

One-to-One Pilot

BY PETE REILLY
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Shoreham-Wading River CSD Pilots Netbooks, and Home Access

Shoreham-Wading River CSD students pioneer a new approach to teaching and learning.

The Eastern Suffolk BOCES Model Schools program selected the Shoreham-Wading River CSD from a number of applicants to participate in a public/private partnership designed to explore the efficacy of one-to-one access, netbook computers, virtualization, and home access in the K-12

environment.

The partnership was a collaboration of Eastern Suffolk BOCES, CDW-G, ClassLink, Ed Tech Journeys, and the Shoreham-Wading River schools.

CDW-G provided netbooks for the students, as well as the server for virtualizing them. ClassLink provided their award winning LaunchPad and Inquiry software, as well as installation and support services. Ed Tech

Journeys provided coordination and evaluation services.

Mr. Tom Tomaszewski, HS science teacher, was chosen to pilot these technologies and to assess their effect on teaching and learning.

The classroom was outfitted with a set of netbook computers, wireless access, a file server to virtualize the computers, and ClassLink LaunchPad software.



Shoreham-Wading River
CENTRAL SCHOOL DISTRICT

The Shoreham-Wading River Central School District is committed to the intellectual, physical, emotional, and social development of its students. This is achieved through an alliance of community, parents, educators, and support staff, all of whom share the common goal of providing quality, affordable education through a differentiated and integrated curriculum. We endeavor to develop each student to the maximum of his/her potential.



The Shoreham-Wading River CSD Project Partners

Realizing that most districts are having difficulty seeing beyond the financial, technical, and management obstacles presented by One-to-One computing, Ed Tech Journeys (ETJ) set out to demonstrate several new and emerging ‘best practices’ that make One-to-One computing possible for the average school district. ETJ, an educational consulting company founded by Pete Reilly, current President of the New York State Association of Computers and Technology in Education (NYSCATE), and former Director of the Lower Hudson Regional Information Center, sought partners to participate in a project that would combine One-to-One computing, cloud computing, virtualization, and netbooks.

Darlene Roces, Administrative Coordinator, Eastern Suffolk BOCES, solicited participants for this project through an RFP and chose the Shoreham-Wading River CSD from among several competitive district applications. Ralph Sharkis and Mike Rooney brought the many resources of CDW-G to the pilot, in addition to providing the netbooks for the students, and the server used to virtualize them. Berj Akian, CEO of ClassLink, was added to the team because of his experience in both the One-to-One and virtualization arenas and for his company’s award winning LaunchPad software.

Project Goals:

1. Evaluate the learning benefits of one-to-one in the classroom.
2. Evaluate the teaching and learning benefits of 24x7 access
3. Evaluate the usefulness of ClassLink LaunchPad as a classroom instructional tool
4. Evaluate the practicality of Netbooks for high school students environment
5. Evaluate virtualization as a new paradigm for instructional technology
6. Evaluate the financial case for one-to-one or ubiquitous computing for the average school district

2009 CoSn Survey:

"K-12 education technology leaders were surveyed 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."



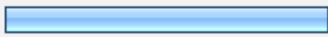
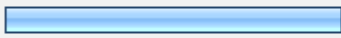


One-to-One Survey Results

1. One to One Access Helped Students Learn

The pilot provided each of Mr. Tomaszewski's science students with a netbook computer. The netbooks were distributed at the beginning of every class and retrieved at the conclusion. Previously, classroom access to computers was minimal. Since in the past there were few computers available, there was little science software in use. Instead Mr. Tomaszewski primarily utilizes science web sites and web collaboration tools.

Having the computers in class made a huge impact on the students. **Niney-two percent** of students indicated that having their own computers was **'Helpful'** or **'Very Helpful'** in their learning.

1. Did having your own computer in class help you learn?		 Download	
		Response Percent	Response Count
Not helpful		7.8%	4
Somewhat helpful		45.1%	23
Very helpful		47.1%	24
<i>answered question</i>			51
<i>skipped question</i>			0

Sampling of Student Comments:

"I found myself eager to learn and it enabled me to stay focused on the topic and succeed in the chapter. It was great having links to review sites so it was easy to just click to get to them instead of having to type in the link."

"I definitely like seeing the information all written out like it was on the internet sites we used. I am more of a visual learner than an audio learner, so the computer was a great addition to the learning process."

"I was able to concentrate on my work and answer my own questions, it was like a personal tutor."



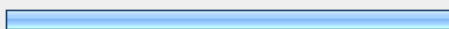

"I enjoy working independently, I was able to do things at my own pace."

"It helped by having the VAST internet resources at my disposal"

One-to-One Survey Results

2. Home Access Helped Students Learn

Because the pilot was initiated late in the year, and because Mr. Tomaszewski primarily used web sites and tools that students accessed directly from their home computer web browsers. Most students did not use the home access capabilities that were available through the pilot. However, over **eighty-one percent** of the students indicated that having the ability to access their files, projects, and school software from home ‘**would be useful**’ in their learning.

6. If you could access your Home and Share drives, as well as all your school applications from home, do you think  Download this would be useful in your learning?		Response Percent	Response Count
No, this would not be useful.		8.3%	4
Yes, it would be useful in my learning.		81.3%	39
I'm not sure if it would helpful.		10.4%	5
		Show replies Explain:	31
		answered question	48
		skipped question	3

Sampling of Student Comments:

“The ability to access our O drives at home was invaluable because it is very difficult to transport files back and forth. Floppy discs are generally obsolete and flash drives are prohibited on most school computers. As a result most students don't save much to their school accounts because the files essentially become trapped on the school computers, which are difficult to access if a student isn't taking a class that meets in the computer labs each day.”

“Most of the time, projects and assignments that are started during class are not finished during class. Being able to access my home and share drives at home will help my learning process and efficiency.”

“I could continue things at home that I did in school without the huge time gap from school to the next day at school.”

“I do not begin things I need to save in school just because I will not be able to access it at home. Therefore everything is done at home, and if I forget something on my computer there is no way I can get it in school. This has been extremely frustrating over the course of the last four years. Overall being able to access my drive at home has been a very convenient tool.”

One-to-One Pilot Results

3. ClassLink Has a High Impact on Ease of Use

The students in Mr. Tomasweski's class used ClassLink LaunchPad as an easy way to get to their personalized menu of applications, websites, files and projects . It gave every student a consistent and reliable experience, as well as kept classroom management of the netbooks to a minimum.

Mr. Tomasweski indicates in his evaluation that utilizing ClassLink LaunchPad had a **'High Impact on Ease of Use'**. He also found that having access to school software and files from home would have a **'Significant Impact'** on his students' learning experience. In fact, Mr. Tomasweski found having access to his files from home and school and being to save files for his students and co-workers in their home or share folders were the LaunchPad tools that he valued most.

As stated earlier, because the pilot was initiated late in the year, and because the netbooks were being used in a classroom where little or no desktop software was being utilized, the full benefits of desktop virtualization, as well as the benefits of the LaunchPad software provided by ClassLink were not fully explored.



What is Desktop Virtualization?

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

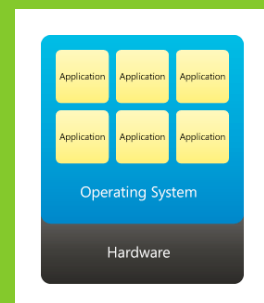


Figure 1: Applications are installed on an application server.

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

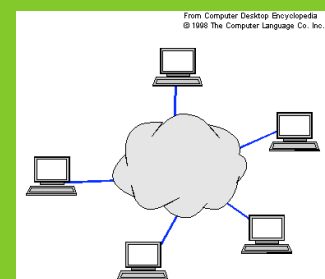



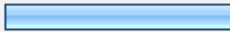
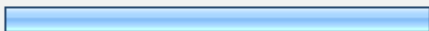

Figure 2: Computers access the server from anywhere.

One-to-One Survey Results

4. Netbooks Accepted at HS Level

Sixty-eight percent of students felt that the size of the netbooks were ‘**Good**’ or ‘**Great**’. A third of students did not like the size. These numbers suggest that a significant number of HS students find the small keyboard, screen, and trackpad appropriate to use. Most of the student comments, however, reflected the shortcomings of the netbook computers for HS students.

The cost-benefits of netbooks may outweigh the minority’s objections to their physical dimensions. It may also be unfair to lump all netbook computers together. Individual brands and models have important differences. Some have larger keyboards, etc. Before making final decisions about the efficacy of netbooks at the HS level it may be prudent to preview additional models.

3. Did you like the size of the Netbook?		 Download	
		Response Percent	Response Count
I didn't like the size		32.0%	16
The size was good		60.0%	30
The size was great		8.0%	4
<i>answered question</i>			50
<i>skipped question</i>			1

Sampling of Student Comments:

“The keyboard is way too small and hindered my ability to type. I constantly found myself typing the wrong letters and having a hard time hitting the Backspace button. The size of the screen was comparable at times but was often annoying on larger pages as I was not able to view the entire screen at once.”

“My hands are too big for the keyboard.”

“The trackpad is terrible, very poor response even when settings were changed.”

“The computer size is unrealistic to work with comfortably.”

One-to-One Pilot Results

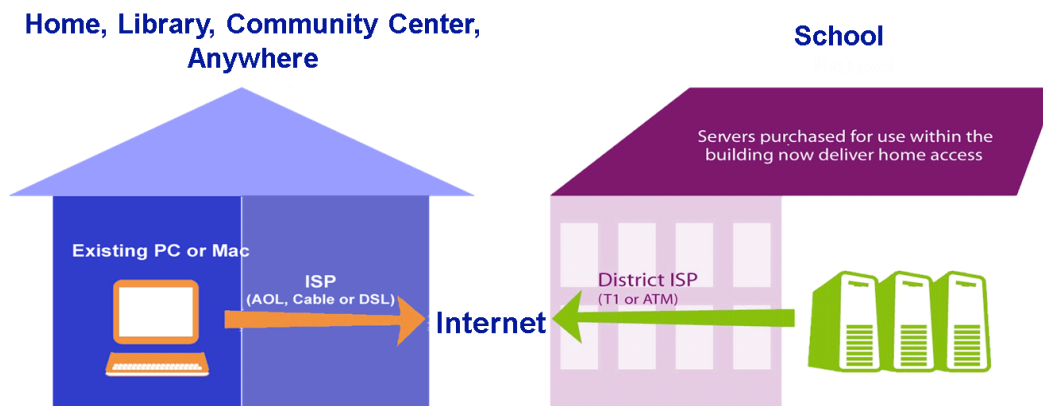
5. Desktop Virtualization Benefits

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.

One-to-One Pilot Results

5. Desktop Virtualization Benefits

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.

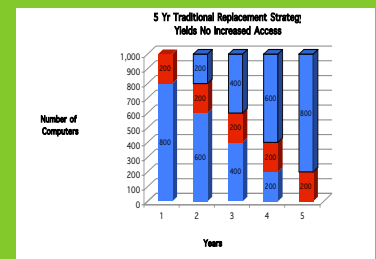
3. Device Independence:

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.

Device	Estimated Cost
Traditional Desktop	\$600
Traditional Laptop	\$600-\$1200
Thin Client	\$200-\$400
Netbook	\$350-\$500

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.

One-to-One Pilot Results

5. Desktop Virtualization Benefits

4. Slows the growth of IT Support:

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.

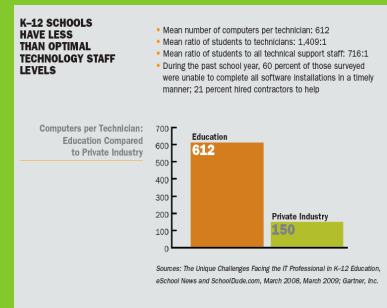
As more computers and other devices are added to the network, this new approach will slow the growth of additional IT support staff.

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.

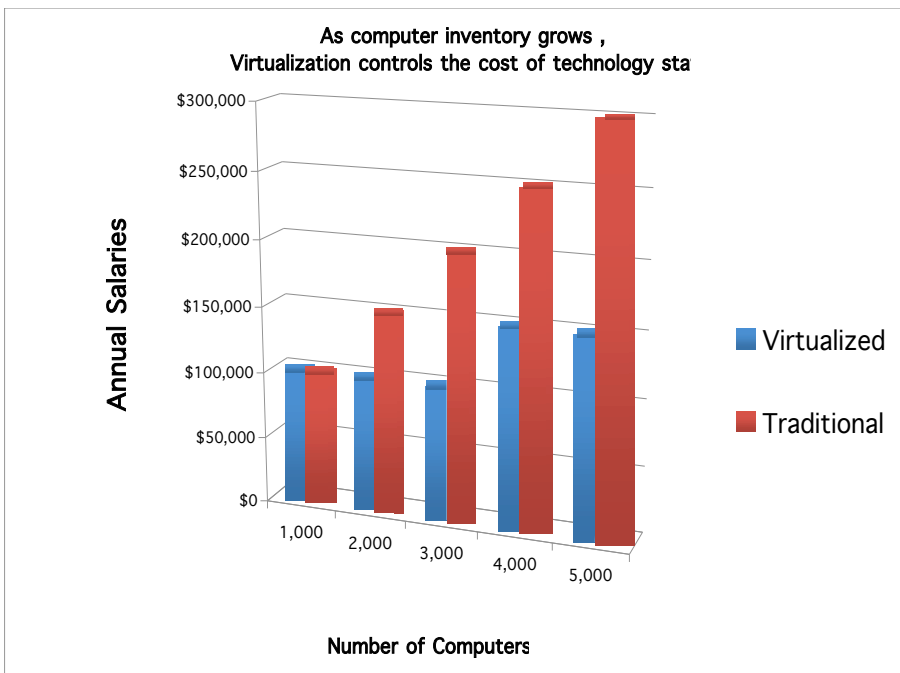


Chart indicates that as more computers are added to the network, technical staff is added at a slower rate if the desktops are virtualized (blue bars) versus the more labor intensive, traditional desktop approach. (red bars)

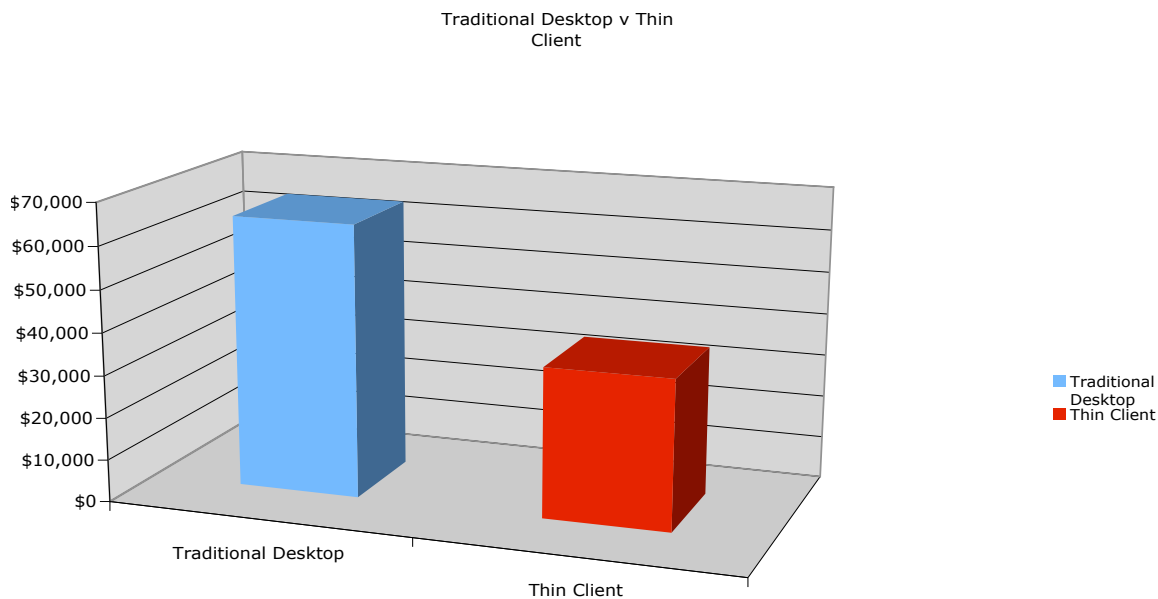
One-to-One Pilot Results

5. Desktop Virtualization Benefits

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.

One-to-One Survey Results

Teacher Survey

Mr. Tomasewski responses to survey questions provided at the end of the pilot:

1. Did students having their own computers deepen their learning experience?

Students having their own computers had a **'High Impact on deepening student learning'**.

2. Do you think that students having home access to the school network might have a positive impact on teaching and learning?

Home access should have a **"Significant Impact on student learning/'**

3. Did having the LaunchPad desktop make using the technology easier?

Utilizing ClassLink LaunchPad had a **'high impact' on making technology easier to use.'**

4. Did the 1:1 environment help you facilitate learning at a deeper level?

The One-to-One had a **'moderate effect'** on facilitating **deeper student learning.**

5. What were the notable impacts on having a 1:1 student to computer ratio? **Benefits:**

"Student interest was increased and maintained." Also, "Assignments were more flexible, they (students) provided simulations and interactions and I was able to monitor that each student was on task and focused on the lesson." - Teacher

"I had 65 students use the notebooks almost on a daily basis. The overall impression was that this provided them with a very beneficial way to learn. It was interesting to them, enabled them to focus on specific topics that they needed to pay attention to - rather than move along with the class (we used them for a review to wrap up the year). The few that downloaded the client at home expressed that this would have been great if they had access throughout their high school career. It was a very positive experience for them." - Teacher

Appendix A: One-to-One and Ubiquitous Computing to empower and engage students

From a teaching and learning perspective one-to-one computing makes complete sense and the positive results of this approach have been well researched and documented.¹

More widespread access to computers makes it possible for students and teachers in schools to transition from occasional, supplemental use of computers for instruction to more frequent, integral use of technology across a multitude of settings (Roschelle & Pea, 2002).

Ubiquitous, 24/7 access to computers makes it possible for students to access a wider array of resources to support their learning, to communicate with peers and their teachers, to become fluent in their use of the technological tools of the 21st century workplace. When students are also able to take computers home, the enhanced access further facilitates students keeping their work organized and makes the computer a more “personal” device (Vahey & Crawford, 2002).

Unfortunately, one of the most common deployment models are pods of 3 or 4 computers in a classroom which puts a tremendous classroom management burden on teachers and disempowers students in a ‘**shared pencil**’ environment.

Another prevalent deployment model is the one computer classroom (often with interactive whiteboard) which also disempowers students by putting them in a ‘**many watching one**’ environment.

Computer labs empower students by allowing them to have their own devices; but access to labs is limited and generally not part of the core classroom experience.



Figure 1: Example of a “shared pencil” deployment.

Definition:

“We define ubiquitous computing environments as learning environments in which all students have access to a variety of digital devices and services, including computers connected to the Internet and mobile computing devices, whenever and wherever they need them.”

“Our notion of ubiquitous computing includes the idea that both teachers and students are active participants in the learning process, who critically analyze information, create new knowledge in a variety of ways (both collaboratively and individually), communicate what they have learned, and choose which tools are appropriate for a particular task.”

From What is ubiquitous Computing?, Center for Educational Technology, [http:// www.rcet.org/ubicomp/what.htm](http://www.rcet.org/ubicomp/what.htm)

One-to-One Success Depends on Teacher Support and Support for Teaching

“It’s really not about the laptops. It is about what the one-to-one laptops enable in terms of new ways of teaching and learning...”

If the teachers and the technology specialists do not have opportunities to learn about and plan for meaningful and well-managed one-to-one uses, it is less likely that the laptop programs’ goals will be reached, and the related investments warranted.”

– Matt Dunleavy, What Added value does a One-to-One Student to Laptop Ratio Bring To Technology-Supported Teaching And Learning?

Appendix A: One-to-One and Ubiquitous Computing to empower and engage students

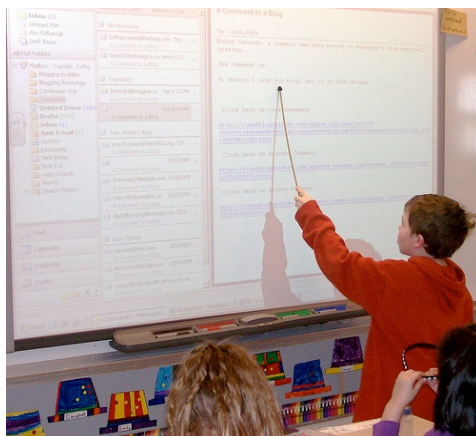


Figure 2: Example of a “many watching one” deployment.

The 21st Century Skills of initiative, self-direction, flexibility, collaboration, and user responsibility; skills that are fundamental to our children’s future success, are undermined by the technology deployment models described above. We need new technology deployment paradigms that empower students and teachers and serve as catalysts for transforming classrooms into environments that model the 21st Century Skills that are so desirable in the workplace.

Those new paradigms are ‘one to one’ and ubiquitous computing. So why aren’t ‘one to one’ and ubiquitous computing environments more prevalent?

It is the economics, management, and technical support of one-to-one computing that seems so daunting. How can we envision a ubiquitous, one-to-one technology environment when our educational technology budgets and minimal support staffs can barely support what we are doing today?

The fact of the matter is that if money and resources were no object, most of us would take steps to expand our computer inventory so that access to learning technologies was seamless, reliable, and ubiquitous.

21st Century Skills

Today’s life and work environments require far more than thinking skills and content knowledge. T

FLEXIBILITY AND ADAPTABILITY

Adapt to Change

- Adapt to varied roles, jobs responsibilities, schedules and contexts
- Work effectively in a climate of ambiguity and changing priorities

Be Flexible

- Incorporate feedback effectively
- Deal positively with praise, setbacks and criticism
- Understand, negotiate and balance diverse views and beliefs to reach workable solutions, particularly in multi-cultural environments

INITIATIVE AND SELF-DIRECTION

Manage Goals and Time

- Set goals with tangible and intangible success criteria
- Balance tactical (short-term) and strategic (long-term) goals
- Utilize time and manage workload efficiently

Work Independently

- Monitor, define, prioritize and complete tasks without direct oversight

Be Self-directed Learners

- Go beyond basic mastery of skills and/or curriculum to explore and expand one’s own learning and opportunities to gain expertise
- Demonstrate initiative to advance skill levels towards a professional level
- Demonstrate commitment to learning as a lifelong process

Resources and Contacts

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