Agenda Item #12

"Innovation Without Restriction"

Glenbrook High School District 225 Technology Plan

2011 – 2012

Prepared for:

District 225 Board of Education

Prepared by:

Michael D. Riggle, Ed.D.
Superintendent

Marcus Thimm
Chief Technology Officer

Ryan Bretag
Coordinator of Instructional Technology
Glenbrook North High School

David Jakes
Coordinator of Instructional Technology
Glenbrook South High School

Kim Ptak, Ed.D.
Director of Operations and Purchasing

March 21, 2011

Executive Summary

The Glenbrook H.S. District 225 Technology Plan for 2011-2012 returns the district to the beginning of a three-year cycle for infrastructure and computing devices. The 21st Century Learning Ecosystem is growing substantially and providing teachers with alternatives for instructional strategies that will help students engage more fully with curricular content. It is important that the district infrastructure be robust and provide the reliability and redundancy necessary to avoid lost instructional time and other conditions that potentially impede the user environment.

Important Considerations

The following considerations either alter or enhance the basic tenets of previous technology planning efforts:

- **Computer Choice**. Internet-based applications have allowed the district to transition from a platform-based philosophy to browser-based. For the new three-year lease agreement, certificated staff will be allowed to choose either the MacBook or a comparable PC as their personal district-supported laptop.
- **Platform updates**. Windows 7 and Mac OS X Snow Leopard will be the operating systems used for the PC and Apple platforms next year.
- **Concept of Landing**. The district will update operating systems and major applications in a manner that does not allow users to "land" on products that eventually become outdated and burdensome to support.
- **Student Access**. A student survey has been completed and will be used to develop a plan to increase student access to the learning ecosystem.

Technology Projects for 2011-2012

- Student Information System – continued implementation of SchoolLogic.
- Business Software – identification and purchase software to replace JSchool.
- Website Redesign – redesign website as recommended.
- Library Software Replacement – replaces old cataloguing system.
- Internet Access – provide redundancy through a second service provider.
- Content Filtering – replace content filtering with superior product.
- Voice over IP phone system – replace digital system in GBN and GBS.
- Wireless Access – increase access points to improve WiFi at both schools.
- Network Wire Management – replacing patch cables in all data closets.
- GBN Fiber Connection Maintenance – work with Northbrook to improve ring.
- GBN – GBS Fiber Connection – additional single mode connection.
- Data Closet Cooling and Emergency Power.
- Server Refresh
- Storage Area Network (SAN) –upgrade and expansion.
- Back up Software Replacement
- Virtual Desktop Technology – pilot

Budget Synopsis

- Reduction in non-payroll budget of 8% (-$127,000)
- Increase in payroll budget of $61,000.
- Decrease in overall technology budget of -$62,000.
- Overall technology budget is approximately 3% of total operating budget.

"Innovation Without Restriction"
Glenbrook H.S. District 225 Technology Plan
2011 – 2012

Introduction

During the Spring of 2008, a group of administrators met several times to review the numerous technology challenges of the district that affected all aspects of the organization and all segments of the population including staff, students, parents and the larger school community. This was a follow-up to a review process requested by the Board of Education in the spring of 2007. It was at that time that the phrase "Innovation Without Restriction" was adopted as the desired technology condition in which the network, devices, and applications supported by the district would serve to encourage innovation among students and staff while minimizing the frustration to these efforts by eliminating technical and procedural hurdles to users. The findings of the group were presented as a technology plan with recommendations to be implemented prior to and during the 2008-2009 school year.

Background

The desired environment for Glenbrook students and staff is best described as a 21st Century Learning Ecosystem. As previously presented to the board of education, "this modern learning ecosystem is built upon the foundation of mobile educators and learners collaborating, communicating, creating and connecting in a learning community and a hybrid-learning environment no longer confined by time, space or place." The very first efforts made by the district were to complete a massive restructuring of the network along with the establishment of a three-year replacement cycle for devices staff and students would use to interface with the network as part of their daily work and activities. This was a substantial commitment supported by the board of education to resolve the numerous issues that had severely affected work and learning environments.

A key element of the first year was the replacement of computers for certified staff. An intricate process was conducted involving numerous certificated staff at all levels, that resulted in a recommendation that the Apple MacBook be issued to all certified staff involved in curriculum delivery or planning as part of their daily responsibilities. All certified staff members not involved in curriculum would be issued comparable PC laptops due to existing price differences and the known advantage the PC platform enjoyed with district-supported applications hosted on the network. A lease was fashioned and executed for the purchase of these computers, which expires in August 2011. The rationale for the selection of the MacBook as the favored device was based heavily on the dual platform capability of the laptop that would potentially resolve the long-standing debate that had split staff throughout the district over the advantages and disadvantages of the Apple and PC platforms and the districts ability to support each.

The pace of evolution occurring in technology continues to accelerate, requiring virtually ongoing discussion to identify strategies for purchase and replacement of components that will contribute to and enhance the building and maintenance of a 21st Century Learning Ecosystem. To guide our decision-making, the following descriptors were adopted prior to the 2009-2010 school year to serve as the fundamental tenets of the Glenbrook learning environment:

- Accessible
- Collaborative
- Customizable
- Engaging
- Fiscally Responsible
- Global
- Integrative
- Interactive
- Literacy-Based
- Mobile
- Participatory
- Reliable
- Secure

Going Forward into 2011-2012

As we prepare to enter the 2011-2012 school year, we chose to expand these descriptors to include:

- Empowering
- Seamless and,
- Streamlined.

Platform Debate. The success of the MacBook, the migration to Active Directory and the deployment of Internet-based applications has effectively resolved the platform debate among certificated staff. With the exception of the Apple iLife and iWork suites and software applications written exclusively for PCs, the major work applications and learning platforms required by certificated staff can be easily accessed on either the Windows XP or Mac OS X Leopard platforms. Users of the MacBook have also had the option of running both operating systems simultaneously using Parallels. However, there are very few users who actively use Parallels to operate the platforms simultaneously and the number does not justify the expense to maintain the licensing agreement.

Platform Updates. With the deployment of new computer laptops prior to the 2011-2012 school year, the initial platforms supported by the district will be **Windows 7** and **Mac OS X Snow Leopard**. We anticipate that Apple will launch **OS X Lion** later this summer and the district will move to that operating system as soon as it has been properly analyzed and tested for compatibility with existing applications and devices. OS X Lion will allow users the ability to access applications developed for the iPad, iPhone and iPodTouch, which will further enhance the learning environment. Windows 7 has been deployed in labs within the district for nearly a year. Snow Leopard has been used by a limited number of users for a similar time. It is important to note that **the district is no longer considered to be platform-based.** The major applications required for use by all staff along with the applications used for interaction with students are now primarily internet-based making the district **browser-based**, which supports 24/7 availability and is independent of location and device.

Computer Choice. The MacBook helped the district move forward in a unified manner by offering the platform environment most comfortable to the user. Prior to the deployment of the MacBook laptop, PC was by far the largest user group. It was predicted that the Apple iLife and iWork software suites would win over many users due to the overall ease of use and integrated approach to incorporating media. However, improvements of applications on the PC side came quickly along with powerful environments such as Google Apps and Moodle that were independent of platform. The familiarity of the PC operating system and file storage also contributed to the migration from PC to Apple to be less than expected. The large number of PC users that still exist, along with a diminishing emphasis on the platform, resulted in a reduced need for certificated staff to be issued the same device. **As a result, certificated staff members have been given the choice of a new Apple MacBook or a comparable PC notebook for the next leasing cycle.** All certified staff members have been asked to submit their final decision by April 8. If they fail to submit their choice, their supervisor will make the decision. Newly hired certificated staff members will also be given their choice of laptops. The district will then accept bids on the desired devices and seek financial options to be presented to the board for approval.

Concept of Landing. The evolution of technology is moving at a constantly faster pace, but organizations, however, tend to move at a much slower rate which can cause an even greater gap between new and existing technology. Employees tend to find a comfort level with various aspects of technology such as operating systems and applications. A good example of this is the Windows operating system. Significant amounts of time can pass before Microsoft launches a new operating system and in the past, these have been treated as events of worldwide significance. The transition to a new operating system can be expensive for an organization, not only based on the cost of the software, but the training that must be provided to bring employees up to speed with changes. Once an organization has "landed" on an operating system or on a desired application, the effort and cost that is required to make a quantum leap to something better is substantial. We are currently experiencing this with the change from SASI to SchoolLogic. Although there are technical hurdles to resolve, part of our discomfort emanates from a new method of completing daily tasks.

Within education, these landings are particularly detrimental because there is little time for teachers to undergo significant professional development during the school year and the ever-expanding list of mandates for training that teachers and administrators are expected to complete through federal and state mandates. The net effect is that it becomes very difficult for a school or school district to stay up to date with the latest developments that could provide substantial improvements in the services provided to students. Therefore, **the district will seek practices that will minimize the "landing" effect as new products become available while trying to provide the stability that is needed for teachers to be effective in their efforts with students.** A good example of not "landing" is Google Docs. In the course of a year, a large number of changes will occur in Google Docs with no announcement from Google. Users accept it as part of the process and move on without complaint.

On a practical level, a similar condition can be accomplished with large software application packages supported by the district. In example, the district now uses Microsoft Office 2008 for the Mac and Microsoft Office 2011 for the Mac has just been released. The district has the ability to deploy both software packages to users with the understanding that they will have one year to transition to the newer version. After a year has passed, the older version will be

removed. A similar, but different process will be conducted with operating systems. New operating systems made available for the PC and Apple will be analyzed and thoroughly tested. Once they have been determined to work properly, they will be deployed to staff devices.

Student Access. Under the leadership of Mr. Wegley, a group of teachers and administrators constructed a student survey to gain insight on current uses of and access to technology by Glenbrook students. Although significant strides have been made over the last three years to the learning environment and access by students, this survey will give extensive information as to the resources available to students and their ability to actively access them when they are away from school. Data from this survey will hopefully result in targeted efforts to increase student access at each high school and provide insight that will help teachers develop learning environments that enhance student engagement.

Technology Projects for the 2011-2012 School Year

Software Applications

- Student Information System

  The district will continue to work with MIG to fully transition into SchoolLogic. The special education module developed by the district will be implemented during the school year.

- Business Software

  The Business Department will conduct a process to identify and select a new software application package to replace the current JSchool system. Attention will be given to the needs of the Human Resources Department for proper integration or replacement of the current iVantage system.

- Website Conversion

  The district will transition from SharePoint 2007 to a new website design product that will allow improved navigation and the incorporation of various tools to enhance the environment that users experience when they visit district or school websites. Calendaring will be a major component of the website to be deployed throughout the school district.

- Library Software conversion

  The Library catalog software will be converted to a web-based and Internet-hosted service. The annual maintenance cost savings and streamlined operation and support are the primary drivers for this change. The new service provider will convert the current library catalogues. This will also standardize the library systems for both GBN and GBS.

Infrastructure Upgrades and Network Improvements

Internet Access

- Second Internet Service Provider

  Last year the district exceeded 100 MB/sec Internet usage bandwidth during peak hours of the school day. We were able to upgrade from 100 MB/sec to 200 MB/sec Internet service while reducing the monthly cost from $3480 to $2400. The savings were $12,960 per year while doubling the Internet capacity. We expect continued increase in our Internet bandwidth needs due to the adoption of an increasing number of Internet-based services such as Google Apps, Moodle, social media, Turn-it-in and Tell-me-more, online library catalogs and databases, and video distribution services like YouTube and Vimeo.

  It is necessary that the district improve Internet access services by providing redundancy and resiliency so we are not affected if our service provider encounters down time. We encountered Internet outages twice last year. Establishing a secondary connection provides additional bandwidth capacity and ensures high availability of Internet access. In this scenario we will configure our schools with Internet provider services as follows:

  - GBN will be serviced by Cogent and will have access to Comcast (existing provider) as a transparent failover in case of a provider outage.

  - GBS, OCC and the district office will be serviced by Comcast and will have access to Cogent as a transparent failover in case of provider outage.

  This type of setup is acceptable under e-rate terms as each provider is dedicated to specific school locations. The failover is not considered a redundant service as it is only failing over when outage occurs. The expected service cost for this second provider is ~$24,000 per year. We have posted the e-rate Form 470 for 2011, indicating this Internet access service need. This e-rate filing provides the opportunity to receive e-rate discounts of 40% should the district decide to subscribe to a second Internet services provider. ($24,000 for second Internet Service Provider = 40% E-rate ($9,600) + $14,400 after the E-rate discount)

- Content Filtering

  The Child Internet Protection Act (CIPA) requires all districts to provide technical means to filter Internet content. With the above-mentioned upgrade to 200 MB/sec Internet bandwidth a replacement of the existing content filtering appliance was required to facilitate the increase.

  During the last 6 months, we evaluated several content filtering products. The evaluation process was very comprehensive and involved. The finalists' appliances were put into production during the last semester to ensure their compliance with district needs. The two finalists were Cymphonix (our incumbent provider of the 100 MB/sec appliance) and M86 Security.

  While both Cymphonix and M86 Security solutions have the same capabilities in content filtering functionality, the new M86 appliance has more granular control and configuration options such as extensive predefined rule-sets for filtering; Mac agents and PC agents to ensure user account level filtering- including mobile client filtering for Mac and PC devices that are off-network.; excellent reporting and real-time monitoring; allows for 12-months logging periods.

  The M86 Security solution costs $26,460 and includes 42 months of maintenance, upgrade and support services. It replaces the 100 MB/sec appliance's $13,000 annual maintenance and license costs. M86 Security holds several statewide contracts for content filtering, while Cymphonix does not.

  ($26,460 for new content filtering provider represents 43% annual cost reduction over the solution it replaced, while increasing filtering capacity and capabilities)

Network

- Voice over IP Readiness (VoIP):

  All network-switching equipment in all facilities must be protected with uninterruptable power supplies and/or generator-backed emergency power services to ensure reliable always-on phone services when using Voice-over-IP telephony. This also protects against electrical brown-outs/black-outs that damages or destroys electronic equipment.

  The benefits of VoIP over traditional telephony are simplified processes regarding phone extension adds/moves/changes that eliminate third party management and maintenance costs. IP phone extensions are tied to network devices (IP phones) and not ports/wall jacks. IP phones use the same data network, therefore, there is less wiring required to install and there are fewer infrastructures to maintain. VoIP phones require Power-over-Ethernet (PoE) capabilities of the data network so that each IP phone can operate using power provided by the data cable connection. Our network is 100% PoE enabled!

Integration with other messaging systems like instant messaging, email applications, voicemail, and video conferencing systems, soft-phone capabilities (using a computer to make calls) become available features as part of the "Unified Communications" solution.

We have filed e-rate Form 470 for 2011 to solicit VoIP vendor responses for a district-wide VoIP implementation. The federal E-rate program will provide discounts for certain components of the VoIP telephony conversion as category 1 or category 2 services. Our district is not eligible for category 2 funding due to our low free & reduced eligibility percentage.

Annual savings potential: $40,000: cost reduction due to reduced dependency on a third party telecommunication service provider for add/move/changes that can now be handled by district IT staff. (Savings: A $6,000 cost reduction will also be realized when using SIP trunking – using our Internet connections to route calls to our CallOne public telephone service provider, eliminating certain Centrex, ISDN and T1 line services.)

- Wireless Access

  We have been tracking WiFi coverage issues during the year. The increased mobile device usage has helped pinpoint areas of improvement and we plan to add a total of 8 access points to GBN and GBS to address these needs. The new Off-Campus/Evening high school facility at 1835 Landwehr Road requires four additional access points versus the former OCC location on Waukegan Road (four access points).

  (Estimated costs for adding 12 access points ~$10,000)

- Network Wire Management

  When we replaced the old network switching equipment with our HP ProCurve Gigabit Power-over-Ethernet switches two and a half years ago, we did not re-wire and re-label all data jacks and patch panels due to work load and sheer numbers of data connections affected. We are in the process of replacing the patch cables in all data closets with new Cat5e/Cat6 connections and providing proper wire management to each data rack and data ports. We have acquired testing equipment to do most of this work efficiently in-house. This wire management refresh will improve network reliability and network troubleshooting as it will establish a single labeling and wiring standard across all facilities. This work was started at GBN last year and will expand to GBS this year. The new administrative office building was wired using this new standard.

- GBN Fiber Connection Maintenance

  The Village of Northbrook conducted maintenance on the Northbrook fiber ring that connects GBN to our data center at 1835 Landwehr as they identified problems. We also noticed several of the connections not functioning and will be working with the Village of Northbrook to repair the existing fiber or switch to new fiber connections in the cables.

- GBN-GBS New Fiber Connection

  One area of improvement on our network is to establish an additional single mode fiber connection between GBN and GBS to create a fiber ring within the district. A ring connection ensures that every location has two routes available to reach the datacenter and Internet resources. We have filed the e-rate form 470 for this new connection to solicit RFPs from vendors. The costs for this connection would be reduced by 40% reimbursements through the e-rate program. We are currently not receiving e-rate funds for the district-owned fiber connections, as they do not represent e-rate services.

Technology Data Closet Cooling and Emergency Power

The life safety/infrastructure work planned for summer 2011 will provide proper cooling in all of the data closets throughout Glenbrook North and Glenbrook South and will provide emergency power for all equipment.

- Cooling

  Currently there are existing data racks located in various technology closets throughout the buildings that are not provided with a means to remove heat from the space. There is concern that high temperatures in the space can cause equipment to shut down or be damaged. To address this issue, DX cooling units will be provided for each space and will be properly sized for the equipment loads in the space.

- Emergency Power

  Although UPS systems are in place to protect servers and equipment from short term loss of power, in the event of extended power loss, there is concern that servers will crash causing data loss and prolonged restart times after power is restored. The work planned for this summer will provide emergency power from existing generators for all data rooms. New transfer switches will be installed and tied to the existing generators. New power wiring will be extended to each equipment room and connected to the existing UPS systems.

Servers

Two and a half years ago, we implemented a HP Blade Server system and VMware virtualization allowing consolidation of almost all physical servers (over 40 servers at that time) to just 9 HP blade server systems in our district data center. Now each school location houses only one Windows server for login and network management functions as a failsafe to the virtualized server farm. The district data center houses the blade server farm along with several legacy servers and systems that cannot be virtualized. GBN houses backup server and storage for off-site backup.

Since that implementation time, we have completed our conversion from Novell to Active Directory, GroupWise to Exchange, Novell Zen to Microsoft SCCM and have added substantial services and applications to our portfolio of virtualized systems, (i.e. Moodle, GBN Moodle, GBS Moodle, SchoolLogic, TeacherLogic, HomeLogic). We are also providing testing and training instances of several server systems and operate now about 85 virtualized servers (doubling the number of virtual server systems).

The virtualized server farm needs minimum amounts of free CPU and memory (RAM) capacity to respond to usage spikes by reallocating processor and memory resources to the various virtual servers that now share the same physical resources. We are now running at 85% system utilization and need to add capacity in CPU and memory to accommodate our systems growth and the ability to automatically allocate the CPU and memory resources to those systems requiring it.

The nine HP blade servers in the data center have a total 18 CPU and 288 GB of RAM (32 GB per server blade). RAM capacity of these blade servers can be doubled to 576 GB – (64 GB per server blade). To do so, we would need to purchase all new memory modules worth $40,000 and remove existing modules. This memory upgrade is no longer cost-effective when comparing it with new server technology:

For the same cost of the above described RAM upgrades it is possible to purchase two new servers with 4 CPU each and 256 GB of RAM each. This would add 8 CPU and 576 GB of RAM to the existing capacity of the blade servers versus just 288 GB of RAM. Instead of 18 CPU with 576 GB RAM we would have 26 CPU with 800 GB RAM, which is clearly more value for the money.

The blade server farm has given the district a great start into the server virtualization. After three years of heavy use it is time to replace these systems with new technology that has better performance and scalability (and cost/performance ratios), enabling us to keep pace with requests for servers and services. Additional considerations are the increased risks of equipment failures due to wear and tear of the systems and extended warranty costs that are due after the initial 3-year term.

The entire HP blade server farm of 9 blade servers can be replaced with 4 quad CPU server systems, while increasing capacity and performance for the next three years. The HP blade system would be reused for less critical services, testing and pilot environments and spare and backup systems and retired from service as they fail.

(Recommendation: $80,000 - purchase of four new Quad CPU servers as described. The costs could be distributed over the three years of expected life using leasing mechanisms)

Storage Area Network (SAN)

The district implemented an HP EVA4400 SAN system two and a half years ago as part of the consolidation and efficiency measures to replace 45 physical systems. The SAN system provides 40 TB of shared storage capacity. This SAN connects to our HP blade server farm and provides the storage space for all connected servers (see above). All application data, databases and user data is stored on this SAN.

As noted in the server section above: we have not only consolidated all 45 servers, but added another 40 virtual servers and increased system usage overall. The disk storage of our SAN system is now almost fully committed, which limits our ability to add additional virtual systems to the blade farm.

The main components of the SAN system are the mechanical hard drives. The typical hard drive is covered by a three (3) year warranty. Our SAN will be entering extended warranty and the failure rate of the existing disk drives will increase. The second component of a SAN system is the type of connectivity it provides (Fibre Channel, iSCSI, and ATA-over-Ethernet are the available choices).

The SAN capacity must be expanded and the SAN performance must be enhanced to keep pace with the growth in virtual servers and applications in our virtualized environment. The greater the number of virtual servers running on each physical server, the more they compete for the physical network bandwidth, storage bandwidth, CPU and memory.

Upgrade decisions in technology normally include~~s~~ these three options:

- Total replacement (rip and replace)
- Expanding the existing system (add more components of the same type)
- Adding a new solution to augment the existing system

The SAN upgrade decision will also need to include the server upgrade decision as it affects the connectivity and access required by the servers.

As laid out in the server section above, augmentation of the existing blade server farm with new stand-alone servers is the best way to increase the compute capacities of the virtualized environment. The new servers come with better network connectivity speeds (10 GB network adapters) and allow us to also rethink the SAN technology. Fiber Channel was the best performing SAN connectivity, but new technologies like iSCSI or AoE using 10 GB Ethernet are becoming cost/performance leaders.

In order to extend the life of the initial blade server and SAN architecture investment, augmentation with new systems is a prudent approach that also allows the introduction of new technology in a non-disruptive way while maximizing the useful life of the initial implementation. Rip and replace may not be cost effective, as it would eliminate this transition option. Downsides are extended warranty costs, increased equipment failure rates, inability to generate trade-in credits for existing equipment when upgrading.

With the adoption of 10 GB Ethernet on the server side, it becomes very cost effective to add high performance and high capacity iSCSI SAN technology without the Fiber Channel expense tag. During our initial implementation, we experienced significant service disruptions as the HP EVA4400 SAN solution was not robust enough. Furthermore, the redundancy implementation of HP components was not always reliable. We are open to review new technologies that improve on these issues and iSCSI represents a cost effective alternative.

Therefore, we recommend adding SAN capacity to our existing systems by introducing a lower cost solution that leverages current capabilities like 10 GB Ethernet instead of Fiber Channel while increasing performance and storage capacity overall. The new servers and new SAN investment would be aligned as they utilize the same network technology (10GB), allowing the virtualized server farm to be further condensed to fewer, more scalable servers.

Another strategic aspect is SAN replications as part of a larger Disaster Recovery strategy – an approach in which the SAN system replicates its data to another location to provide continued operation in the event the primary SAN system becomes unavailable. This replication of data requires SAN capacity equal or greater to the primary SAN. We are well positioned with our high-speed connectivity between the schools and our datacenter to accommodate this type of solution.

60 TB of high performing SAN is now available for $40,000 – half of the HP EVA4400 SAN cost three years ago.

(We are reviewing various SAN products and technologies to prepare our SAN RFP process.)

SAN Network

Servers access the SAN over a dedicated SAN network to ensure data security. The SAN network will need to match the SAN and server network speeds and we recommend 10GB SAN switching technology. (Cost: SAN network switching equipment: $25,000)

Software

- Backup Software Replacement

  With our data growth after upgrading the network, servers and SAN systems we encountered extremely long backup processes that frequently failed. The three main file servers that store all user data take at least 14 hours each to complete their full backup. Until now, we have used SyncSort Backup Exec, a “file-level” backup solution, for our backup needs. It is one of few solutions that is Novell/Windows/Linux compatible and it was the appropriate tool during our system migrations from Novell to Windows servers. We have worked with the vendor to address this performance issue as well as the failing backup jobs and feel that this product no longer meets our needs.

After evaluating other backup tools, we have selected CommVault Simpana 9, a block-level backup system that also employs hardware independent data deduplication technology. Both block-level backup and data deduplication shorten the backup window and reduce the needed disk space for the backup process. (Cost for CommVault Simpana is ~$25,000 and represents a maintenance/licensing cost reduction over our current SyncSort solution. This purchase was covered in the current 2010/2011 budget)

Virtual Desktop Technology

During the last 12 months, we explored mobile technology in classrooms, libraries and labs. We learned that the shared use of computers creates a slow login to the computers because a local user profile has to be loaded from the network and created on the local hard drive. This has proven to be problematic for classroom instruction as it takes significant time to build the local user profile for a student using the mobile device. One work around was to remove these computers from the Active Directory system and provide a generic local user profile effectively eliminating this login delay. The downside is that we cannot manage these systems effectively and would no longer be able to determine what individual users are doing with these systems.

Desktop virtualization is an option we would like to explore. This technology essentially stores desktops on the network and not to the local computer. It allows for personalized desktops for each individual staff/student so that this desktop can be accessed from or delivered to any computer. VMWare View 4.5 and Citrix Xen Desktop 5 are leading vendors in this area. We would like to explore this technology as part of a pilot. This pilot will involve the network server team and level 4 desktop technicians. (Cost projections: Citrix solution is based on student enrollment numbers x $8 per student / <$40.000 annual subscription cost, plus server and SAN storage capacity depending on the scope of deployment, other licensing models for partial deployments are available.)

Broadcasting Department – Phase 2

Last year both broadcasting departments at GBN and GBS were standardized on Apple technology for desktops, notebooks and software. A key part of the solution was a commitment to implement Final Cut multimedia editing and workflow software. Both departments reviewed competing products and determined FinalCut to be the best solution. We worked with Apple to identify the required hardware and software components as well as professional development and implementation services.

In phase 1 of this project new desktop and notebook computer hardware with the FinalCut software were deployed, omitting the FinalCut server-based sharing and workflow capabilities. This approach allowed the departments to learn the software and transition into this new environment in calculated steps.

In phase 2 FinalCut server software, required server hardware and media storage systems for both departments will be implemented that will allow them to utilize workflow processes, sharing of media files and collaborative editing of media content that resides on the media storage system. Apple certified Servers and Storage will be installed and configured, Glenbrook IT staff will be trained to administer and maintain this infrastructure and professional development for department staff will provide the necessary knowledge transfer to transition into the full use of the FinalCut software.

2010/2011 – Technology Budget – Payroll Dollars Not Reflected

Program 2660	**Information Systems**	**FY 10/11**	**FY 11/12**	**Notes**
109332	Professional Development	$25,000	$15,000	
109419	Supplies Departmental	$5,000	$5,000	
		$30,000	$20,000	
Program 2662 108312	**Information Services** Consultants	$20,000	$20,000	iVantage
108323	Repairs & Maintenance Services	$70,000	$80,000	Increased – no apple care warranties
108319	Professional Development	$20,000	$20,000	
108390	Other Contractual Services	$5,000	$5,000	
108414	Non Consumable Supplies	$5,000	$5,000	
108542	Software & Licensing	$200,000	$200,000	
108541	Technology Equipment	$65,000	$75,000	
108318	Improvement of Instruction	$50,000	$50,000	Tablets, document readers, etc.
108431	Electronic Resources	$48,000	$50,000	
108343	Telecommunications/Internet Service	$65,000	$100,000	Redundancy for Internet
		$548,000	$605,000	
	Total Program 2660&2662	$578,000	$625,000	
Program 2661 167471	**Information Systems** Software	$70,000	$50,000	Student system software
Program 2663 166312	**Information Systems** Consultants	$30,000	$20,000	
166320	Professional Development	$10,000	$10,000	
166322	Leases	$192,000	$140,000	
166470	Software/Non consumable	$85,000	$85,000	Includes library software
166541	Technology Equipment	$562,000	$470,000	$25K FCC radio changes, maintenance computers refresh $10K, $75K lab lease, $60K SAN, $65K servers, $120,000 broadcasting phase 2, 25K network equipment, $50K RtI tech, $40K VDI pilot
		$879,000	$725,000	
	Total Program 2661&2663	$949,000	$775,000	
PROPOSED FY 11/12 BUDGET			$1,400,000 8% decrease	
10/11 BUDGET		**$1,527,000**	**$1,527,000** 22% decrease	
09/10 BUDGET		**$1,962,500**	**$1,962,500** 30% decrease	
08/09 BUDGET		**$2,796,410**	**$2,796,410**	

Historical Technology Expenditures

		FY 06/07	FY 07/08	FY 08/09	FY 09/10	FY 10/11	FY 11/12
Program 2660	**Information Systems**						
109332	Professional Development	$32,945	$90,650	$17,000	$22,000	$25,000	$15,000
109419	Supplies Departmental	$11,358	$10,000	$13,000	$7,000	$5,000	$5,000
		$44,303	$100,650	$30,000	$29,000	$30,000	$20,000
Program 2662	**Information Services**						
108312	Consultants	$138,281	$369,500	$81,500	$75,000	$20,000	$20,000
108323	Repairs & Maintenance Services	$79,830	$100,000	$132,500	$70,000	$70,000	$80,000
108319	Professional Development					$20,000	$20,000
108390	Other Contractual Services	$40,973	$50,200	$5,000	$10,000	$5,000	$5,000
108414	Non Consumable Supplies	$61,427	$110,000	$50,000	$18,000	$5,000	$5,000
108542	Software & Licensing	$142,104	$169,000	$330,000	$180,000	$200,000	$200,000
108541	Technology Equipment	$424,772	$112,000	$112,000	$80,000	$65,000	$75,000
108318	Improvement of Instruction	$63,375	$85,000	$85,000	$85,000	$50,000	$50,000
108431	Electronic Resources			$43,000	$46,000	$48,000	$50,000
108343	Telecommunications/Internet Service	$34,605	$32,000	$72,000	$75,000	$65,000	$100,000
		$985,367	$1,027,700	$911,000	$639,000	$548,000	$605,000
	Total Program 2660&2662	$1,029,670	$1,128,350	$941,000	$668,000	$578,000	$625,000
Program 2661	**Information Systems**						
167471	Software				$250,000	$70,000	$50,000
Program 2663	**Information Systems**						
166312	Consultants			$100,000	$100,000	$30,000	$20,000
166320	Professional Development			$27,500	$20,000	$10,000	$10,000
166322	Leases			$192,500	$192,500	$192,000	$140,000
166470	Software/Non consumable			$360,000	$212,000	$85,000	$85,000
166541	Technology Equipment			$1,175,410	$520,000	$562,000	$470,000
				$1,855,410	$1,044,500	$879,000	$725,000
	Total Program 2661&2663	$0	$0	$1,855,410	$1,294,500	$949,000	$775,000
TOTAL BUDGET		**$1,029,670**	**$1,128,350**	**$2,796,410**	**$1,962,500**	**$1,527,000**	**$1,400,000**
			10%	**148%**	**-30%**	**-22%**	**-8%**

Historical Technology Expenditures

	FY 07/08	FY 08/09	FY 09/10	FY 10/11	FY 11/12
Technology Payroll	$1,003,435 (budgeted)	$1,084,867 (budgeted)	$1,233,870 (budgeted)	$1,283,225 (budgeted)	$1,348,669 (proposed budget)
Technology Non-Payroll	$1,356,030 (actual)	$2,654,113 (actual)	$1,771,147 (actual)	$1,527,000 (budgeted)	$1,400,000 (proposed budget)
Total Technology Cost	$2,359,465	$3,738,980	$3,196,370	$2,810,225 (budgeted)	$2,748,669 (proposed budget)
Total District Operating Budget	$86,676,342	$90,279,087	$90,778,419	$92,972,476	n/a
Tech Payroll as a % of District Operating Budget	1.1%	1.2%	1.3%	1.3%	n/a
Tech Non-Payroll as a % of District Operating Budget	1.5%	2.9%	2.1%	1.6%	n/a
Total Tech as a % of District Operating Budget	2.6%	4.1%	3.4%	3.0%	n/a
Total Budgeted Tech FTE	17.28	17.28	17.56	17.56	17.56 (proposed)

Increased Service Levels From FY 2007 – Today

- ✓ Wireless network on all campuses
- ✓ 3-year technology refresh cycle vs. 5-year cycle
- ✓ Improved, centralized service desk software
- ✓ Laptops with dual platform for all certified staff
- ✓ Windows Active Directory replaced Novell e-Directory
- ✓ Consistent technology equipment in all classrooms – including interactive whiteboards
- ✓ Netbooks available for student use
- ✓ Moodle – single platform for curriculum delivery
- ✓ Google Apps – collaborative space for students and faculty for classroom instruction
- ✓ Increased internet bandwidth
- ✓ Remote access for staff and students
- ✓ Increased level of expertise for Apple Support
- ✓ Broadcasting Equipment
- ✓ Off-Campus Equipment

Increased Efficiency From FY 2007 – Today

- ✓ Centralized Server Room
- ✓ Centralized Help Desk
- ✓ Centralized purchasing of computers and technology equipment
- ✓ Certified teachers were given laptops allowing for 1 computer to be used in the classroom and office
- ✓ Laptops were put in science classrooms to allow for use in both classroom and lab
- ✓ Career path and job classes for technicians
- ✓ Centralized software deployment and software self-service

interoffice
MEMORANDUM

to: Dr. Dave Hales

from: Dr. Craig A. Schilling & Marcus Thimm

re: **Discussion/Action: Approval of Technology Plan / Recommendations**

date: May 5, 2008

In Spring 2007 the district's technology staff presented to the board, recommendations regarding the updating of technology district wide. At that time the Board of Education requested that the administration embark upon a review process, which included consulting with staff, vendors and various consultants. The review process was to verify those strategies that would result in improving the effectiveness of technology throughout the Glenbrooks, as well as enable teachers to utilize technology more efficiently in the classrooms. The recommendations were developed with the end user in mind. The goal here was to make technology transparent to the user.

Attached, are a number of documents outlining the recommendations for "Innovations without Restrictions 2008/09". Included are recommendations, as well as an executive summary, educational rationale, and a comparison with last year's plan and budget. It is the district's goal to implement most of these recommendations by the start of the 2008/09 school year. The exception will be the distribution of new notebook computers to teaching faculty. It is anticipated that will be completed by December 1, 2008. With the purchase and replacement of staff computers, the district will have replaced approximately 50% of desktop machines between this year and next. In the end we will cascade newer machines to replace those that are obsolete. We are also going to explore the possibility of third party reconditioning to some of the older machines and making them available to our low-income students/families.

The plan documents have been reviewed on two separate occasions, April 17th and April 30th, respectively, by the Board Technology Committee, of which Skip Shein and Steve Hammer are members. The plan has also been reviewed by the district's Technology Committee the GEA and in other administrative settings. We anticipate no major staff changes at this time as a result of implementing this plan.

Once the plan is approved, we will issue RFP's, where possible, for software, hardware, and installation. Supervision of the installation will be part of each proposal. Therefore, we do not anticipate needing any additional outside assistance to implement the project. However, to insure that the project runs smoothly we have identified an implementation team, (last page of the attached Executive Summary), to oversee the project. In addition to the implementation team, we will also involve and seek input from various constituencies at key points in the process. We are also anticipating providing monthly updates to the board's technology committee.

Monday evening's agenda will be multi-faceted in that it will include presentations from a number of groups. An agenda is attached so that you can anticipate the information you will be receiving.

Attachments

GLENBROOK HIGH SCHOOLS
1835 Landwehr Road
Glenview, IL 60026

Monday, May 5, 2008 – 7:30 PM

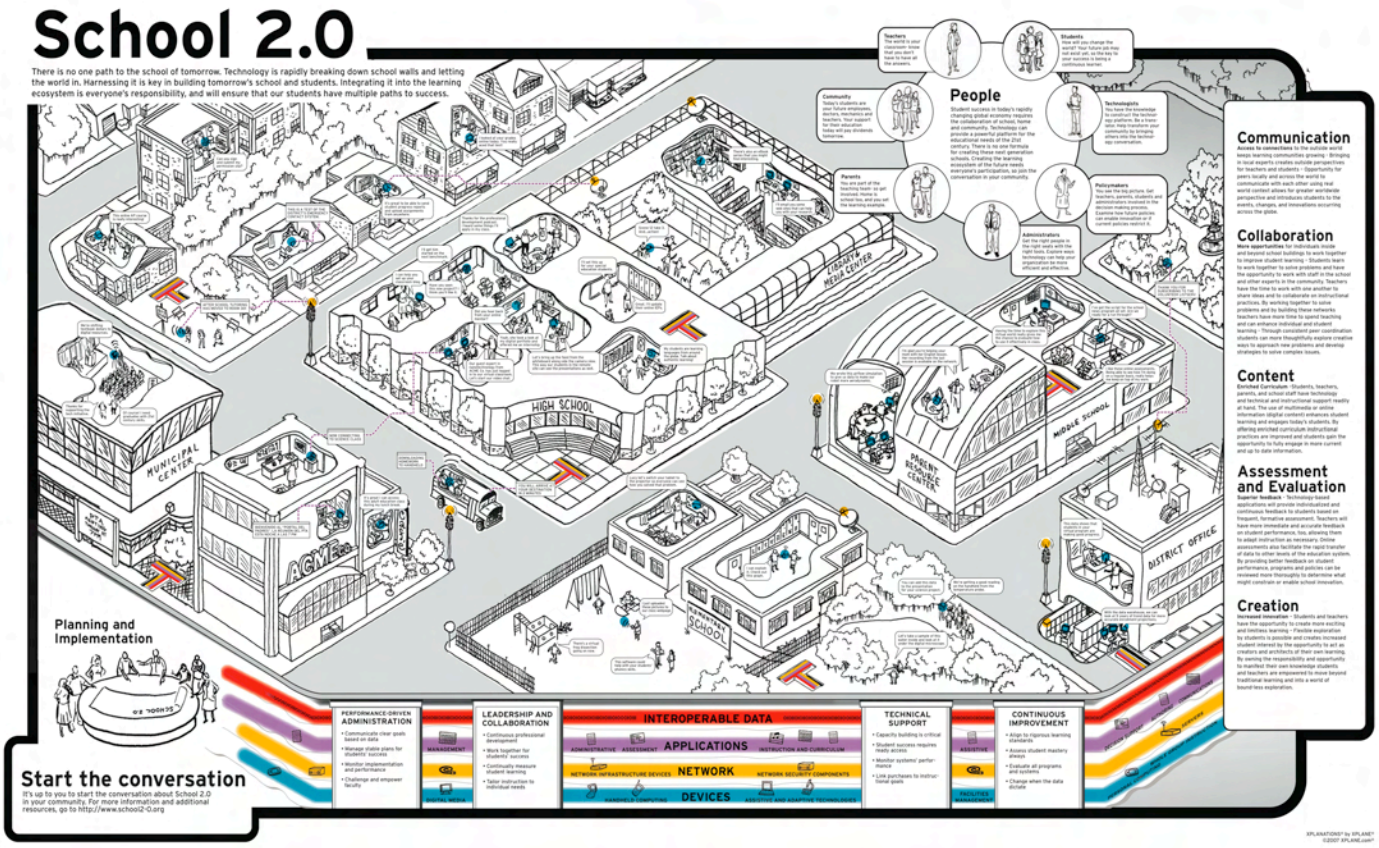
Special Board Meeting

TECHNOLOGY PRESENTATION AGENDA

1. Introduction / Overview – Presented by Craig Schilling & Marcus Thimm
2. Demonstration of MAC Book – Presented by Ryan Bretag
3. Educational Rational – Presented by Mike Riggle & Brian Wegley
4. From a Teacher's Perspective
5. Timeline / Finances – Presented by Craig Schilling & Marcus Thimm

Attachments

1. 21st Century Learning Landscape Road Map
2. Innovation without Restrictions 2008/09 (Executive Summary)
3. Technology Upgrade Plans – 2007 and 2008
4. Technology Update Plan
5. 2008 Technology Plan Budget



A Vision of a 21st Century Learning Ecosystem

Innovation Without Restrictions is the beginning of a journey to create a 21st Century Learning Ecosystem based upon the commitment of District 225 to the highest quality education for our students. This modern learning ecosystem is built upon the foundation of mobile educators and learners collaborating, communicating, creating and connecting in a learning community and a hybrid-learning environment no longer confined by time, space, or place.

District 225

Introduction

Innovation Without Restrictions is the beginning of a journey to create a 21st Century Learning Ecosystem based upon the commitment of District 225 to the highest quality education for our students. This modern learning ecosystem is built upon the foundation of mobile educators and learners collaborating, communicating, creating and connecting in a learning community and a hybrid-learning environment no longer confined by time, space, or place.

The following is a summary of the road map that will guide District 225 towards a 21st Century Learning Ecosystem.

Impact of Mobile Technology on Learning

A portable, wireless world that allows for 24/7/7 connectivity affords teachers the best opportunity to infuse technology into the learning environment and students the best opportunity to learn the 21st Century Skills[1] needed to compete and to be successful in this new world economy and digital society. While ubiquitous access (1:1) to mobile, wireless technology for all students is the vision, empowering teachers with these tools before the students is vital.

The current model of desktop computing and computer labs promotes technology for technology sake and are not as conducive to transforming the teaching and learning in the classroom. In fact, the research on the impact of mobile technology on learning and performance indentifies a number of critical points[2]:

- Transformation of the learning environment
- Enhanced professional development both in breadth and depth
- Adoption of a more process-based and formative assessments
- Increased administrative productivity especially assessment
- Increased use of a constructivist methodology
- Greater access to resources
- Better communication with parent and student
- Increase in confidence and competency with their technology skills
- Greater awareness of instructional technology, learning networks, and 21st Century learning
- Production of higher quality, more relevant teaching materials

Along with these points, there are two points that literature identifies as enhancing the culture:

- Ubiquitous Access
- Equity

Both of these foster the type of environment where all educators feel empowered to evolve in their practices in a community of practice focused on harnessing the collective knowledge of their peers, a culture vital to the successful beginning of a vision for a 1:1 student notebook environment.

---

[1] The Partnership for 21st Century Learning Skills

[2] Saul Rockman's study of various quantitative and qualitative research and Assessing an Initiative to Provide Laptops for Florida's Teachers

Professional Development Summary

Ongoing professional development is essential to the success of the movement by District 225 towards a 21st Century Learning Ecosystem. Because of this, a comprehensive road map for educators has been developed to ensure that all District 225 educators are afforded the best opportunity for success within this new landscape. Through multiple entry points and a wealth of just-in time resources, this road map serves as a commitment to learning, networking, and connecting both formally and informally for all educators.

Commitments

- Commitment One: Provide access to hardware for the 21st Century Learning Ecosystem
- Commitment Two: Provide a diverse range of formal and informal skill development critical for functioning in a dual-platform environment
- Commitment Three: Provide diverse, continuous just-in time support and professional development on evolving pedagogical and methodological repertoires for a 21st Century Learning Ecosystem that fosters risk-taking and innovation
- Commitment Four: Provide evaluation data on progress of movement to a 21st Century Learning Ecosystem

Commitment One

Commitment one provides educators access to hardware for the 21st Century learning environment that affords each teacher the best opportunity for innovation and efficiency.

Intended Outcome

Equity is created throughout the district by providing each educator access to the same hardware complete with department applications

Benchmarks

- Phase I: Instructional Supervisors, Instructional Department Administrative Assistants, and Technology Mentors
- Phase II: Early Adopters -- 8 formal sessions for educators wanting to utilize their computer during the summer; informal opportunities without support at any point
- Phase III: Departments deployment with appropriate image

Timeline

- Phase I: June
- Phase II: Formal (8 times); Informal (any time)
- Phase III: Start of School Year

Commitment Two

Commitment two provides a diverse range of formal and informal skill development critical for functioning in a dual-platform environment.

Intended Outcome

Each educator is able to utilize new hardware and applications effectively and efficiently

Benchmarks

- Technology Mentors complete two intensive summer sessions and are prepared to provide skill development training and support to their respective departments
- Each educator is able to operate in at least one platform and provided with necessary skills needed to perform basic administrative functions; if mobile, educators are able to utilize the mobile device through the school environment.
- Each educator is able to operate in both platforms and is able to make platform choice based upon needs; if mobile, staff is able to utilize the mobile device outside the school environment
- Creation of informal skill development opportunities (e.g. Interactive tutorials, electronic/print skills manual, etc.)
- Creation of self-paced online course on skill development

Timeline

- Orientation: Two-Hour Workshop upon receiving new hardware. Workshop provided by a combination of Apple, Technology Trainers, Coordinators of Instructional Technology, and Department Technology Mentors. Times based upon aforementioned Phases
- Formal: Ongoing throughout the year provided by a combination of Apple, Technology Trainers, Coordinators of Instructional Technology, and Department Technology Mentors. Times based upon site-based calendars
- Informal: Materials to be developed based upon anticipated needs
- Self-Paced Course: To be developed specifically for teachers choosing to progress on a quicker timeline than indicated by the Phases

Commitment Three

Commitment three provides diverse, continuous just-in time support and professional development on evolving pedagogical and methodological repertoires for a 21st Century learning environment that fosters risk-taking and innovation.

Intended Outcome

Teachers infuse a 21st Century Ecosystem into the learning landscape of District 225

Benchmarks

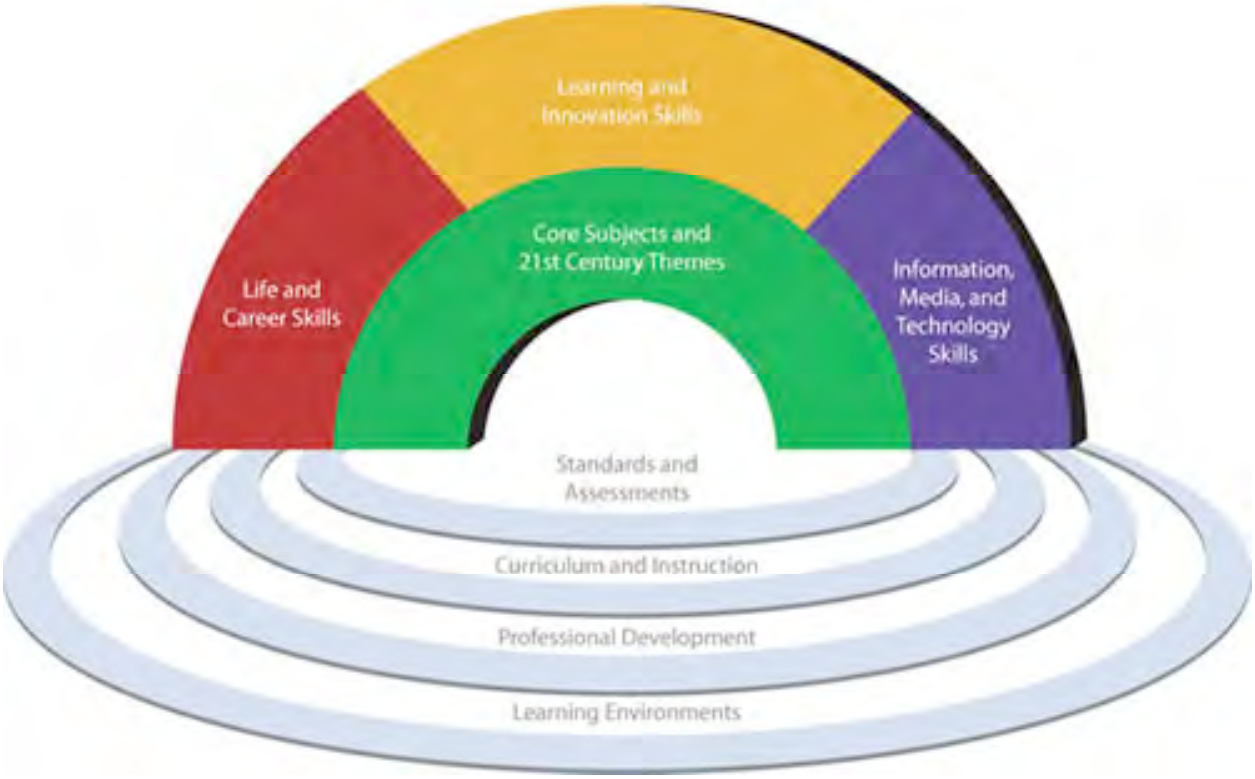
- Development of Glenbrook University Courses focused on Mobile Learning Environment, 21st Century Learning Skills[3] (see Appendix One), Digital Media, and Participatory Media/Web 2.0
- Development of 24/7 learning opportunities via participatory media
- Development of a comprehensive 3-year professional development plan in the area of 21st Century learning environment and National Educational Technology Standards for teachers (see Appendix Two) and students (see Appendix Three) offered throughout school year and during summer with a focus on a blended learning environments, participatory media, 21st Century Learning Skills, 1:1 Mobile learning, and various administrative software packages

Timeline

All three to be completed before start of 2008-2009 academic year

---

[3] 21st Century Learning Framework



Commitment Four

Commitment four provides evaluation data on the progress of our movement to a 21st Century learning Ecosystem.

Intended Outcome

Quantitative and qualitative research over a three year period covering technical components and support, professional development, classroom innovation, learning impact, and hardware and software adoption.

Benchmarks

- Establishment of data gathering tools
- Progress reports created and communicated to all stakeholders

Timeline

- Data gathering tools to be in place during the summer of 08
- Progress Reports to be communicated on a quarterly basis

Notebook Deployment Summary

Phase I

Target Completion Date

End of June

Target Audience

Instructional Supervisors, Instructional Department Administrative Assistants, and technology mentors

Training

- 1/2 workshop for each group
- 1/2 workshop with trainers and coordinators (tech mentor only)

Policies and Procedures

- Users must sign an Acceptable Use Policy as either Basic User or Power User (in development and pending discussion with GEA)
- Users must sign off during the end of the year procedure in departments or at a time when they are ready to receive their notebook that they have backed up their data allowing for their old computer to be removed and wiped clean for recycling or cascade
- Software Adoption Policy articulated and adopted (in development)

Phase II

Target Completion Date

August 15, 2008

Target Audience

Early Adopters

Training

- Formal Workshops: 8 days throughout the summer at three hours per session; 16 maximum participants each; Technology Trainer leads session at the district office; and Sign-up is required
- Informal Workshop: Teachers can come any time with a 24 hour notification to pick up their computer; No training or support unless time is free; and Baseline image unless time permits

Phase III

Target Date

Start of School (December 1, 2008 is final day of “old” technology)

Target Audience

All Educators

Training

- Overview of dual-platform during Glenbrook Day
- Department-based deployment and training during Glenbrook Day

Appendix One: 21st Century Learning Framework

Document provided by *The Partnership for 21st Century Skills*

The Partnership for 21st Century Skills has developed a unified, collective vision for 21st century learning that can be used to strengthen American education. The key elements of 21st century learning are represented in the graphic and descriptions below. The graphic represents both 21st century skills student outcomes (as represented by the arches of the rainbow) and 21st century skills support systems (as represented by the pools at the bottom):

21ST CENTURY STUDENT OUTCOMES:

The elements described in this section as "21st century student outcomes" (represented by the rainbow) are the skills, knowledge and expertise students should master to succeed in work and life in the 21st century.

Core Subjects and 21st Century Themes

Mastery of **core subjects and 21st century themes** is essential for students in the 21st century. Core subjects include English, reading or language arts, world languages, arts, mathematics, economics, science, geography, history, government and civics.

We believe schools must move beyond a focus on basic competency in core subjects to promoting understanding of academic content at much higher levels by weaving **21st century interdisciplinary themes** into core subjects:

- **Global Awareness**
- **Financial, Economic, Business and Entrepreneurial Literacy**
- **Civic Literacy**
- **Health Literacy**

Learning and Innovation Skills

Learning and innovation skills are what separate students who are prepared for increasingly complex life and work environments in the 21st century and those who are not. They include:

- **Creativity and Innovation**
- **Critical Thinking and Problem Solving**
- **Communication and Collaboration**

Information, Media and Technology Skills

People in the 21st century live in a technology and media-driven environment, marked by access to an abundance of information, rapid changes in technology tools and the ability to collaborate and make individual contributions on an unprecedented scale. To be effective in the 21st century, citizens and workers must be able to exhibit a range of functional and critical thinking skills, such as:

- **Information Literacy**
- **Media Literacy**
- **ICT (Information, Communications and Technology) Literacy**

Life and Career Skills

Today's life and work environments require far more than thinking skills and content knowledge. The ability to navigate the complex life and work environments in the globally competitive information age requires students to pay rigorous attention to developing adequate life and career skills, such as:

- **Flexibility and Adaptability**
- **Initiative and Self-Direction**
- **Social and Cross-Cultural Skills**
- **Productivity and Accountability**
- **Leadership and Responsibility**

Appendix Two: National Educational Technology Standards for Teachers

Document provided by *International Society of Technology Educators*

Digital-age teachers perform and model the National Educational Technology Standards for Students (NETS•S) as they design, implement, and assess learning experiences to improve student learning and engagement; enrich professional practice; and provide positive models for students, colleagues, and the community. All teachers should be prepared to meet the following standards and performance indicators. Teachers:

1. Facilitate and Inspire Student Learning and Creativity
Teachers use their knowledge of teaching, learning, and technology to facilitate learning experiences that advance student creativity and innovation in both face-to-face and virtual environments. Teachers:

a. promote, support, and model creative and innovative thinking and inventiveness
b. engage students in exploring real-world issues and solving authentic problems using digital tools and resources
c. promote student reflection using collaborative tools to illuminate their own thinking, planning, and creative processes
d. model knowledge construction and creative thinking by engaging in face-to-face and virtual learning with students, colleagues, and others

2. Design Digital-Age Learning Experiences and Assessments
Teachers plan and design authentic learning experiences and assessments incorporating contemporary tools and resources to maximize content learning in context and to develop the knowledge, skills, and attitudes identified in the NETS•S. Teachers:

a. design or adapt relevant learning experiences to incorporate digital tools and resources that promote student learning and creativity
b. develop technology-enriched learning environments that enable students to become active participants in setting their own educational goals, managing their own learning, and assessing their own progress
c. customize and personalize student learning activities to address a variety of learning styles, working strategies, and abilities through the use of digital tools and resources
d. provide students with multiple and varied formative and summative assessments aligned with content and technology standards and use resulting data to inform learning and teaching

3. **Model Digital-Age Work and Learning**
Teachers exhibit knowledge, skills, and work processes that are representative of an innovative professional in a global and digital society. Teachers:

a. demonstrate fluency in the application of technology systems and the transfer of current knowledge to learning of new technologies
b. collaborate with students, peers, parents, and community members using digital tools and resources to support student success and innovation
c. communicate relevant information and ideas effectively to students, parents, and peers using a variety of digital-age media and formats
d. model and facilitate effective use of current and emerging digital tools to locate, analyze, evaluate, and use information resources to support research and learning

4. **Promote Digital Citizenship and Responsibility**
Teachers understand local and global societal issues and responsibilities in an evolving digital culture and exhibit legal and ethical behavior in their professional practices. Teachers:

a. advocate, model, and teach safe, legal, and ethical use of digital information and technology,

including respect for copyright and the appropriate documentation of sources
b. address the diverse needs of all learners by using learner-centered strategies and providing access to appropriate digital tools and resources
c. promote digital etiquette and responsible social interactions related to the use of technology and information
d. develop and model cultural understanding and global awareness by engaging with colleagues and students of other cultures using digital age communication and collaboration tools

5. Engage in Professional Growth and Leadership

Teachers continuously improve their professional practice and exhibit leadership in their classroom, school, and professional community by promoting and demonstrating the effective use of digital tools and resources. Teachers:

a. participate in local and global learning communities to explore creative applications of technology to improve student learning
b. exhibit leadership by embracing a vision of technology infusion, participating in shared decision-making and community building, and developing the leadership skills of others
c. evaluate and reflect on current research and professional practice on a regular basis to make effective use of existing and emerging digital tools and resources in support of student learning
d. contribute to the effectiveness, vibrancy, and self-renewal of the teaching profession and of their school and community

These standards reflect a working draft of the 2008 Teacher Standards refresh

Appendix Three: National Educational Technology Standards for Students

Document provided by *International Society of Technology Educators*

As foundational ICT skills penetrate throughout our society, students will be expected to apply the basics in authentic, integrated ways to solve problems, complete projects, and creatively extend their abilities. ISTE's National Educatonal Technology Standards for Students (2007) help students preparing to work, live, and contribute to the social and civic fabric of their communities.

The new standards identify several higher-order thinking skills and digital citizenship as critical for students to learn effectively for a lifetime and live productively in our emerging global society.

1. Creativity and Innovation

Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology. Students:

a. apply existing knowledge to generate new ideas, products, or processes.
b. create original works as a means of personal or group expression.
c. use models and simulations to explore complex systems and issues.
d. identify trends and forecast possibilities.

2. Communication and Collaboration

Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others. Students:

a. interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media.
b. communicate information and ideas effectively to multiple audiences using a variety of media and formats.
c. develop cultural understanding and global awareness by engaging with learners of other cultures.
d. contribute to project teams to produce original works or solve problems.

3. Research and Information Fluency

Students apply digital tools to gather, evaluate, and use information. Students:

a. plan strategies to guide inquiry.
b. locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media.
c. evaluate and select information sources and digital tools based on the appropriateness to specific tasks.
d. process data and report results.

4. Critical Thinking, Problem Solving, and Decision Making

Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources. Students:

a. identify and define authentic problems and significant questions for investigation.
b. plan and manage activities to develop a solution or complete a project.
c. collect and analyze data to identify solutions and/or make informed decisions.
d. use multiple processes and diverse perspectives to explore alternative solutions.

5. Digital Citizenship

Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior. Students:

a. advocate and practice safe, legal, and responsible use of information and technology.
b. exhibit a positive attitude toward using technology that supports collaboration, learning, and productivity.
c. demonstrate personal responsibility for lifelong learning.
d. exhibit leadership for digital citizenship.

6. Technology Operations and Concepts

Students demonstrate a sound understanding of technology concepts, systems, and operations. Students:

a. understand and use technology systems.
b. select and use applications effectively and productively.
c. troubleshoot systems and applications.
d. transfer current knowledge to learning of new technologies.

INNOVATION without RESTRICTIONS 2008/09

EXECUTIVE SUMMARY

The school board and district administration seek to implement strategies that will result in an effective technology ecosystem - consisting of network infrastructure, personal computing hardware, software and support services - which would provide 21st Century technology enabled classrooms, computer labs as well as other learning/teaching and work environments.

The recommendations for technology upgrades have to directly impact the educational activities in the district. We are planning to address the key concerns of our staff by providing:

- Reliable and consistent technology access to the network and Internet to expand the learning environment
- A foundation for additional services, such as security, VoIP, Video distribution, online learning and collaboration and communication services
- Remote access to relevant district data systems for staff and students
- Standardized hardware and software for maximum compatibility, ease of use and equity
- Efficient and reliable computer systems for administrative and educational tasks
- Effective technology support services
- Network bandwidth, storage capacity and compute capability so technology is not an obstacle but an enabler in the class rooms and labs

IMPROVEMENTS AS A RESULT OF TECHNOLOGY UPGRADES:

- Refreshed wired networks at both schools to provide reliable connectivity and additional services like Voice-over-IP telephony, security & building automation or video distribution
- District wide wireless network based on the most current technology standards, (802.11N), with security and scalability in place
- Scalable Internet bandwidth of 100 MB capacity for the district and remote access for staff and students
- Web Portal / Web Sites for online sharing
- Scalable and reliable data storage on the network for any place anytime access
- Standardized hardware for all staff minimizing training and change management costs, maximizing compatibility and choice
- Standardized printing capabilities throughout the district
- Software standards that will provide maximum compatibility and choice for software

BACKGROUND

The current state of technology at the district is not at the desired levels of performance and the software tools in use are in need of upgrades. Past technology disruptions have seriously strained the trust in technology's reliability and consistency resulting in reduced use or "just-in-case" utilization. Perceived limitations are: internet experience, network access, (i.e. login speed, dropped connections), network storage capacity and personal computing environments with outdated software.

The Board of Education and district administration seek to implement strategies that will result in an effective technology ecosystem - consisting of network infrastructure, personal computing hardware, software and support services that would provide 21st Century technology enabled classrooms, computer labs, as well as other learning/teaching and work environments.

The first priority is to create a stable technology foundation on which to build. This foundation needs to provide reliable network connectivity, sufficient data storage capacity and access, and lastly processing capabilities to deliver applications and data to the users in timely and predictable fashion.

In support of this effort, Insight Inc. was selected to conduct assessments of key technology areas:

1. Novell/Microsoft
2. Storage Area Networks
3. Network
4. Security
5. Wireless Access
6. Desktop Application/Software Image
7. Energy/Power Savings

Primary deliverables for each of these assessments are:

I. Current State Analysis
II. Detailed Solution Path or Paths to achieve the desired future state.

The District provided prior assessment reports: Prescient/STS (11/2005), Graphtech (3/2006), Tympani (4/2007), Advanced Data (5/2005), Internal Surveys (2006/2007)) and the District Technology Plan 2006 – 2009. Additionally, a vision document was developed through department level sessions with entire departments, small groups and/or meetings with individual staff members. The department level meetings involved almost 150 staff members in various roles and revealed shared concerns and general expectations regarding technology uses and abilities. The technology needs were also discussed at several committees, (ATM, DTC, TAC), as well as shared with various staff members.

This current assessment work with Insight validated findings of prior assessments in several areas and made specific recommendations for some. The areas with such recommendations are Storage Area Networking, Wireless Networking, and Security. We took these recommendations as starting points and solicited proposals for the respective technology areas from several vendors. We reviewed proposals and made them comparable and we also assessed compatibility, scalability and flexibility of these solutions. Additionally, we reviewed the interdependencies of these upgrades and the necessary sequence of implementation.

With the assessment project ongoing we participated in several conferences and briefings, (i.e. Novell Brainshare, Illinois Technology Conference for Educators, and Apple Executive Briefing), and worked with hardware and software vendors to improve the district technology.

Several pilot programs were launched to assess feasibility of potential technology solutions. These pilot activities include:

Pilot A.) Apple Macbooks with Dual Boot Capabilities

These systems were deployed to two test groups of teachers, (nine per school), several district and school administrators, administrative assistants and technical support staff. An online collaboration space was used to gather feedback and share solutions. Feedback from the first group was used to refine the equipment and configuration for the second group. Peripherals and applications were thoroughly tested.

Pilot B.) Windows XP in certain Labs and Teacher Notebooks

Several instructional software titles require XP operating systems. We have installed the Operating System in those areas to tune the district software image and configuration for this platform.

Pilot C.) Notebook Systems in Science Department at GBS

Tested mobility of staff using Windows XP notebooks as their primary computer system resource. Findings: Teachers were able to move with their systems from work areas to classrooms, while maintaining their configurations and data 'on-the-go'.

Personal Computing Resources

(All technology/computing devices used by individuals to access applications, consume or create digital information)

- Printer Technology Upgrades
- Desktop Operating System upgrades for all Windows and Apple Computer system
- Acquisition of Dual Platform Notebook Computer Systems for teachers
- Adoption of Accountability and Acceptable Use Policies

Computer Platform Choice

A great concern was the decision on platform for desktop/notebook systems. The adoption of Windows based administrative software had led to a confrontation with staff depending on Apple Mac computers, as they had to adopt the PC platform to access and operate administrative applications. A survey was conducted and a committee was established to analyze the impact of standardization onto a single platform versus support for dual platform environment. The committee recommended support of the dual platform as it recognized the impact that Apple Mac computers had in several academic areas. Currently 25% of staff utilize Apple computer, some of which use PC and Mac to complete their various computing tasks.

When Apple released Intel processor based Mac OS X computers in early 2006 it changed the landscape of platform choice. When the district began the discussion on hardware platforms this option was not available. Today, the availability of Apple computers that can run OS X or Windows operating systems, or both simultaneously for that matter, makes it an ideal choice to end the old platform standard dispute.

The Apple hardware platform gives us the opportunity to establish a consistent hardware standard while affording software choice for our technology users. This would provide the district with flexibility and choice, and therefore greater opportunity, while reflecting the district's view of technology as a profit center and not a cost center. Bottom line: The platform war is over. It is now all about document standards, not operating system standards.

Feasibility
To further assess our ability to support a dual platform environment we also engaged Apple Engineering and Consulting Services to review our Apple system compatibility. Apple has provided us with technical recommendations that give us clarity on how to best support Apple technology in our heterogeneous environment. Apple engineers state that we can support Apple OS X systems with our Novell Server operating system with little changes. A migration to a Windows Active Directory is not mandated in order to support Apple systems in a heterogeneous environment. OS X servers will be used to improve the file access and home directory service across these platforms. Creating what is called a "magic triangle" between Apple's Open Directory OS X servers, our Novell Servers and the Apple desktop/notebook computers will provide integrated authentication and synchronization of user rights and profiles. This method is used for both Novell and Microsoft integration with Apple systems. As a result, users will have one home directory across both client operating systems and a single user login ID.

Staff Desktop/Notebook Standardization
Notebook Computer Systems with Dual Operating System Capabilities will be provided to all teachers and other staff groups needing mobility. This will establish a strong hardware standard while providing operating system and application choice. HP Desktop Computers will be deployed for all other staff.

This approach replaces teacher assigned desktop and classroom computers with one notebook system per teacher. Staff that currently uses one Mac and one PC computer will only need one dual operating system capable computer as well.

Notebook computers have much lower electrical requirements and lower energy consumption. They also feature batteries that provide data protection in case of power outages at a school building.

The notebook system can be taken home to provide remote access to the district network. The staff member can customize certain usability features and can opt in to "empowered ownership", after accepting associated policies and meeting certain criteria.

Remote Network Access Capabilities
This will be done via Virtual Private Network (VPN) gateways that provide secure connectivity via the Internet. Another component of this is improved internet access for the district's network.

While the district currently provides remote access to files via the Novell NetStorage and web-based email, access to applications like SASI (our Student Information System) and IGpro (grade book application), are not available via remote access today. These applications have not been accessible via a web interface and require locally installed software. Staff has requested the ability to access these applications remotely.

There are two ways to provide access to these applications:

1. Notebook computers, which have the applications loaded plus remote access capabilities to our district network, via VPN (Virtual Private Networks, providing secure access), or the Internet
2. Terminal Servers that host virtual Windows Desktops running these applications, which are accessed via web browser or client computers, that only need to run a small access program

The Insight assessment looked at virtual desktop technology to facilitate One-to-One computing scenarios and recommended tools like VMWare's (Virtual Desktop Infrastructure), to provide remote access and managed desktop experience. A key limitation of virtualization solutions is the lack of multimedia support and the need to restrict the virtualized desktop, as it is to a shared hosted software environment where the underlying hardware resources are highly utilized by many concurrent users. Terminal Services may work well for specific applications that do not require multimedia functions but it will not replace the rich capabilities a personal computer, (desktop or notebook), affords its user.

The district currently uses Windows Terminal Server services to provide access for select applications and users. We are going to expand this capability to other applications like SASI and IGPro applications. The remote access needs of our staff however cannot be satisfied with this approach alone. Notebook systems will provide 'anywhere' and 'any-time' access to all relevant resources.

Software

- Microsoft School Agreement for desktop OS and Office Productivity Software
- Adoption of United Streaming Video distribution (server and annual subscription)
- Adoption of Support Software Applications (service desk, Inventory & Asset Management, System Monitoring)

Windows XP versus Windows Vista

The Insight assessment looked at the compatibility of Windows XP and Windows Vista to our current set of applications, as well as the compatibility of our desktop computer hardware with both operating system versions. Insight recommended that we do not upgrade to Windows Vista at this time, as only about 400 desktop systems are capable of efficiently running the Vista Operating system. The hardware requirements for Vista are not met by 70% of our current hardware.

We recommend moving to Windows XP as the new baseline standard for all Windows based computers. Microsoft has extended its support for Windows XP to the Year 2014. Windows XP has a classic mode, which makes it look and feel like Windows 2000, which should minimize training needs. Also, most staff will have experience with XP either from home usage or through exposure to Windows XP based systems in select lab areas in the district.

With the new Windows Server 2008 release and Windows Vista desktops the Microsoft architecture is undergoing fundamental changes. We will benefit from evaluating these two components jointly as Microsoft positions them to work together. Therefore, we will initiate a Windows Vista pilot program to evaluate the operating system. We will leverage the pool of recently upgraded computer systems for that pilot process, as well as the new Intel based Apple Mac systems.

Microsoft is providing an annual software subscription-licensing model, (licensed per computer system), which allows us to upgrade to the most current versions of the operating system and office productivity suite software. This will provide us with the ability to stay current with the software at a predictable budget.

We recommend adopting a Microsoft School Agreement for Operating System and Office Suite.

Updated Software Standards

Windows XP and Office 200X, OS X 10.5, Office for Mac, iLife 08, iWork 08

We recommend updating the desktop operating systems to Windows XP and the office productivity software to Office 2003/2007 under a Microsoft School Agreement. This would allow us to upgrade to the most current versions at a later date without incurring additional costs. Windows Vista and Office 2007 are not fully supported by the majority of our current desktop systems based on available hardware resources. Only 450 PC have Vista compatible configurations. Windows XP upgrades will only require memory upgrades on older desktop computers.

Apple Mac computers will be standardized on OS X 10.5 (leopard) with Office for Mac, iWorks 08, iLife 08 and Windows XP for dual boot option. Mac computers will be covered under the Microsoft School Agreements for the Windows software.

Network System Upgrades

(All technology resources providing connectivity between personal computing and server systems)

- Network Switch Upgrades
- Wireless Network Infrastructure
- Internet Bandwidth Upgrade
- Internet Filtering and Firewall System Upgrade

Mobility limitations have been a key concern for staff. With the adoption of mobile devices like notebook computers, it is critical to implement a high performing, secure and reliable wireless network. As we seek to provide notebook technology to our staff, a wireless network will be a critical component of our technology foundation.

The Insight assessment validates that a large number of wired networking devices, (switches and routers), would have to be replaced due to their age and position in manufacturer's support life cycle.

Not all available data ports have been connected to the network. Inactive data ports are typically creating service desk calls and trigger support costs. We recommend adding network switch capacity to enable all data ports in the district. A first thought may be to assume that a wireless infrastructure eliminates the wired network. This is usually not true. Instead, it augments the wired network, which provides the highest performance of all available connectivity option. Wired connections will always be a preferred form of connectivity when moving large amounts of data to the local system, (i.e. Video files).

The need for connectivity will increase with a growing number of mobile computing devices and additional computer technology in classrooms and labs. We also need to add Gigabit switches and Power-over-Ethernet capabilities to our wired network so we can implement a modern Wireless N (802.11 N) standard based wireless network infrastructure. The upgraded wired and wireless network will also support other IP-network based technologies like Voice over IP telephony, video streaming, video conferencing, security systems and building automation tools. Adding Gigabit switching capacity allows re-deploying the older switches to service secondary areas, with lesser bandwidth needs, while activating more data ports throughout the district.

The overall wired network architecture allows itself to be reviewed in light of a large number of aging switches and routers, and a need for new technology and additional port capacity. With this as a starting point we have solicited proposals for wired and wireless equipment to either augment or replace the switches already in place. Additionally, we have solicited proposals from the leading manufacturers, Cisco, HP, Foundry, Meru, Aruba and Collubris, (using the Gartner Magic Quadrant Analysis Tools).

The Internet Bandwidth Upgrades are critical as we consume more and more Internet based services and provide more Internet based communications tools. This bandwidth increase requires upgrades to several appliances, which are critical in managing the traffic flow into our district network. CIPA (Child Internet Protection Act), as well as data and network security are the primary external drivers to invest here. We currently have Comcast Fiber services and this upgrade will mostly be a reconfiguration at the district office location. Comcast will perform the upgrade according to standard deployment procedures. The work cannot start before July 1st due to federal E-rate funding program regulations. The migration will be completed in July.

Data Storage

- Storage Area Network System Replacement
- Backup Systems Replacement

The district operates three, (ten year old, manufacturer end-of-life), XIOTECH Storage Area Network (SAN) systems. These systems are not technology upgradeable and are configured as not redundant to each other. The Insight assessment recommends consolidating these three systems into one larger Storage Area Network. Insight provided a design based on the HP EVA 6100 series SAN system. We have taken this design and requested proposals from competitive manufacturers.

We have reviewed XIOTECH, COMPELLENT, HP and APPLE SAN system proposals. We will also be reviewing the new SAN solution's ability to facilitate data storage growth, data management, data backup and recovery, performance reporting and monitoring as well as upgradeability/integration into a long term Disaster Recovery and Business Continuity Solution. Please note: The Disaster Recovery and Business Continuity planning was not part of the Insight assessment project.

The upgrade of our current Xiotech SAN systems is critical since we have high disk space utilization, at up to 97% of available disk space. The three SAN do not have the capacity today to provide storage space to all system users without noticeable limitations. The existing SAN will not hold necessary user data and system data that may have to be migrated as required by client system or server system upgrades.

The SAN consolidation and upgrade is a critical step to achieving a reliable technology environment. This Upgrade will be performed with full vendor support.

The data migration and cutover to the new SAN is non destructive to the existing SAN data and will be tested before going live. Test migrations could take up to 48 hours per SAN. The new SAN system will provide the district with capacity, as well as the file access performance needed to support all other upgrades and improvement processes.

Data Center

Data Center Relocation at District Office
Server System Replacements and Purchases

The district is standardized on HP Proliant server technology, which has an excellent performance and reliability track record. The district currently operates 34 servers running Novell Netware or Windows 2000 Server. The majority of these servers are out of standard warranty and over three years old. As a long-term strategy it is essential to maintain servers at peak performance and replace them before they fail in production. The support costs and extended warranty packs are also not cost effective.

As part of the technology refresh we seek to replace district servers to increase reliability and performance.

The district leverages VMWare ESX Server virtualization to reduce the number of physical servers needed. We will be expanding its use and consolidating our Windows application and database servers onto virtual servers to reduce the number of physical servers. We will also build out a virtualized Microsoft Active Directory infrastructure as a pilot project, which will avoid purchasing additional servers to run the required directory services servers.

Novell Netware based servers will gradually be upgraded to Novell Open Enterprise 2 Linux. We will also create server redundancy through clustering. (Clustering is binding servers into groups that share the same workloads). These new Novell Servers also support virtualization, which will allow us to run several workloads that would have required separate physical servers, on one server.

OS X servers will be redeployed to serve as file, policy and directory integration servers for Apple computers.

The value of virtualization is twofold:

1. Reduction of the number of servers in the data center results in reduced operation costs and better utilization of each server resource, and
2. Mobility of applications and server systems supports better disaster recovery and business continuity.

Network Operating System Choice

Novell versus Microsoft

Another concern was to review the Novell Network Operating Platform and possible migration to a Windows Active Directory environment to improve on the technology systems. It is important to review what problems this migration is intended to solve. A key problem was the Novell - OS X client integration several years ago. This issue had been resolved. Another issue stated is the slowness of Novell Network logins. Here it is worth noting that even Insight staff stated that their Active Directory login process takes several minutes. All managed network environments will impose these delays onto the users. A migration to another Network Operating system will not eliminate this phenomenon. It is a question of what level of client management do we want to impose onto the network client computers and user accounts. We are in the process of reviewing the login process and have already achieved improvements in several areas.

The Insight assessment did not provide the level of detail needed to move forward with a Network OS migration at this time. A recommendation to purchase third party software to assist in the directory migration and purchase of directory servers for each location was given. The Insight assessment advises to plan for a slow migration to Exchange server and SharePoint portal and to begin with pilot implementations. It also did not fully address the policy and software provisioning mechanisms currently fulfilled by Novell ZENworks. A Microsoft Active Directory migration does not offer immediate benefits in these regards. Therefore, we are recommending focusing on optimizing Novell services by maintaining an up-to-date Novell environment that is optimized for Apple integration for the next 12 months. We will migrate to Novell Open Enterprise 2 servers. The migration from Novell Netware to Novell Open Enterprise Server is an evolutionary upgrade. The resulting upgraded Novell Operating System has a great level of interoperability with Microsoft Windows servers and will ease any future migration plans.

As parallel activity we will build a Microsoft Active Directory system that is integrated with our Novell eDirectory. With this integration in place we can then migrate to a Microsoft Active Directory at any time and in phases to minimize disruptions.

Policies, Technology Adoption and Change Management

While there is a need for significant technology upgrades and a desire to start the next school year with improved technology, the impact of these changes needs to be considered. Some changes have to occur at the organizational level, i.e., policy adoption, change management processes, technology adoption processes and standard setting, etc. Without addressing these topics the organization will run the risk of technology related disruptions and failures.

Policy Needed:

Some staff members have voiced their desire to be more empowered with the assigned computer systems so that they can better utilize the technology and creatively explore software and hardware for their curriculum. Currently, service expectation from the service desk has not been met. Empowerment of our users will increase their innovation though technology and increase their ability to self serve. There are, however, significant risks involved with empowering users. One concern is that illegal or unlicensed software could be loaded or configuration changes may result in unstable or malfunctioning systems. Another concern is the ability to maintain a meaningful standard throughout the district.

Support Software Upgrades

We will implement new service desk software that will provide visibility into the support process, as well as be accessible by the users, via a web browser. The new support software is aligned with ITIL standards and will provide extensive reporting on key performance indicators.

We will implement Novell Asset management and inventory tracking tools to manage the physical computer assets more timely and accurately.

In Conclusion

This report primarily focuses on the technical resource aspect and is concerned with identifying those technology upgrades that can be initiated and completed before the start of the new school year. The key objective is to create a foundation of reliable, predictable and high performing services that provide network connectivity, storage capacity and computer system access that makes technology become a transparent component of learning and working at the Glenbrooks.

Please note: This list of technology upgrades does not exclude other enhancements and upgrade activities that may occur.

TIMELINE/ACTION PLAN

Upon approval of this technology project we will issue Requests for Proposals and select vendors from those who have submitted bids. We will then develop detailed deployment plans for the installation and configuration changes.

Upgrade recommendations have been grouped by technology areas and are partially interdependent. We have identified several series of upgrade activities that can occur independently of each other:

Internet Bandwidth Upgrade

Activities:

1. Comcast will provide new Fiber service between the district office and Comcast Data Center for commercial grade Internet access (100 MB service versus 20 MB today). The new Fiber connection will be brought into the new data center location at the district office.
   a. Resources needed:
      Comcast Engineering - for installation of fiber connection and service activation,
      Tympani - for network configuration changes,
      Tariq Baig - for DNS changes and internal IP address routing changes
   b. Time line:
      i. Due to E-rate requirements provisioning work would begin July 1st.
      ii. Installation of service to be installed and activated according to Comcast project plan by the end of July.

2. Purchase and Install upgraded CIPA filter and Firewall solution. Firewall and Cymphonix Internet Filter appliances need to be replaced in order to handle the upgraded Internet bandwidth.
   a. Resources needed:
      i. Glenbrook IT staff will install new firewall appliances
      ii. Tympany will configure new firewall and transfer settings from old firewall
      iii. Glenbrook IT staff will install new CIPA filter appliance
      iv. Cymphonix staff will assist in configuration migration
   b. Time Line:
      i. Upon approval a purchase order will be issued to Cymphonix and Cisco
      ii. Cymphonix will deliver new CIPA filtering appliance, Cisco will deliver new firewall appliances
      iii. Glenbrook IT will install and connect new appliances
      iv. Tympani will configure Cisco firewalls and Cymphonix CIPA filter.
3. Notifications to all third party service providers and software vendors regarding Firewall and IP address changes (i.e. Library Catalog subscription services) and create vendor list.
4. After provisioning the new Internet connection we will migrate DNS and other IP addresses to the new Internet provider and program firewalls, websites and email systems.
5. Test and Validate correct operation

Network Equipment Upgrade

Wired Switch Upgrades at both schools:

I. Data closets will need additional electrical and cooling capacity to accommodate more network switches. This can be performed by either internal maintenance staff or sub contracted, and
II. Some existing switches will have to be relocated and replaced with Gigabit and Power-over-Ethernet switches

District Office Network / Data Center

High Level activities will include:

I. Physical construction of new Data Center location, with power and cooling services. ARCON will develop designs and plans.
II. Build out of Data racks, UPS, Cooling data wiring and electrical. After the RFP process and award of contract, the bid winner will provide implementation plan.
III. Relocation of Servers and Switches – Glenbrook IT staff will relocate server equipment.
IV. District Office Data Center Relocation will require Local Area Network cabling to be redirected/replaced at District Office Facility.
V. Internet Service fiber replacement will be brought into new data center location.
VI. Fiber connections and T1 lines need to be redirected to new location. The redirection of the T1 lines will require service outage, though multiple fiber strands will allow for redirection without service interruption to the buildings.

SAN Upgrade

1. Install new SAN hardware (disk arrays, controllers, switches and consoles)
2. Test and configure new SAN
3. Backup of SAN data (regular daily process)
4. Test migration of existing SAN - validation
5. Cutover to new SAN and reconnect servers to new SAN

Server Upgrades

Novell Netware to Novell Open Enterprise Server (OES) migration:

- Upgrade of root servers
- Upgrade of file and print servers
- Upgrade of Groupwise servers
- Upgrade of Utility servers

Install VMWare ESX on new servers
Configure ESX environment
Create pilot and test server environments as virtual servers
Migrate Windows Production Servers
Add Disaster Recovery Options

INNOVATION WITHOUT RESTRICTION
IMPLEMENTATION TEAM

Craig Schilling
PROJECT SPONSOR

Marcus Thimm
PROJECT MANAGER

PROJECT TEAM MEMBERS

Ryan Bretag
GBN

David Jakes
GBS

Kim Ptak
Business

Jim Senft
Tariq Baig
Network/Servers

Apple
Desktop

Vendors selected
through RFP process

TECHNOLOGY UPGRADE PLANS

2007	2008	COMMENTS
TECH UPDATE PLAN		
Goes beyond the audit recommendations	Y	
Moves to single server platform	N	Apple desktops benefit from the "Magic Triangle w/OSX Server
Moves to current technologies	Y	
Increases reliability of network, servers, & electrical power	Y	
SERVERS		
Migrate from Novell to Windows & Active Directory	N	Requires further study, testing of Windows Server 2008 & Windows Vista
Migrate to single server platform	N	Not necessary w/NAN, not desired - see above
Cluster the file and print servers	Y	Consolidate servers, will allow redundancy through clustering
Use virtual servers (VMware)	Y	
Proactively monitor servers & services w/ MOM,	Y	Most completed in 2007. The remaining to be completed in 2008.
SMS, ISA, Insight Manager		
Formalize the disaster recovery plan	Y	
EMAIL		
Migrate from GroupWise to Exchange/Outlook	N	Not necessary at this time
Improve reliability of email transactions	Y	Upgraded current Groupwise to GW 7.0, will move to GW 8.0
Improve spam filtering	Y	
Enable PDA and remote device email	Y	NOKIA Intellisync (PDA Handheld integration) comes bundled with GW 7.0
ADMINISTRATIVE SOFTWARE SYSTEMS		
Systems Now Current		
Applicant Tracking	N	
Blackboard.com	N	Further study
Bookstore Point-of-Sale	N	Further study
Cafeteria	Y	
Document Imaging	Y	
Fingerprinting	Y	
Human Resources	Y	
ID Cards	Y	
Library	Y	
Principalm (student data PDA)	Y	
Special Education	Y	
Student Administration	Y	

2007	2008	COMMENTS
Need Purchase / Upgrade		
Finance System	**N**	Hillarie Siena has budgeted for this
Service Desk	**Y**	
Web Site	**Y**	
SERVICE DESK		
Set Service Level Agreements	**Y**	
Use accurate metrics to evaluate service	**Y**	
Provide customer surveys to percentage of users	**Y**	With new service desk software
Automate ticket escalation	**Y**	"
Use online, routable request forms for hardware, software, and user accounts	**Y**	"
Accept help requests from phone, email and web	**Y**	
Provide 24/365 password reset system	**N**	Need to ID system
Use a call management system	**Completed**	Parent Connect
Implement "Right Answers" for end users	**Y**	
Integrate service desk software w/Active Directory	**N**	
WEB SITE	**Y**	Decision made to use Sharepoint - will go live in July
DESKTOPS		
Upgrade from Windows 2000 to xp / VISTA	**Y**	Will upgrade to XP
Explore feasibility of a single desktop platform	**N**	Not necessary with dual platform MAC book
Reduce number of network protocols	**N**	We only have TCP/IP and AFP
Increase desktop and login performance	**Y**	
Move primary file storage for everyone to servers	**Y**	
Centralize desktop administration	**Y**	
Guarantee replacement cycle is adhered to	**Y**	
NETWORK		
Upgrade "end of life" Cisco hardware (normal replacement cycle)	**Y**	
Improve filtering, cache, bandwidth management	**Y**	
Utilize more fiber strands between sites	**Completed**	
Build secure backbone for wireless networking	**Completed**	
Secure network from attacks	**Y**	
Install appropriate fiber & copper in construction areas	**Completed**	
Verify quality of oldest fiber & copper in GBN	**Completed**	

2007	2008	COMMENTS
POWER & BATTERY BACKUP		
Replace Admin UPS system	**Completed**	
Upgrade GBN & GBS UPS systems	**Completed**	
Provide additional electrical power to the GBN server room	**Y**	
Re-configure UPS systems to take advantage of redundant batteries	**Y**	
Configure proactive alert notification on UPS systems	**Y**	
Configure centralized, remote administration of UPS systems	**Y**	
DISK STORAGE SPACE		
Increase network space for wtaff to use the network as their **primary** storage location	**Y**	SAN
Increase storage space for emails and attachments	**Y**	SAN
Increase storage to support virtualization of servers	**Y**	
Increase storage for replication of data	**Y**	
Increase storage for snap backup and recovery of files	**Y**	

Glenbrook High Schools Tech Update Plan
Jan-07

	A	B	C	D	D
	Project Description	**Service Provider**	**Services & Software**	**Hardware**	**Total**
	INCLUDED IN "INNOVATION WITHOUT RESTRICTION PLAN"				
	2008 Expense				
7	Windows Server Hardware	Hewlett Packard		$40,000	$40,000
8	Macintosh Server Replacements	Graphtech, Deerfield	$41,250	$11,356	$52,606
13	Service Desk				
14	Service Desk Software and Service Enhancement		$65,848		$65,848
15	"Right Answers" Subscription		Incl. Line 16		
21	Win 2000 to Win xp Migration	Insight, Bloomingdale	Incl. Line 4		
23	Desktop Software (Office Pro 2003)	Insight, Bloomingdale	$207,570		$207,570
24	Desktop Software (Win XP)	Insight, Bloomingdale	$88,000		$88,000
26	RAM and Hard Drive Upgrades for Existing Computers	TBA		$10,000	$10,000
30	Build Wireless Backbone	Tympani, Downers Grove	Incl. Line 32		
35	Upgrade GBN and GBS UPS Systems	Arerico, Arlington Heights	Incl. Line 39		
36	Re-Configure UPS Systems to Use Redundant Batteries	Arerico, Arlington Heights	Incl. Line 39		
37	Configure Centralized Administration and Alerts on UPS's	Arerico, Arlington Heights	Incl. Line 39		
40	Additional SAN Disk Space	Insight, Bloomingdale		$224,000	$224,000
41	Training and Overtime				
44	Professional Development for All Staff (Presenters)	Various	$14,000		$14,000
42	Tech Staff Training	Various	$10,000		$10,000
43	Technician Overtime and Extra Days for 10-Month Techs	Internal	$12,000		$12,000
45	Professional Development for All Staff (Participant Stipends-August)	Various	$20,000		$20,000
	Electrical GBN				$55,000
	Deferred Expense				
	TOTAL				**$799,024**
	COMPLETED IN FY 2006/07				
12	Email Security Appliance	TBA		$10,000	$10,000
18	Web Site Design with Content Management System	TBA	$120,000		$120,000
19	Web site Hardware, Software and Configuration	TBA	Incl. Line 21		
29	Configure Additional Fiber Strands	Tympani, Downers Grove	Incl. Line 32		
32	Ensure Quality of Existing Cable Plant in Old GBN Wings	TBA		$10,000	$10,000
28	Core Upgrade	Tympani, Downers Grove	$25,000	$275,000	$300,000
31	Cymphonix Web Filtering Appliance	Tympani, Downers Grove		$13,000	$13,000
33	Power and Battery Backup				
34	Replace Admin UPS system	Arerico, Arlington Heights		$21,738	$21,738
	TOTAL				**$474,738**

	NO LONGER NEEDED	Service Provider	Services & Software	Hardware	Total
11	PDA and Remote Device Email Access	Insight, Bloomingdale	Incl. Line 4		
3	Servers				
4	Novell to Windows Server Migration	Insight, Bloomingdale	$461,000		$461,000
5	Server Software (Exchange, SMS, MOM, VMWare, ISA, Norton)	Insight, Bloomingdale			$0
6	Configuration of Server Monitoring and Alerts	Insight, Bloomingdale			$0
9	Email				$0
10	Group Wise to Exchange Migration	Insight, Bloomingdale	Incl. Line 4		$0
16	VoIP Gateway for Call Management			$30,500	$30,500
17	Web Site				$0
20	Desktops				$0
22	Remote Desktop Management & Centralized Administration	Insight, Bloomingdale	Incl. Line 4		$0
25	Support for Macintosh Workstations - 2 years		$121,400		$121,400
27	Network				$0
39	Disk Storage Space				$0
	TOTAL				**$612,900**
	Included in Construction				
38	Provide Additional Power to GBN Server Room	TBA		$18,000	**$18,000**
	GRAND TOTAL				**$1,904,662**

INNOVATION WITHOUT RESTRICTION - TECHNOLOGY 2008/09

		1-time outlay Referendum & Ops Funds	Annual Tech Budget	Lease Agreement	TOTAL
I.	**ONE-TIME CAPITAL OUTLAY EXPENSE**				
	INFRASTRUCTURE				
	Network Switch Upgrades	$290,000	$40,000		$330,000
	Wireless Network Infrastructure	$330,000	$40,000		$370,000
	Internet Filtering and Firewall System Upgrade	$25,000	$5,000		$30,000
	Storage Area Network System Replacement	$230,000	$40,000		$270,000
	Business Continuity & Disaster Recovery	$170,000	$20,000		$190,000
	Backup Systems Replacement (software)	$43,000			$43,000
	Electrical	$55,000			$55,000
	Server System Replacements and Purchases	$50,000	$0		$50,000
	(hardware & services)	$1,193,000	$145,000		$1,338,000
II.	**SOFTWARE & OTHER ANNUAL SERVICES**				
	Internet Bandwidth Upgrade		$43,000		$43,000
	Backup Systems Replacement		$12,000		$12,000
	Microsoft & Apple School Agreement		$170,000		$170,000
	Other		$64,000		$64,000
	United Streaming Video Distribution		$15,000		$15,000
			$249,000		$249,000
III.	**PERSONAL COMPUTING RESOURCES**				
	Desktop Hardware upgrades	$10,000			$10,000
	Acquisition of Dual Platform Computer Systems				
	Desktop - purchase 250 HP	$192,500			$192,500
	Laptop - 3 year lease 500 units APPLE			$183,000	$183,000
	Professional Development	$50,000			$50,000
		$252,500		$183,000	$435,500
	TOTAL	**$1,445,500**	**$394,000**	**$183,000**	**$2,022,500**
	REVENUE				
	FY 07/08 Technology Budget				$350,000
	FY 08/09 Technology Budget				$700,000
	FY 08/09 Server Replacement Funds				$170,000
	FY 08/09 Computer Funds				$500,000
	Referendum Funds				$210,000
	Special Ed One-Time Funds				$75,000
	Energy Avoidance (annual)				$17,500
	TOTAL REVENUE				**$2,022,500**
	BALANCED BUDGET				$0

Cost Comparison - Both w/3 year warranty
MAC book Parallels, Mac Os - $1,200
HP 6710p with camera - $1,013
Difference - $187