Instructional Technology Audit
North Mac CUSD 34

Report February 20, 2013

Prepared and Presented by
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Acknowledgements

Thank you to Ms. Marica Cullen and her staff for inviting the Area 5 Learning Technology Center to North Mac to conduct a basic instructional technology audit and providing open access to district staff and facility resources.
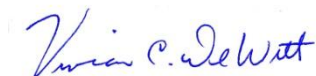
Building walk-throughs, informal interviews, random classroom visits and other data collections were conducted by the visiting team.

It was clear to the team North Mac CUSD 34 staff wants to utilize instructional technology in a meaningful way and that the district has made substantial investment in bandwidth and hardware by providing high-speed connections to each of its campuses. In addition, each classroom has newly installed Promethean Boards and projectors.

Further, the newly consolidated school district has also committed substantial resources to continuous student achievement and school improvement as exhibited through the school improvement plans.

Again, thank you to the administration for supporting the instructional technology audit process and to the staff, parents and school board members that contributed to the outcome of this process. Further, I would like to thank the visiting audit team members for their time and expertise. It is our hope that the information and recommendations provided within this document effectively guide North Mac in a proficient use of instructional technology that will fully support student learning.

Sincerely,

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Executive Summary

Purpose

The instructional technology audit will provide 1) a review of four areas that impact effective instructional technology deployment including documenting current instructional and administrative technology practices and 2) recommendations to maximize the effectiveness of current and future instructional technology implementations.

Data Collection

The audit team used the following data collection documents to prepare the North Mac instructional technology report: Staff Surveys, Building Walkthroughs, Classroom Visits, District Inventories, Network Specialist documents, and Staff Interviews.

The four areas examined:

Part I. Infrastructure: School's internal network, external network, servers, staff and student computers

Part II. Support Organization for Technology: Technology department staff responsibilities for system support and reliability.

Part III. Systems Operations: Procedures, practices, policies and documentation surrounding the management of the district's technology resources, data collection and data aggregation systems.

Part IV. Curriculum and Management Technology Initiatives: Current practices in the integration of technology to support instruction, staff knowledge and skill levels in utilization of technology tools, current assessment, planning, and decision-making practices.

Key Findings and Recommendations

Part I. - Infrastructure
(School's internal network, external network, servers, staff and student computers)

      The network infrastructure is sound and provides the staff and students with network access. All staff interviewed reported issues with dependability of the network. Girard and Virden campuses both have high-speed with 20 MB connectivity. Wireless access is available in all buildings, but access is restricted as password is not freely available to staff and students.   Newly installed Promethean Boards and projectors are in all classrooms. Both campuses have buildings with sections constructed in the pre-electrical era.

      The district faces limited funding and other challenges in several instructional technology areas. For example, an average of 75%+ percent of all networking, hardware and software components in the district is 3 to 7 years old. Also, the current switches controlling the bandwidth and the poorly designed wiring within the buildings do not take advantage of the high-speed bandwidth coming into the two campuses. Replacing and updating infrastructure and older equipment and software upgrades will require adequate, ongoing funding. Careful fiscal planning and timely updates would help minimize the impact of these issues.

Infrastructure-Positives:

- High speed campus connections to the internet (20MB at each campus)
- Building core network is in place.
- Emergency data and battery backup for servers and essential data systems are in place.
- Full-time district technology person at the South Campus with part time persons at the North Campus

Infrastructure-Findings and Recommendations

Finding:

a. Approximately 80% of all network electronics are over five (5) years old. Network electronics of this age are far more subject to failures resulting in network access interruption.

b. The speeds of the majority of the intranet network switches at each campus are 10/100MB (with only the North Campus having 1GB switches on the backbone). These switches and the current wiring design do not take advantage of high-speed Internet the district is paying for at each campus. Most of the older electronics are used in classrooms to connect the student, teacher and staff workstations. Network interruptions, according to educators' surveys, are frequent. The slowness, unreliability and interruptions with Internet connection cause teachers to rely less on these computers for student and instructional resources. (Inventories and teacher surveys are included in the Appendices.)

c. At the South Campus, switches are daisy chained and are not high-speed.

Note: Factors a, b, and c cause the network to be unreliable and the high-speed bandwidth coming into the two campuses not to be utilized within the buildings.

d. Limited staff, student and guest access to the wireless network in all buildings

e. No remote access by staff or students to their work stored on district servers

Recommendation: It is important to have a project plan that details how and when these older network electronics will be replaced and how the replacements will be funded. Included in this project plan should be the replacement of the backbone in each building with a fiber backbone with direct connections to newly replaced, high-speed switches. Also, in this new project plan the district should consider how the infrastructure should be updated to accommodate future instructional use by student and staff including accommodating for future online state and federal testing requirements of students. Other future instructional uses should include how to accommodate for 1-to-1 laptop program and/or making accommodation for a Bring Your Own Device (BYOD); remote access to instructional resources; etc. http://www.edtechmagazine.com/k12/sites/edtechmagazine.com.k12/files/111331-wp-k12-byod-df.pdf

Finding: 85%+ of instructional computers are five or more years old

Recommendation: Continue to replace the computers that are over five years old based on an up-to-date inventory as funding allows.   The replacement schedule should be placed on a district project plan. Factors in the hardware replacement decision should consider the expansion of a 1-to-1 program and/or making accommodation for a Bring Your Own Device (BYOD). Accommodating for these kinds of student use of technology may eliminate the need for the older computers to be replaced.

Finding:
  a. 85% of the total servers are three years and older. Servers of this age are more prone to failure and require more maintenance.
  b. Wiring closets need to be highly organized, secured and electrical power surge protectors installed.
  c. Servers are distributed throughout the building not located in one/two central location.
  d. District critical data disaster back-up plan not in place. Off-campus backup also not in place. A local failure/disaster could mean the loss of critical student data.

Recommendation: Develop a project plan to organize, replace, and update any server and hardware closets over four years old by either replacing servers or by migrating applications and database to a virtual server environment. This project plan should be developed by in conjunction with the Learning Technology Network Specialist and the district's data/instructional technology plan team or the district may use a company with considerable experience in developing/documenting/implementing server virtualization projects. By implementing virtual servers, this will reduce the current 9 servers that are being supported by district staff and vendors; reduce the cost of replacing hardware, allow the districts crucial data to be backed up in a secure, redundant data-center environment. An example and further information about virtual servers can be found at http://www.cdw.com/content/solutions/case-studies/virtualization/illini-cloud-project-showcase.aspx

Finding: Printer ages are not on inventory, but staff indicated that 90% of printers are over 4 years old. Further in 2011-12 district indicated that decentralized printer cartridges alone cost $12,000. This cost does not include repairs, replacements, paper, or electrical use.

Recommendation: Develop a project plan with a timeline and cost to replace printers after determining printing needs. District might consider consolidating printing into central locations and using high-volume, high-speed, lower cost laser copiers/printers as a more cost-effective method of meeting printing needs.

Finding: Staff working off-site need to access certain files on server located on district network, but do not have this capability. Teachers also have no means of providing access to documents for students off campus.

Recommendations: There are multiple ways of securely allowing staff access to files stored on district servers. For example, class resources could be placed on a MOODLE or other online classroom management tools for ways to provide remote access. MOODLE is a free application, but would require some local management. The project plan should explore alternatives, to allow staff to access their documents when off-site. Even free solutions such as Google Apps should be explored. The cost will be based on the type software and the number of staff needing this access and the cost of the alternatives to provide secure access.
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Finding: The current Microsoft server and Microsoft based workstation/laptop operating systems (XP) are outdated. The Microsoft productivity software is also outdated. This could cause compatibility issues for students with more current versions on home devices.

Recommendation: A project plan needs to be developed that establishes a timeline to upgrade the current server and workstation operating systems along with the current office productivity software.

Finding:

   a. No formal process for district coordination and oversight of all hardware and software updates, policies, repairs, purchases, installation and vendor-rated activities exists.
   b. The district lacks an online trouble ticket system to track and schedule needed technology repairs.
   c. Inventory records are incomplete – missing serial numbers, specific age of hardware, etc.

Recommendation: A formal project plan and automated, web-based trouble-ticket system needs to be implemented to coordinate and oversee all hardware and software updates, repairs, policy, purchases, installation, detailed inventories and vendor-rated activities is needed for more effect and efficient use of district funds.

Key Findings and Recommendations

Part II. Support Organization for Technology
(Review of technology department staff responsibilities for technology support and reliability)

North Mac District 34 has all the state and federal instructional technology board policies in place such as the CIPA (Child Internet Protection Act), staff and student local use policies. The district is meeting all the state required data reporting deadlines for fiscal and student achievement data. To meet these requirements and local student reporting requirements, North Mac uses SKYWARD as its Student Information System (SIS) and cafeteria software. In addition, North Mac uses other data collections systems such as: Follett in the library, web-based IEPs for special education students,, AIMS Web, AutoSkills, Lead21 (literacy series) and Everyday Math Extended Programming.

Currently, the district does not use an automated "trouble ticket" system to report, request and track repairs and updates on hardware and software nor is there any formal documentation (log) of when and who does the current repairs other than the invoices paid to contracted vendors. Procurement, including bidding, ordering, repairs and reporting of these types of requests, is handled on a building by building basis through an informal and un-automated process. Consolidation of the two previous school districts has challenged the district to effectively support costs, timely repairs and growth caused by the number of computers, software and other technology devices it supports today. The total procurement, support and repair process of the technology organization structure needs to be examined and automated.

Presently, repairs at the South Campus are done or coordinated by the technology coordinator and repairs at the North Campus are coordinated or executed by the Librarian and one elementary school teacher. Each campus currently contracts with separate vendors. These district positions report back to the superintendent. Instructional technology initiatives are under the direct supervision of the building principals with superintendent approval. It is clear that support responsibilities need to be clearly defined along with the technical skill sets required and the duties of each internal and external position examined closely. A formal procurement and support process needs to be defined and adopted. Contractual support and repair requests issues also need to be clearly defined.

A new 3-year technology plan needs to be updated for July 1, 2013 to June 30, 2016 in preparation to meet state/federal guidelines and district data collection and online testing requirements. More importantly, the instructional technology plan needs to articulate and effectively implement instructional technology and data collection necessary to take full advantage instructionally of current and future technology purchases.

Support Organizations-Positives:
- Facilitated and followed the fiscal year 2010-2013 technology plan which expires June 30, 2013
- Current internal technology support person(s) works closely with vendors – South Campus and North Campus each have their own vendors
- District purchased and installed Promethean Boards and projectors for all classrooms

Support Organization – Findings

Finding: Full-time district technology coordinator must possess technology knowledge and skills to reduce dependency on vendor support. District financial records from 2011-12 indicate that the following funds were spent on outside technical support: _____ with an additional _____ in salary for district technology positions.

Recommendation: Since the district's consolidation it now serves 1640+ students and 100+ staff. According to North Mac's inventory, there are over 1000+ instructional and administrative technology devices. These devices include servers, computers, printers, copiers, projectors, Promethean Boards and other peripherals' as well as technology related devices such as cameras, sound systems, etc. The District needs to consider hiring a full-time district technology director that possesses high-end technology skills to reduce dependency on vendor support. Industry standards recommend an acceptable ratio for end user to support staff for IT is 40:1. However, most school districts' technology support staff to end users ratio usually falls in the 1000:1 range. Therefore districts the size of North Mac usually have a Specialist/District Director and one technical support person, because they have found it to be a more efficient and effective use of district technology resources and funding.   Two examples of districts with this type of technology support are Gillespie CUSD 7 and Williamsville CUSD 15. (See Draft District Technology Job Description included in the Appendices for technical/instructional skills needed.)

 (Technology support ratios are discussed in the following article - http://www.workforce.com/article/20030206/NEWS02/302069998# . Also see reference Horizon Report 2012 for Total Cost of Ownership at http://www.iste.org/docs/documents/2012-horizon-report_k12.pdf?sfvrsn=2 .)

Finding:

    a. No formal process for district coordination and oversight of all hardware and software updates, policies, repairs, purchases, installation and vendor-rated activities exists.
    b. The district lacks an online trouble ticket system to track and schedule needed technology repairs.
    c. Inventory records are incomplete – missing serial numbers, specific age of hardware, etc.

Recommendation: Full-time District Technology person should oversee and coordinate the above processes as part of their duties.

Finding: No formal instructional technology position descriptions and no formal evaluation of technology support staff presently exist. Expectations of the duties being performed or not performed by existing technology support staff does not, in some cases, reflect the type of work the technical support staff is doing.

Recommendation: Review present technology support staff duties needed to effectively and cost-efficiently support district instructional technology needs.   Create needed job descriptions and define work responsibilities, experience, knowledge and skills needed by each position(s).

Finding: The help desk structure is not effectively supporting the integration of technology into instruction or any of the other district requirements in administrative areas.   Most problems are not documented or tracked, and there is little notification of problem status to end user. School personnel or unsure of the proper procedure to secure timely support for issues as that process does not exist.

Recommendation: Once technical support personnel are in place, and a formal process for requesting and prioritizing support through a trouble ticket system has been developed, the staff will need to be trained in this new procedure. Leadership will need to insure that the procedure is followed.

Finding: The current Technology Plan is expiring on June 30, 2013. This instructional technology plan needs to include elements stated above and should also include an Infrastructure Project Roadmap (Plan) that would address the elements outlined in the Part I, II, III and IV of this technology audit. Currently, the district does not have anyone in-district that could oversee and assist in the implementation of a much needed infrastructure update.

Recommendation: Once there is approval on the scope of a District Technology Plan which includes the Infrastructure Project Roadmap, the district will need the person described above with high-end networking and project management skills. Thus the recommendation is for the district to consider hiring an in-district person with many of these skills. (Checking with several districts and considering the high-rate of unemployment of persons with these skills, it is estimated the base salary for someone with these skills should be in the $40 to $50,000 range.)

Key Findings and Recommendations
Part III. Systems Operations
(The procedures, practices, policies and documentation surrounding the management of the district's technology resources and data collection systems.)

The North Mac CUSD 34 support organization has implemented a number of best practices to insure a reliable and safe school technology environment. There is an informal data backup plan and emergency power back up. No formal disaster recovery (DR) plan is present nor is vital data stored off-site.

Student and staff use of instructional technology and internet are addressed by district policies, procedures and student handbooks. No detailed inventory of technology equipment that is assigned to student and/or staff exists, nor are staff required to sign agreements for district-owned assets assigned to staff for mobile, home and work use.

Areas of concern include how repairs are handled informally and how those repairs are assigned, executed and tracked. It is clear that customer expectations are not being met by the current process for reporting needed repairs and the timeliness of the repairs being complete in a satisfactory manner. Further, the district does not use network and server monitoring tools which would assist in proactively seeing and reacting to connectivity, network and bandwidth related problems.

The District needs to review instructional technology purchase processes including creating a "roadmap" of the most effective use of scarce district funds and resources in order to repair, replace and update by priority needs.

The district uses several data collection systems. It needs to fully align district data collection systems and identify future data collection needs for the district. These data collection systems will need to organize data in order to fully integrate Data Driven Decision Making processes that will guide student learning needs, more efficiently identify best use of district funds and resources.

Positives:
- On-site data backup in place.
- Mission critical student, financial, H-R data is backed up via NAS with a 30+ days tape
- Procedures exist for adding/removing teachers and students access to the network
- District uses two different Internet filtering programs (Dan's Guardian at South Campus and Sonic Wall at North Campus.) Further Windows Server keeps servers and AVG on individual computers ensures a level of security from hackers and viruses
- Software is available through the district by vendors that monitor server status and network intrusion

Systems Operations-Findings and Recommendations:

Finding: There is no written policy, guidelines or procedures in place for checking out district technology equipment for off-campus use by staff and students.

Recommendation: Develop policy, guidelines or procedures and implement process as needed for checking out district technology equipment for off-campus use by staff and students.

Finding: Network security needs to be audited every three years—audit should include LAN, WAN and wireless—documentation updates, drawings, backup plans, electrical capacity, etc.

Recommendation: Develop a process, plan and policy of what information and documentation is necessary and where it should be maintained in order to insure North Mac's in-house control of current technology infrastructure design and technology/electrical capacity. Note: Policies to address staff's

ability to bring non-district owned-technology and other electronic devices for work use should be addressed. Donated or personally-owned items such as coffee pots, microwave ovens, personal refrigerators, etc. can be great drains on scarce electrical capacity or even interfere with an aging buildings' network infrastructure.

Key Findings and Recommendations

Part V. Curriculum and Management Technology Initiatives

North Mac CUSD 34 has several learning initiatives that integrate technology into the curriculum and through the years the staff has been given opportunities for staff development which to support core instructional technology integration strategies. Further each teacher is required to use SOCS to post daily assignments and student materials online.

Building walkthroughs, classroom observations and informal interviews with the teachers reveal 75+% of student used computers are located in labs while each classroom has a teacher's workstation connected to newly install Promethean Boards and projectors. As observed by the audit team during their one-day visit, 90% of these Promethean Boards and the teachers' workstations were not being used by the teacher and/or students for instructional use. Classroom use of instructional technology was observed as teachers were using it for teacher-directed, lecture-type instruction. The observed uses of technology by students were in the lab-settings where students were using the computers for composition, keyboarding, accounting, or other vocational uses. These low-level types of student learning and teacher instructional activities are classified as Literacy and Adapting Uses of instructional technology. (See Appendices for ETP Rubric for definition of Literacy, Adapting and Transforming Uses). During visit which occurred during prime instructional hours, no high-level integration of instructional technology was occurring within classrooms. Basic uses observed occurred in two business labs, 5 Promethean Boards were in use: 2 for starter sentences 2 for teacher created PowerPoint presentations, and 1 math teacher for working problems. The rest of the Promethean Boards were off.

Data collection by the audit team did not indicate the use of technology to support a culture of data-driven decision-making that relies upon data to evaluate and improve teaching and learning. Some professional development for instructional technology is being offered at the North Campus; but professional development records show staff were not receiving on-going, effective training to assist in implementation and setting expectations for instructional technology use.

Positives:
- Each classroom is equipped with a Promethean Board and projector
- District has purchased the online component for Everyday Math (K-5) and LEAD21 (K-5) Literacy which allows for additional learning resources
- AutoSkill and Aims Web district license support RTI and appropriate interventions for student learning are in place
- On-going staff development is offered at the North Campus by the Librarian
- Each teacher maintains a website where assignments and classroom materials are posted (SOCS)
- Parents have access to student grades for middle and high school students
- iPads have been purchased for special education and Title I as intervention resources
- Online learning opportunities for students to obtain instruction in courses not offered in the traditional schedule via Lincoln Land Community College

Curriculum and Management Technology Initiatives – Findings and Recommendations

Finding: District faces funding shortages for instructional technology including providing supplies, support replacement of aging inventory, professional development, repairs, etc.

Recommendation: District needs to examine purchase and work orders from previous years to determine, non-efficient/effective use of districts funds. (Needed review of printer cartridge cost, for example.)

Finding:
    a. Student to instructional computer ratio is approximately 3:1 with 75+% computers for student use located in labs/business. This limits the integration of technology in an ongoing, just in time manner in instruction as is supported by research and evident in the Common Core Standards in both ELA (reading, writing, informational text) and Math.
    b. Each classroom has a ceiling mounted projector attached to teacher computer and Promethean Board which does not increase the opportunity for student-centered learning and access to technology.
    c. Restricted wireless access at all buildings with exception of South Campus Gym.

Recommendation: Obviously there are budget issues and time for accelerated training for teachers that may impact how fast the district can move toward greater student access; but having students without a laptop or mobile device which may be used for anyway anytime learning access will also pose learning engagement issues. Therefore, the District's instructional technology planning will need to consider innovative ways in which North Mac will be able to build the infrastructure and capacity to support and promote programs such as 1-to-1 or BYOD to increase student access to such devices.

Finding: During building visits and interviews, staff indicated a significant lag-time in requesting hardware repairs and software updates. One teacher indicated she had been waiting over a year for a problem to be fixed. Upon further investigation by one of the visiting team members, the problem was fixed on the spot in less than 5 minutes.

Recommendation: As indicated in the recommendation on Page ___ a formal, on-line trouble ticket systems needs to be implemented to insure reliability and accessibility to existing instructional technology. Research shows if hardware is not repaired in a timely manner or networks are not reliable, stable and have adequate speed, teachers will not use it.

Although adequate access to technology is a key factor in successful implementation, researchers investigating the impact of technology on student learning have found that a major barrier to technology use is the lack of technical support. Even teachers who enjoy using computers will stop using technology if the equipment is unreliable. Many teachers lack adequate troubleshooting skills — not to mention time — to fix equipment, especially if it breaks in the middle of a lesson. Consequently, the effective use of technology requires an adequate school and district infrastructure and must include timely, on-site technical support. (http://www.wested.org/online_pubs/learning_return.pdf)

Finding: There is no formal expectation or support for on-going teacher professional development and implementation of technology in ways that research shows positively impacts student learning and attainment of 21st Century Skills needed to succeed in life.

Recommendation: District needs to create on-going professional development opportunities supported by an evaluation/implementation feedback loop which fully incorporate learning strategies which align to Common Core Learning Standards and are supported by appropriate instructional technologies.

Research says: *When teachers began experimenting with team teaching and interdisciplinary, project-based instruction, teachers needed professional development related to alternative student assessment strategies, such as performance-based assessments. Clearly, as teachers begin using technology for more sophisticated purposes, instructional support is as essential as technical support.* (http://www.wested.org/online_pubs/learning_return.pdf)

Finding: Current teacher webpage creations tool is classified by users as cumbersome and expensive to the district.

Recommendation: District needs to investigate more user-friendly, cost effective web design tools. The district also needs to examine the value of the communication being facilitated by these pages to see if the investment in money and teacher time is justified. In addition, the district needs to explore what functions that might be meet by the current SIS program in order to communicate with parents and students.

Finding: There are a number of specialized subscription based software applications that have annual fees that are increasingly impacting budgets. Some examples are Brain Pop, Turnitin, AutoSkill, AIMSWeb, and EveryDay Math Extended. No formal plan for evaluation/effectiveness of present "subscription" web-based instructional resources exists.

Recommendation: Before committing to renewing these subscriptions there should be an accounting of the number of students using these programs and evidence documenting their value in meeting the learning objectives that relate to new state and national standards for students.

Finding: There is currently no wide-reaching, all encompassing district plan in place that focuses on implementation of instructional technology support of higher order thinking skills, 21st Century Skills, Common Core Standards supported by Data Driven Decision Making and other strategies which support and promote student growth and learning:
- No plan in place to promote innovative / higher-order uses of instructional technology by students
- No plan in place to accommodate future use or expansion of programs such as: 1 to 1 or Bring You Own Devices (BYOD)
- No plan in place to accommodate for impact of online testing on available technology resources for student learning
- No on-going teacher professional development and support for instructional technology use
- Current uses of instructional technology by student and staff are classified are Literacy and Adapting)

Recommendation: A focused 3-5 year District Instructional Plan supported by appropriate instructional technology use is needed. This **Instructional Technology Plan is recommended** to focus on following:

Environment: provide a safe, flexible, and effective learning environment for all students
- Virtual learning expansion – hybrid and total online instruction
- Additional web-based content and mobile tools to access content
- Adequate ET and IT staff to meet state standard of 1:1000

Engagement: engage students in meaningful curricular content through the purposeful and effective use of technology
- Innovative professional development models and extended availability of digital tools to access PD
- Provide 24/7 access for students to division software and technology resources that support instruction
- Increase access to mobile communications and learning devices for students
- Update division curricula to further embed the use of digital technologies

Application: afford students with opportunities to apply technology effectively to gain knowledge, develop skills, and create and distribute artifacts that reflect their understanding.

- Enhance and support instruction for staff and students through the use of applications that promote 21st century skills.
- Provide multiple options for global communication for instructional staff, students.
- Provide resources to assess ICT literacy for administrators, teachers and students.
- Explore technology-based assessment models

Tools: provide students with access to authentic and appropriate tools to gain knowledge, develop skills, extend capabilities, and create and disseminate artifacts that demonstrate their understandings.
- Maintain appropriate student to computer ratios
- Purchase and implement a variety of technology tools to support student instruction
- Embed technologies in each curriculum guide when updated.
- Provide a variety of delivery models for technology training for teachers and students

Results: Use technology to support a culture of data-driven decision making that relies upon data to evaluate and improve teaching and learning.
- Assess the efficacy and usefulness of the current student information system and other available data tools
- Provide appropriate decision support tools for all stakeholders
- Provide appropriate training and support for all staff to assist with data mining, data interpretation and using to technology to plan and deliver instructions to support needs identified with data
- Design and implement pilot projects that use emerging technologies for assessment purposes

The district's vision for instructional technology would be embodied in these goals. Positive impact on student achievement and preparation of a 21st century work force is based upon active learning environments supported and enhanced with technologies that provide students the opportunity to engage with content scenarios that include authentic research, problem solving, analysis and evaluation, and critical thinking all the while mastering 21st century skills and habits of mind.