages of human physical development with fine motor skills, K–2 students are just not ready for a laptop program.

For grades 3–4, I suggest that certain changes be made to Microsoft Office, which is a highly recommended program for laptop programs. First, change all the icons in Microsoft Office to large icons. Second, change the default font size to 18. This concept has worked very successfully for the students at East Rock Magnet School. The default configuration works well for grades 5–12. However, remember that the Options section under the Tools tab allows for many variations. As a hint, make any

necessary changes before imaging any of your laptops; this will save time later so you don't have to do any reconfiguration changes individually on each laptop.

Implementation

Use this list as your implementation checklist.

- Obtain the funds through your allocated school budget, school system, or state budget, and/or from a grant.
- Get laptop pricing from various companies. Do not accept the first quote! The salesperson always has pricing leverage to make better deals, especially on larger orders.
- Compare and check various laptop features such as size, weight, durability, warranty, battery life, screen size, screen clarity, etc. (Refer to the section above on Laptop Essentials.) Request a demo unit for at least one week to make an accurate assessment. Any company that denies this request will probably not provide quality service later.
- Choose a laptop cart either from the company supplying the laptops or a cart that meets all the criteria as explained in the section Choosing the Correct Cart.
- Decide on the software that will be used for each laptop. This decision can be based on your district or site-based policy. Then, get your best possible pricing for the software.
- Get pricing for your wireless equipment, server(s), CAT 5 wiring, network equipment, and installation. Schools with a network infrastructure already in place may only need the wireless equipment.
- Create a simple spreadsheet that itemizes all of the possible expenditures, then finalize and adjust according to your budget.
- After getting proper approval, order all of the finalized line items.
- When equipment and software arrive, double-check your invoices for quantities and specifications. Notify the vendors of any discrepancies immediately. Be sure to store all equipment in a secure location.
- Oversee all installation procedures to make sure provisions and specs are completed to your satisfaction.
- Start creating the perfect laptop with all software, security, and configurations. Have it tested by a group of teachers and a few students to resolve any flaws.
- In the meantime, label all your laptops and cart shelves with an automatic labeler. As an example, "7-3-1" means cart #7, column #3, and shelf #1. This eliminates confusion in the classroom so that students can return their laptops in the correct place. As a suggestion, use the above label code as the laptop name in your domain's network.
- Now that your laptops are stored securely in their carts, make sure they are charged completely. Charge them for at least 24 hours the first time. After charging, check to make sure all batteries are recalibrated by using the battery recalibration. This will indicate any faulty batteries that should be immediately replaced by the manufacturer.
- Once the laptop is tested, begin cloning all your laptops and return them to the carts.
- In the meantime, conduct ongoing staff training to prepare your teachers for laptop implementation in the classroom.

- Send out a letter informing parents that their children will be using laptop computers and that a mandatory meeting will take place. A special permission form will be given out at the meeting allowing their children to participate. In addition, a media release form needs to be signed to protect your school district's liability for any publicity use. Adhere strictly to these rules and you will find all your parents cooperative throughout the year.
- Introduce the laptops to each classroom, making sure that everyone understands the rules and regulations. The technology coordinator of your school should model at least 5–7 lessons with teachers before classrooms are left to operate independently.

Helpful Information

- Use Web-based software, the trend of the future, as opposed to server-based software. This eliminates server updates and configurations. In addition, Web-based software is updated on a daily basis by the company, which eliminates hours of work on your part. Some specific examples are online encyclopedias, periodical databases, online grading systems, and online testing.
- Showing teachers how to teach with technology, as opposed to traditional methods, is the key objective of any laptop program. Once teachers see its effectiveness, they will use it on a daily basis. The purpose is for the teacher to independently create technology lessons and infuse technology into the academic curriculum using a multifaceted interdisciplinary approach.
- When the technology coordinator models lessons in the classroom, it is *imperative* that teachers are present with their students.
- Provide a simple Teacher's Log form for teachers to list their weekly lessons. Have them hand them in on a weekly basis to be checked by the principal and/or technology coordinator.
- The Internet, Microsoft Office, Kidspiration, and Inspiration software are your most valuable assets. With proper lesson planning, they will give your students all the essential tools they need to master technology skills and core study skills, as well as develop creative thinking and visual learning techniques that will prepare them for the twenty-first century. Other software and programs will be enhancements to fulfill the needs of your curriculum.

As we implement programs at East Rock Magnet School, we always go through the important step of validating program effectiveness. The federal government report was filled with endless accolades from teachers, parents, students, and the evaluators. It can be seen on the school's Web site; see Quotes from Staff and Final Evaluation.

Over three years of extensive research and development have gone into the process of trying to perfect this program at East Rock Magnet School. It is understood that the suggestions given here can be implemented on a simpler basis and changed to fit the needs of any educational setting.

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Online Resources

East Rock Magnet School Model Laptop Program
http://eastrock.org/mlaptop.htm

PLATO Orion Standards & Curriculum Integrator
http://www.plato.com/k12/accountability/orion.asp

East Rock Magnet School Collaborative Units
http://eastrock.org/units.htm

East Rock Magnet School Project Evaluation and Assessment
http://eastrock.org/assessment.htm

East Rock Magnet School Final Evaluation
http://eastrock.org/evaluation.htm

Datamation Systems, Inc.
http://www.pc-security.com

Fortres Grand Corporation
http://www.fortres.com

Symantec Ghost Corporate Edition
http://enterprisesecurity.symantec.com/products/products.cfm?ProductID=3

Quicky Software
http://www.quickysoftware.com

NTP Software
http://www.ntpsoftware.com/products/qfs

Learning for the 21st Century
http://www.21stcenturyskills.org/reports/

Wireless Technologies in Education
http://www.peakgroup.net/educationoutlook/wirelesstechnology.html

techLEARNING: Wired Versus Wireless
http://www.techlearning.com/content/about/archives/volume23/may.html

CoSNs Emerging Technologies:
A Guide to Wireless LANs in K–12 Schools
http://www.cosn.org/emerging_technologies/wireless.html

School Laptops—Reinventing the Slate
http://www.districtadministration.com/page.cfm?id=316

Never Mind the Laptops
http://www.nevermindthelaptops.com/home.htm

Learning with Laptops
http://www.learningwithlaptops.org