

Virtualization Pilot

BY PETE REILLY
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Dana Grafstein and Lauren McHugh's
Second Grade class welcome their guests
on Parent's Night.



Wethersfield Schools Pilot Virtualization and Home Access

Silas Deane Middle School students pioneer a new approach to teaching and learning.

As part of its long range technology planning the Wethersfield Public Schools researched a number of emerging technology strategies that might allow the district to realize its vision to provide every student and teacher with seamless, consistent access to a host of technology resources- cost effectively.

Representatives from the Wethersfield technology planning committee visited the Monroe Public Schools to assess their innovative desktop virtualization strategy.

The trip to Monroe led to discussions with one of their technology partners, ClassLink Inc. and it was decided that Wethersfield would embark on a pilot project to see if desktop virtualization might be a viable long term strategy.

The pilot was placed in Silas Deane MS. In June, ClassLink virtualized the

desktops and installed their LaunchPad software on each computer participating in the pilot. Students immediately began to use the virtualized desktops on a daily basis both in school and from home.

As technical issues were encountered they were reported to ClassLink and resolved.

This evaluation includes student and teacher surveys, system usage statistics, and interviews with staff.



The Mission of the Wetherfield Public Schools is to ensure that all students:

1. Acquire skills and knowledge for life-long learning, enabling them to compete in a global economy
2. Develop a positive sense of self, enabling them to set high expectations;
3. Develop self-discipline and function as responsible citizens of society; and
4. Develop and understand their ethical, cultural, aesthetic, and intellectual values and respect



What is Desktop Virtualization?

Desktop Virtualization takes the software applications that reside on desktop computer hard drives and moves them to application servers.

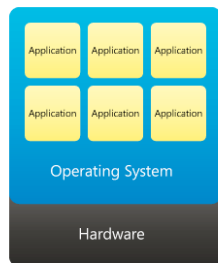


Figure 1: Applications are installed on an application server.

Teachers and students can then access their applications from any computer, in any location, at any time... 'virtually'.

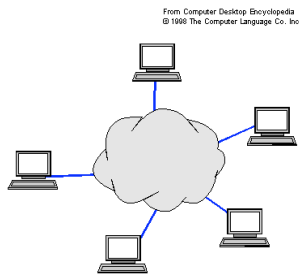


Figure 2: Computers access the server from anywhere.

Project Goals:

1. Evaluate the teaching and learning benefits of 24x7 access
2. Evaluate the usefulness of ClassLink LaunchPad as a classroom instructional tool
3. Evaluate virtualization as a new paradigm for instructional technology
4. Evaluate the financial benefits of virtualization.

2009 CoSn Survey:

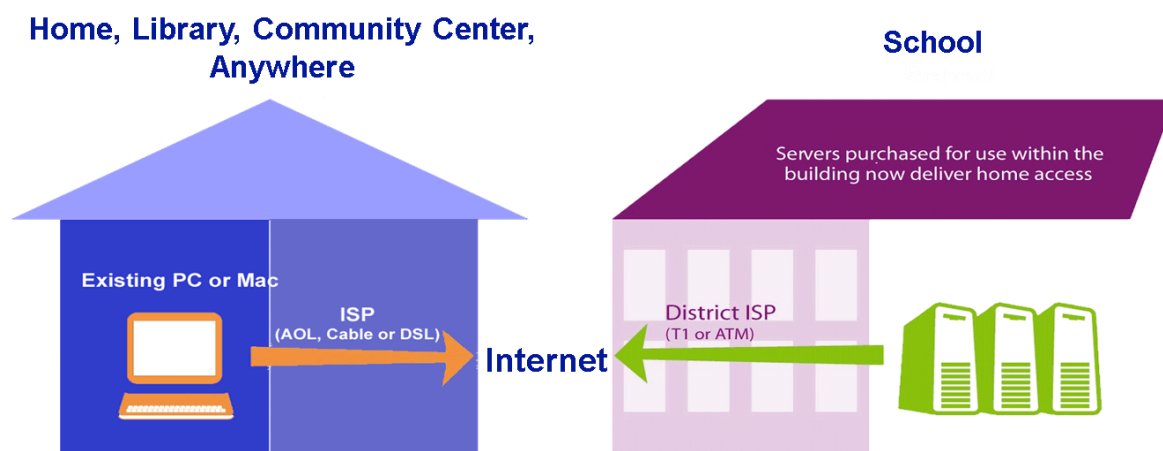
"Citrix surveyed K-12 education technology leaders at the March 2009 CoSN Annual Conference to determine attitudes and expectations related to virtualization in the primary education environment. Eighty percent of the respondents cited an interest in desktop virtualization, which indicates that virtualization solutions in the K-12 classroom should see an increase in the months and years ahead."

"The responses we received make it very clear that the most meaningful technical benefit of virtualization in the K-12 environment is the ability to spend less time on the management and support of software and hardware," explained Podwojski. "And, with stimulus funds reaching the educational system, school districts can implement the virtualization solutions that will deliver these time and cost savings - benefits that will last long after stimulus money has been spent."

Virtualization Survey Results

1. Home Access Helped Students Learn

The virtualization pilot allowed students and teachers to access the school's educational software and individual student files and projects from home.



Eighty-eight percent of student respondents indicated that having access to the school's educational software, and their own files and projects from home was **'Helpful' or 'Very Helpful'**.

Sampling of Student Comments:

"There were some issues but it was very useful."

"It was amazing I could work on my school account at home. Love it."

"I can finish my projects faster and now I don't have to worry about staying after school."

"I could work on my projects at home so I can get them done faster."

"I liked it a lot."

"This program was very helpful because I was easily able to access the school's server and complete projects and assignments without staying after school or coming in early before school."

"I never felt rushed doing my projects, and it was easy to use."

"It was helpful because i could easily access links to the Internet such as Picsearch or Grolier, or programs that I was using such as Microsoft Word and Powerpoint."

"It helped get my project done faster. And I liked it a lot because it was helpful and you don't have to worry about getting your in school project done."

Virtualization Survey Results

1. Home Access Helped Students Learn

Teachers echoed the students assessment with **67%** indicating it had a **‘Significant Impact’** on learning.

91% of teachers responded that home access had a **‘Moderate’** to **‘High Impact’** on the **students’ enthusiasm** for finishing projects at home.

“Yes-Students were able to work over the weekend and not just rely on computer time at school.” - Teacher

“Many students, being able to access their projects at home, were better able to complete work in a timely manner.” - Teacher



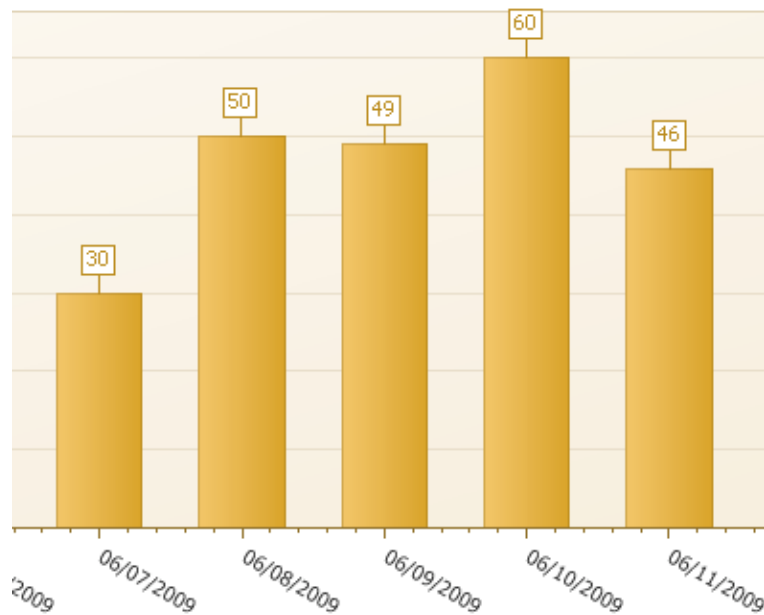
Students overwhelmingly want to continue to have access to school resources and their individual files and projects from home. Fully **87%** of students indicated that the **would like to continue to have access**

		Response Percent	Response Count
No, I don't want to continue to have access.		13.0%	7
Yes, I would like to continue to have access		87.0%	47
<i>answered question</i>			54

Virtualization Survey Results

1. Home Access Helped Students Learn

Students at the Middle School were trained on how to log in to the school network from their home or other remote locations on June 3rd and 4th. The statistics below show the immediate impact that having home access had on usage. On one evening the number of students accessing the system went over the maximum number of simultaneous users. The chart also shows that students accessed the system on weekends.



Off-Hours Home Usage Logins from Sunday June 7th to Thursday June 11th, 2009.

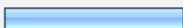

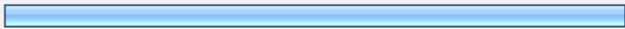
A sampling of home access statistics from Wednesday June 10, 2009, shows 60 students and/or other family members logging in to the school's virtualized computer system on that day from 4:00PM until 10:24PM. Note: 30 students and/or teachers logged into the system on Sunday June 7th.

One-to-One Survey Results

2. ClassLink LaunchPad a High Impact Instructional Tool

ClassLink LaunchPad provided a consistent and reliable desktop for students and teachers. Staff and students could access their desktops from any computer in the school or from home. LaunchPad has a powerful set of built-in collaboration tools that were not fully utilized in this brief pilot.

83% of teachers responded that having ClassLink LaunchPad made accessing software, websites, and their individual files and projects **'Easier' or 'Much Easier'**,

	Response Percent
It didn't make it easier. 	16.7%
It made it easier. 	25.0%
It made it much easier. 	58.3%

“I was able to check student's projects from home over the weekend when they asked me for input. They emailed me at home and then I was able to look in their folders at their projects.” - Teacher

“Yes; although some of the software we use for multimedia (PhotoStory and iMovie) or for audio files (Audacity) cannot be used through Class Links.” - Teacher

“The links were very easy to follow.” - Teacher

“I modified documents I had created for the smart board. I looked at student work and was able to make suggestions for improvements to students in a more timely fashion.” - Teacher

One-to-One Survey Results

2. ClassLink LaunchPad a High Impact Instructional Tool



Eighty-eight percent of students responded that **having a desktop menu** was **‘Helpful’** or **‘Very Helpful’**.

		Response Percent	Response Count
Not helpful	<input type="checkbox"/>	12.3%	7
Helpful	<input type="checkbox"/>	43.9%	25
Very helpful	<input type="checkbox"/>	43.9%	25

One-to-One Survey Results

2. ClassLink LaunchPad a High Impact Instructional Tool

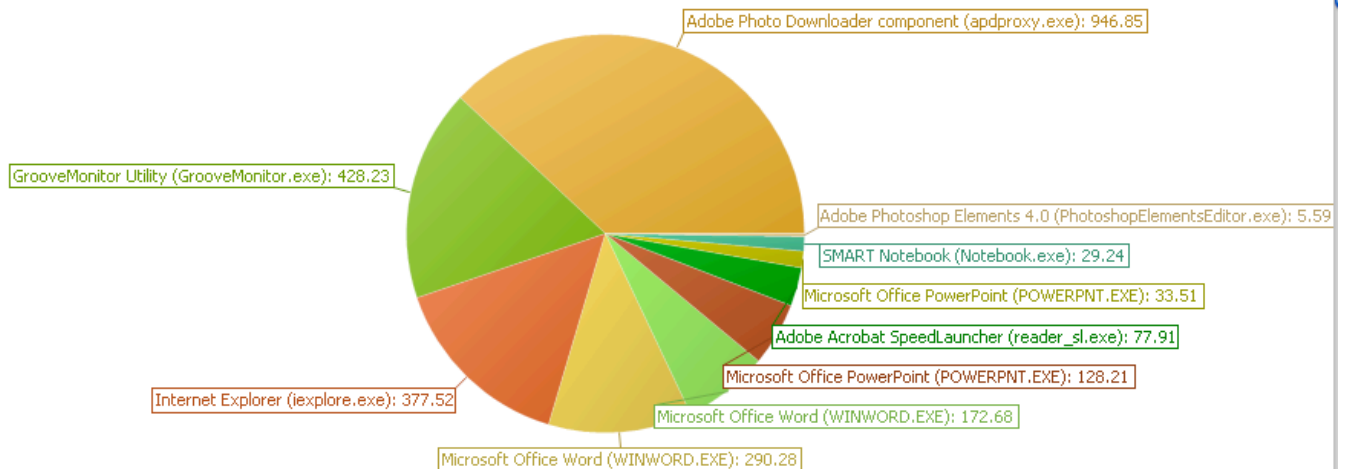
The chart below shows the top ten applications that were used during one particular week in June. Allowing students seamless access to their applications from any location increases the use of educational software, thus returning more value on the school's software investment.

Time Spent per Application - from June 7th to June 11th, 2009 - Top 10 Applications

The students are using many educational resources in their learning. This report shows that Groovemonitor, Adobe Photoshop, Internet Explorer Microsoft Word, PowerPoint, Smart Notebook, and Adobe Acrobat were the most utilized applications during this particular week.



Top Ten Time Spent Per Application This Month(hours)



Virtualization a New Paradigm for Instructional Technology

3. Consistent, Reliable Access from Anywhere at Anytime

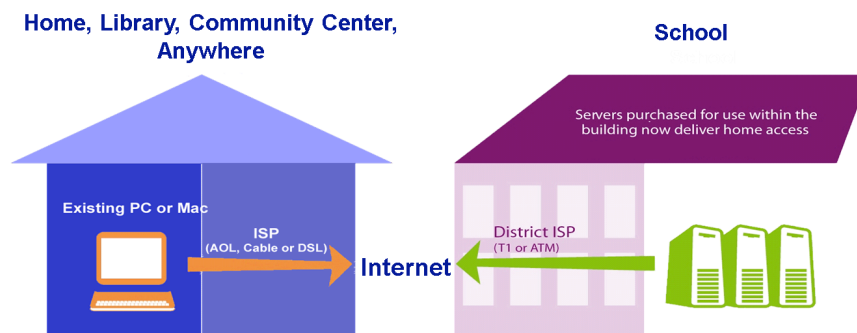
There are several strategic educational and technical benefits of desktop virtualization.

1. Home access:

Because the education applications that students use during the day have been moved to application servers, they are able to access them remotely from any computer that has Internet access. Having access in the evening and weekends extends learning beyond the classroom.

Many of the applications that are used at school are not commonly found in the home, so having 24x7 access to them increases the district's return on investment for their software purchases.

Students can retrieve or save their work files directly to their Home and Share drives, or teacher created 'drop boxes'; thus eliminating the need for flash drives and other peripherals to be transported to and from school.



Utilizing ClassLink Launchpad in this environment, provides teachers with collaboration tools so that they can easily work online with students during non-school hours.

No matter where students are within the school building when they log in they see the same menu and have access to the same programs. In many schools, all of the student's applications are not loaded on the hard drives of every machine, so consistent access is not possible.

Virtualization a New Paradigm for Instructional Technology

3. Consistent, Reliable Access from Anywhere at Anytime

2. Slows the Computer Replacement Cycle:

Because the educational applications have been taken off of the individual computer hard drives and installed and run on application file servers, the processing power of the individual desktop computer is not used. Consequently, the device that the teacher, student, or staff member uses does not have to be the 'latest and greatest' to run the 'latest and greatest' applications. This allows the district to utilize their older computers for longer periods of time without impacting their instructional functionality.

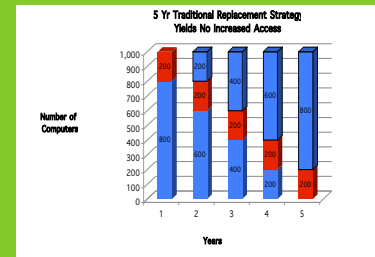
Slowing the replacement cycle can be a major cost savings for a school district with limited resources. A typical district refreshes its computers every 5 or 6 years. Virtualizing the desktop computers can extend the refresh cycle to 10 to 12 years. Doing this saves the district the expense of one complete replacement cycle. This is an important area of cost reduction.

3. Device Independence:

Once a school has virtualized its desktops it is free to purchase a variety of low cost devices, in addition to the desktops and laptops that have been purchased in the past. Many schools purchase 'thin clients' at a cost of approximately \$200 for some areas, netbooks for \$400 for other areas, and continue to purchase fully loaded desktops and laptops that they have always purchased.

By virtualizing the desktop and creating device independence the district can save significant dollars in the initial purchase of devices, and save even more by not having to replace them in a 5 year refresh cycle

Traditional 5 Year Replacement Cycle Yields No Increased Access...



Device Independence



Netbook = \$350



Thin Client = \$200

*Note: Estimate only. Prices may vary.

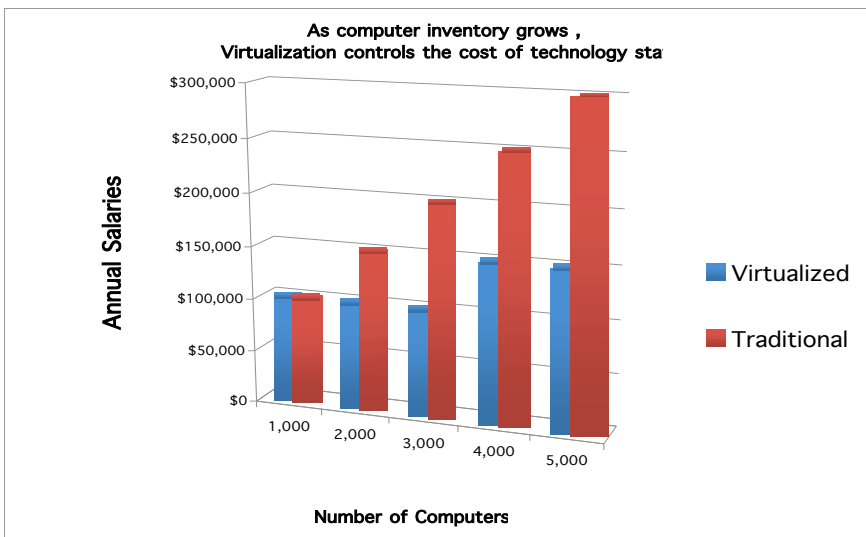
Virtualization a New Paradigm for Instructional Technology

3. Consistent, Reliable Access from Anywhere at Anytime

4. Lower IT Support Costs:

Virtualizing student desktops removes most software from the local hard drive. Doing this reduces the amount of time IT staff spends managing and supporting hundreds of desktop computers. Most issues are resolved centrally on the application file servers.

As more computers and other devices are added to the network, this new approach will slow the growth of additional IT support staff.



The chart indicates that as more computers are added to the network, technical staff is added at a slower rate if the desktops are virtualized (blue bars) versus the more labor intensive, traditional desktop approach. (red bars)

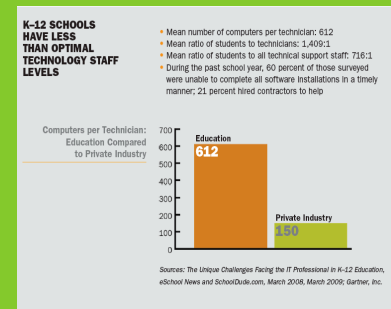
This can be a significant cost savings over time.

K-12 Traditional Desktop

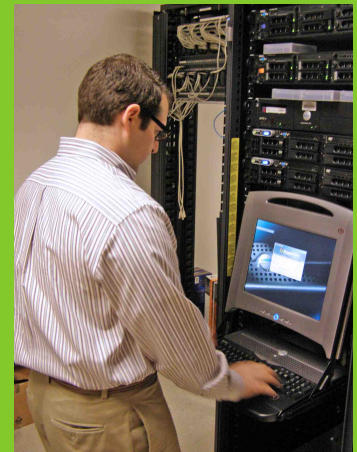
1 Technician required for every 500-750 computers

K-12 Virtualized Desktop

1 Technician required for every 1000-1500 computers



Note: Number of computers per technical support staff statistics from "The Unique Challenges Facing the IT Professional in K-12 Education, eSchool News and SchoolDude.com, March 2008, 2009; Gartner, Inc.



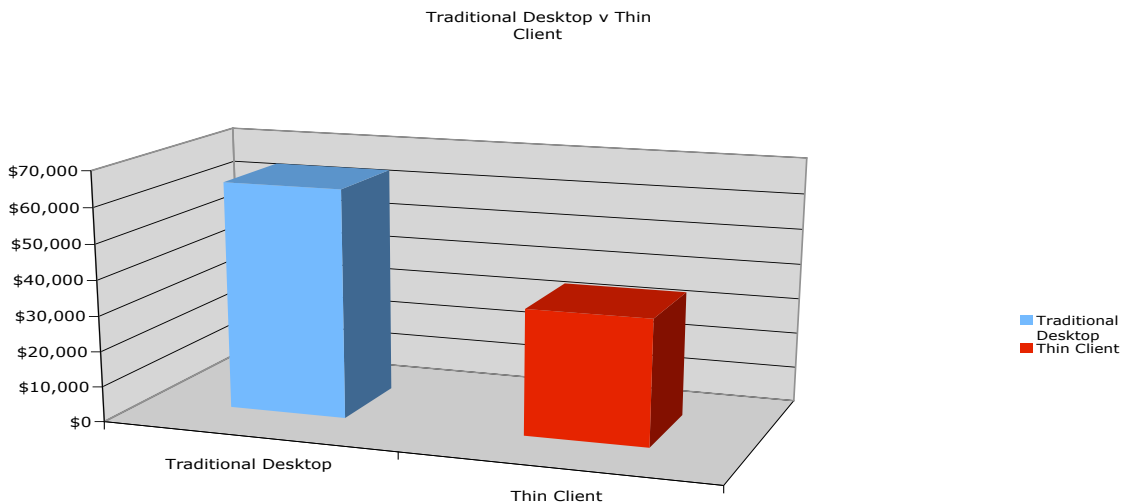
Virtualization a New Paradigm for Instructional Technology

3. Consistent, Reliable Access from Anywhere at Anytime

5. Lower Energy Costs:

The amount of energy a computer uses can vary greatly based on many factors. Under 'moderate use mode', defined as being powered on and under average application load, a traditional desktop computer uses 100-200 watts of energy. A typical monitor might use 75 watts. Together the computer and monitor consume 175-200 watts of energy each hour. A typical Thin Client computer uses approximately 6kWh of energy.

When we look at the cost of electricity to maintain traditional desktops and monitor versus Thin Client devices the savings is substantial.



Using Thin Clients instead of traditional desktop computers can save 45%-60% in energy costs. The approximate savings for implementing Thin Clients for a 1,000 computer network is more than \$30,000 per year; a 45% savings in energy costs.

The 5 year savings is estimated at \$150,000.

Appendix A:

Multimedia Applications and Hybrid Virtualization Implementations

Although most applications work well in a virtualized environment, not every application does. For instance, it would not be advisable to virtualize computer programming application or video editing and audio editing applications. Some highly processor intensive applications such as CAD use more server resources than optimum and although they can run effectively from servers, it makes more sense to install and run them on the local computer hard drive.

When applications need to run locally, a hybrid environment is implemented. In a hybrid environment a user can toggle between the universally accessible applications available from the servers and the Internet, and the applications installed locally.

As part of the virtualization pilot, middle school teachers were asked what applications they use with their students. The most commonly used applications were: Word Processing (91%), PowerPoint (82%), SMARTNotebook (72%), Online textbook (72%), PhotoStory (55%), and United Streaming (55%).

Most of these applications will run virtually,. The technical staff is working to resolve performance issues with United Steaming; however, it is advisable to consider a hybrid model going forward.

		Response Percent	Response Count
SmartBoard/Notebook		72.7%	8
Multimedia (Photostory or iMovie)		54.5%	6
Audacity		18.2%	2
Word Processing		90.9%	10
PowerPoint		81.8%	9
Publisher		27.3%	3
Excel		18.2%	2
Finale		9.1%	1
UnitedStreaming Video or video streaming from websites		54.5%	6
Online Textbook		72.7%	8
Photoshop Elements		18.2%	2
Geometer Sketchpad		9.1%	1
Playing Audio files		27.3%	3

Resources and Partners

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