

How to Build a Thin Client Classroom in 24 Hours or Less

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Virtually every school in the U.S. (99 percent according to NCES) has Internet access, and the ratio of students to computers improves every few months with new purchases and donated equipment. However, having equipment is very different from using it. We wanted to design a model classroom for the National School Boards Association Conference in November 2002 to see how thin-client technology could be used in a cooperative learning environment.

Integrated Options

We have visited many classrooms and schools throughout the country and witnessed what works and what does not. Classrooms that buzz with activity have equipment that is ready to use, seamless, and always on. Teachers and students connect to ideas and tools in a comfortable setting; they enjoy searching for answers and practicing new skills. Teachers have shifted from lecture-style instruction to activity-oriented learning. They accommodate more individualized learning and all students can achieve.

In classrooms with integrated rather than disconnected technology, we found that everything worked together. The technology was easy to use, part of a seamless network, and always on.

	Integrated Technology	Disconnected Technology
Ease of Use	Consistent applications Security up to date	Multiple applications & versions Insecure desktop
Seamless Network	Server-based information Server-based applications Easy transfer	Floppy disks CDs Email transfers
Always On	Always available in classroom Access to relevant information	Scheduled computer time Equipment failure

IT and Instructional Input

When it came to designing a model classroom, we needed input from an experienced educator and the recommendations of IT specialists. Because the classroom is so different from an office or more typical IT setting, it is essential that system administrators work with instructional users to define needs and discuss feasibility.

Shelly Luke Wille, San Mateo County Office of Education, created a series of classes where participants (teachers, administrators, and other adults) listened to instructions and completed activities in collaboration. As the instructor of the Model Classroom Sessions, she required the following:

- One device per two students located in group work areas throughout the room.

- Teaching space in the center of the room with a projector connected to a laptop.
- Desktop space for books, papers, and other materials at each workstation.
- Open working space for group activity such as round or long tables.
- Access to instructional web pages and several applications.

I believe the design allows for students to expand their knowledge base with room for creativity. The ease of the set up allows for students to complete projects and cross curricular projects as well.

Cara Ledy, Andale High School

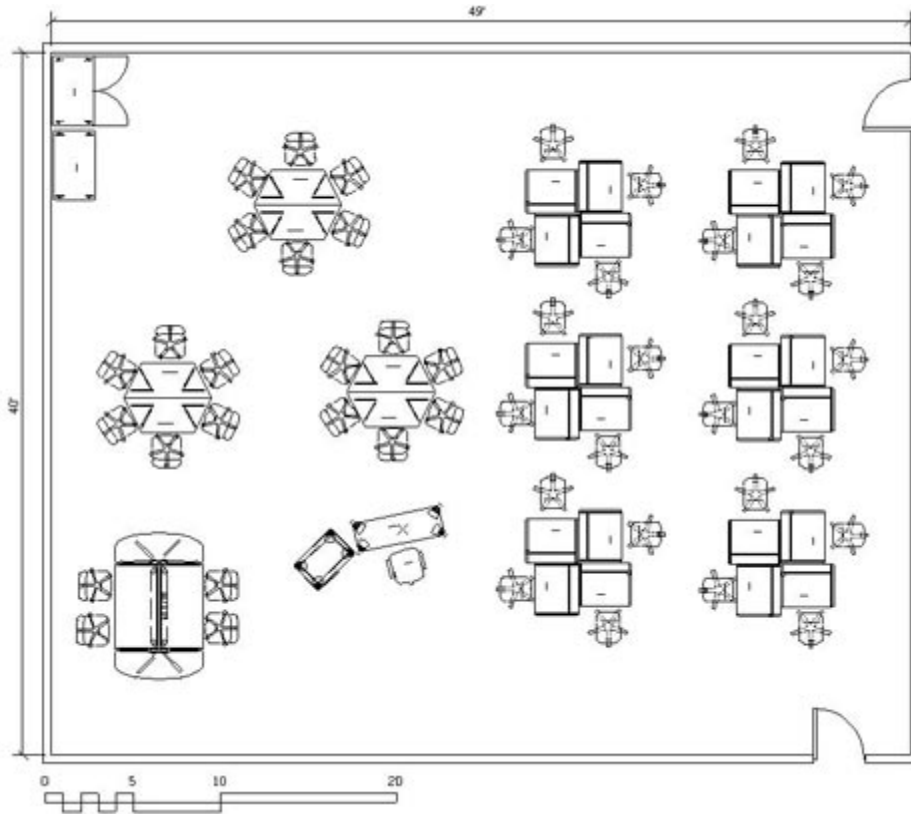
William Myrhang, Technical Marketing Engineer, National Semiconductor, oversaw the setup and deployment of the technology. He focused on feasibility, and making sure that his team could quickly deploy a working technology infrastructure. His recommendations for a model classroom included the following:

- Two HP Proliant application servers running Microsoft Windows 2000 and Citrix MetaFrame preconfigured by a system integrator specializing in K-12 education design. (We chose ClassLink Technologies.)
- 20 HP T20 thin clients with flat panel displays to provide plug and play access to servers, reduce equipment failure, require less energy, and occupy a minimum of desktop space.
- 4 HP EVO W6000 Workstations for high-end computing, if needed for multimedia and video editing.
- 12 light-weight wireless thin clients (WebDT 325 and 380 from DT Research) used for flexible, wireless access from work tables and pods.
- 6 WebDT 530 integrated flat panel TFT thin client displays for viewing multimedia applications.
- The network was built from common network switches, wireless access points, and firewalls to maximize performance and keeping cost in mind. Each pod connected through inexpensive five port and eight port Netgear switches.
- A common router firewall from Linksys was used to separate the classroom traffic from the rest of the connected rooms.

A thin client network seems to be a very cost-effective way to provide the students with state-of-the-art software without much work or maintenance.

Arlie Huffman, WarrenTech

Next, we contacted Virco, a furniture manufacturing and design company, to provide an alternative to conference center tables and chairs. They setup 24 individual tables grouped into six pods, six trapezoid tables grouped into three rounds, a long work table, cabinets for servers, a teacher station, and appropriate seating.



This environment worked nicely as far as optimum helpfulness and efficiency goes. People were able walk around and help me quickly. Also, I was able to collaborate with my peers at my table and discuss important issues.

Bonny Fugett, Lecompton Elementary

Technology Setup

Prior to deployment, ClassLink Technologies setup the servers with Citrix MetaFrame and Microsoft Windows 2000. They created three profiles with access to different applications and resources. Participants logged in as an administrator, teacher, or student. Applications available from every desktop included Microsoft Office, Internet Explorer, and Mozilla.

Once the furniture was in place, we began unpacking boxes and connecting wires. Each thin client required an Ethernet connection, a monitor, keyboard, mouse, and power. With the push of the “on” button, they connected to the application servers over the local wired and wireless connections. The servers accessed the Internet via the conference center’s network.

Teaching Time

Classes began at 8am the first morning of the conference. The first participants were surprised by the setup. They wanted to know where to turn, how to face the speaker. We assured them that this class would be different and directed everyone to share, two people

per workstation. With a brief introduction, Mrs. Wille had them searching the Internet for their first task and sharing results with the people at their table.

I liked the way it was easy for me to interact with my peers while I was working.
Dean Vogel, California Teachers Association

Based on outgoing evaluations, 89 percent of participants rated the classroom an excellent or good learning environment and 66 percent said that the classroom changed their thinking about thin-client technology. We found no difference in functionality or ease-of-use between the high-powered multimedia computers and the thin clients. Most participants preferred the thin clients due to their small size. Although we had wireless devices for mobility, the setup of the room enabled people to work collaboratively and dynamically without moving equipment.

I think this is our solution to down-time issues and shortages of IT personnel.
Janet Foster, Xenia Schools

Thin Client Power

We knew that we were on to something important by the first afternoon. Word had spread throughout the conference and teachers were bringing administrators to the afternoon sessions to show them what the classroom looked like, how the technology worked, and the instructional style modeled by Mrs. Wille.

The learning environment provided today was awesome. The hardware was very user friendly and open. The equipment was up-to-date and a pleasure to explore!! The support staff was amazing! I plan to look for other sessions by this company.
Susan Whitaker, Perry Middle School

For educational IT directors, the Model Classroom proves that they can set up an effective learning environment with low-cost equipment quickly. Because the servers handle application processing and data storage, students and teachers can plug-in the desktop devices without local configuration. The IT department manages software and upgrades memory and processor speed on the servers as needed.

The Director of Technology and the Director of Instruction both get what they need in the Model Classroom: technology that is easy to use, easy to deploy, and worry free.

Equipment

2 HP Proliant Application Servers <ul style="list-style-type: none">• Citrix MetaFrame• Windows 2000• ClassLink Portfolio
20 HP T20 thin clients
4 HP EVO W6000 Workstations
12 DT Research Web PADS (6 WebDT 325, 6 WebDT 380)
6 DT Research WebDT 530

HP iPAQ Microportable Projector
Netgear 5, 8, and 24 port switches
Linksys router firewall
Virco tables, chairs and cabinets <ul style="list-style-type: none">• 24 Future Access™ individual tables• 48 IQ series task chairs• Plateau table for the teacher station• 6 8700 series trapezoid tables• 1 Mojave conference table• Additional seating lines: EGG, PHD, 9200