Instructional Technology Program Review

Sample District Public Schools

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Sun Associates
55 Middlesex Street, Suite 216
North Chelmsford, MA 01863
www.sun-associates.com

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Summary

Purpose and Background to This Review

During the 2012-2013 school year, in accordance with its strategic plan, Sample District Public Schools initiated an evaluation of their instructional technology program. Sun Associates, an educational consulting firm with strong expertise in instructional technology program evaluation and strategic planning, was hired by Sample District to facilitate this evaluation. Sun Associates worked with the district to frame the evaluation as a comprehensive review of how instructional technology impacts the overall teaching and learning environment in Sample District. The resulting instructional technology program review is the basis of the following report.

The program review aims to provide baseline data—a current-status snapshot—on teacher, student, administrator and parent attitudes, beliefs, skills and aspirations for the use of technology to support teaching and learning. It is anticipated that Sample District will use this evaluation to create and clarify the district's work in instructional technology. Ideally, the district will also gain insight into the variety of ways that instructional technology fits into the district's overall strategic plan and vision for teaching and learning.

Through meetings and discussions with a district committee of stakeholders including teachers, administrators, and technology staff (see **Chapter I**) the evaluators facilitated the creation of visionary performance indicators around instructional technology use (see the **Appendix** for a copy of the full text of the district's indicators). These indicators were created by the program review committee to reflect *the ideal use* of technology in Sample District's schools, and were then used to measure current technology use.

Summary Findings and Recommendations

Over the course of a three-month program review process, the evaluators spoke with and listened to a large number of Sample District teachers, parents, administrators and interested community members. Through analysis of the resulting data, the evaluators have developed a number of findings related to areas where district performance is off from the ideal expressed in the indicators. Subsequently, the evaluators have developed recommendations for how the district can improve its performance.

Organization of the District's Indicators

The district has developed four highly descriptive performance indicators to guide this program review and to express its intent for how technology is to be used to support student learning (see **Appendix**). These indicators reflect similar goals as those described in the National Educational Technology Standards (NETS) set forth by the International Society for Technology in Education (ISTE). As explained in greater detail below, the NETS standards articulate a unified, inter-related set of objectives

for how technology should be used to support student-centered learning and the development of life-long learning skills. The basic thrust of the review effort in Sample District has been to determine the extent to which current technology practice in the system fits within the framework of the committee-created indicators, ISTE NETS, and similar best practices. The following report presents the findings from this evaluation and offers recommendations for reconciling current practice with the indicators at all levels of the district's educational environment.

Of the district's indicators, the one for Student Skills and Outcomes clearly represents the overarching outcome, and in some senses the vision, for instructional technology integration in the district. The other three indicators – Teacher Skills/Pedagogy, Administration and District Policy, and Infrastructure – are clearly supportive of the Student Skills and Outcomes indicator, but also reflect key aspects of district practice and culture in their own right. For example, the Teacher Skills/Pedagogy indicator seeks to find teachers who implement relevant, real world, differentiated, learning experiences. These would be the same sorts of basic pedagogies desirable for Sample District teachers whether or not technology was integrated. The sorts of policies that "foster teacher leadership, accountability, and that celebrate success and encourage risk-taking" should ideally be existent in the district and supportive of all teacher endeavors. Technology just happens to be the focus of this particular evaluation, and so therefore the effort of this evaluation is to discover how district policies, practices, and resources contribute to the overall and ongoing success of Sample District's students and teachers in using technology to support these broad goals. This relationship illustrates Sample District's overall orientation that technology is but one tool for reaching desired educational outcomes.

Summary Findings

As an overarching point, the evaluators note the many positives found in Sample District's educational environment. Specifically:

- Teachers across the district are found to be uniform in their desire to utilize technology as a tool for teaching and learning. With virtually no exceptions, teachers express a strong interest in insuring that their students have access to, and receive benefit from, the use of a variety of technology supports. Technology is employed as a tool for learning across all grades and subject areas; this includes specialty areas such as music, art, and physical education.
- Teachers are nearly all "on the same page" with regard to technology's ability to inspire and engage students. Teachers laud technology's value as a tool for differentiating instruction. The evaluators are impressed by this uniformity of teacher opinion and see this as a strong basis for further developing the district's vision for technology supported learning.
- Sample District students have a basically sound set of skills in the use of commonplace technology tools for productivity. Students at all levels use technology to produce presentations, documents, and other products associated with their learning.
- Sample District has a robust technology infrastructure and has done much to ensure that all students benefit from this infrastructure. Devices such as computers, iPads, and laptops are commonly and readily available throughout the district. The district network has adequate bandwidth and is extraordinarily well supported by technical support staff.

- The district is making good headway at rolling out cloud-based systems (e.g., Google for Education) for communications and collaboration.

These positives position the district well for making further and substantial progress in its efforts to ensure that instructional technology is utilized as a catalyst for the development of student 21st century learning skills.

Specific to the indicators developed by the district's technology evaluation committee, the evaluators present the following summary findings. Further detail and the data supports for these findings is found in **Chapter II** of this report.

Student Skills and Outcomes – Sample District's students at all levels (K-12) are found to make use of a variety of instructional technologies within the educational environment. Students are seen to be using devices such as iPads, mobile labs, and computer-lab based workstations to produce a variety of work product and to engage in skill-building activities. During classroom observations, students were commonly found typing papers, creating presentations, as well as locating and utilizing various online resources. Particularly at the elementary level, a number of students were observed (and reported to be, via surveys) using computer-based-instruction (CBI) programs such as RazKids and Castle Learning to build basic skills, engage in remediation, and/or prepare for state tests. The evaluators note that many teachers at all levels question the strength of their students' basic computer skills, and many teachers (particularly at the secondary level) are concerned that students do not have adequate typing skills.

Beyond the development of basic technology skills, there are several other key themes in Sample District's Student Skills and Outcomes indicator. Taken together, these themes include students taking ownership over their own learning via technology aligned with national technology standards (NETS-S) in a personalized learning environment. In regard to performance meeting this part of the indicator, the evaluators find that the district has realized somewhat mixed success. While teachers are very clear that a "personalized learning environment" is one that comes as the result of differentiated instruction (see below), it is clear that presently most students are not afforded the opportunity to actually choose how technology meets their learning needs. Most student use of technology is still highly teacher directed. Teachers report that they "provide" students with opportunities to use technology so as to "differentiate instruction". The evaluators find that teachers' definition of a personalized learning environment also hinges upon a definition of differentiation that emphasizes the use of technology to provide students with technology-based ways of accessing information and producing work product. Despite the fact that students are often found to be using technology, there is little evidence that most students are utilizing technology in ways that meet with the highly student-centered spirit of NETS. Teachers point to a lack of student higher-order thinking skills related to technology and thus mixed success with skills such as information literacy and critical thinking. Information literacy and critical thinking are two fundamental NETS skills.

Teacher Skills/Pedagogy – Sample District teachers define personalized learning as both the product of and vehicle for differentiated instruction. They understand differentiation to mean providing multiple ways for students to interact with content and instructional activities. For the majority of Sample District teachers, it appears that differentiation is indeed the objective for technology integration. When asked to provide examples of how technology is integrated into instruction, teachers point to encouraging

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students to create technology-based products (presentations, papers, etc.) and to utilize CBI to learn basic skills. Teachers contrast these uses of technology with more traditional ways of accomplishing the same tasks – e.g., teacher lecture, using traditional texts, and creating work product that does not incorporate computer use. For the most part, the evaluators find that Sample District teachers are skilled at supporting student technology uses that are currently prevalent in Sample District schools.

As with the student skills indicator, where Sample District falls short of the Teacher Skills/Pedagogy indicator is in pushing the envelope to "design and adapt relevant real world learning experiences that…promote creativity, communication, collaboration, and critical thinking in line with best pedagogical practices". While there is evidence that many teachers have "adapted" existing practices to incorporate technology, there is relatively little evidence that many have designed such experiences with an orientation toward student centered learning. In particular, the majority of teachers have not used technology to create truly transformed instructional environments that are generative of the key NETS-S skills (creativity, communication, collaboration, and critical thinking).

Administration and District Policy – This indicator is about the district's performance in creating the environment and policy/practice structures that support and encourage teachers and students to work in the ways identified in the student and teacher indicators. One part of the indicator speaks to "equity of access" for all students and staff, and in this regard the evaluators find that Sample District has done a good job of ensuring that all students and staff have access to basic technology infrastructure (more on this in the next indicator) and network resources. There are concerns on the part of teachers and administrators that not all students have access to technology outside of school.

The bulk of the Administration and District Policy indicator concerns the existence of policies and practices that support and encourage teacher technology use. Here the evaluators find that while most teachers are using technology (see above), there is little in regard to actual policies – and more importantly, supports such as the "K-12 plan for technology integration" – existing in the district. Data shows weak agreement by teachers that the district "encourages" them to take risks with regard to new and innovative educational practices. Likewise, similar ambivalence is found around agreeing that there are clear expectations for student technology use and the existence of adequate teacher training. Finally, in terms of beliefs related to whether students demonstrate an understanding of "safe and ethical" technology use (which is in fact another NETS standards), teachers and parents are again ambivalent.

Infrastructure – Sample District's indicator for technology infrastructure examines not only the obvious issue of whether there are sufficient technology resources available for learning, but also whether there exists a shared vision for instructional technology use, sufficient budget for technology, and effective technical and instructional (teacher professional development) supports. Here again, Sample District's performance is somewhat mixed. As previously noted, the district's technical infrastructure seems sound and complete. While there are many teacher requests for "more" or "newer" equipment, the evaluators observe that there is wide-spread availability of technology devices in the district, there is on-going replacement of devices and new devices are constantly being added. There also seems to be an exemplary level of positive feeling toward the district's technical support staff. New infrastructure is clearly required in a few areas, but these seem to be known to the district and there is a process in place as well as a budget for making these improvements.

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Where Sample District could most improve its performance in this indicator is with regard to the existence of a strategic vision (and plan) for technology. At present, it does not seem that the district has a truly comprehensive strategic technology plan that provides the detail and resources for achieving a strong vision for technology's role in teaching and learning. The lack of a plan is somewhat obscured by the clear fact that individual teachers do integrate technology into their teaching; it is the degree to which those efforts are coordinated or aimed strategically at reaching a commonly held, visionary goal that is questionable. Teachers are ambivalent in their belief that the district has a vision and that they understand it. Parents tend to feel that they do not understand the vision, and many question whether one exists.

Where a comprehensive strategic technology plan would surely include a plan for teacher professional development, and a vision for how professional development would emphasize developing teacher skills in line with the Teacher Skills/Pedagogy indicator, it is clear that Sample District could use such a plan. At present, there seems to be a single individual in the district charged with offering teacher instructional support for technology. This person is highly regarded by teachers, yet is spread remarkably thin across the district. The result is that there is absolutely not enough teacher professional development of the embedded type that ties technology to the meeting of core curriculum objectives.

Summary Recommendations

In light of the findings presented above, the evaluators have developed a set of recommendations for the district to consider as efforts are made to extend the progress that the district clearly has made in its instructional technology program. It is important in considering these recommendations to understand that the overall recommendation is that the district work with its stakeholders and community to craft ways to address technology integration *entirely within the context* of existing district initiatives. The evaluators strongly believe that technology must never be a "stand alone" initiative that takes precedence over curriculum and instruction needs. Rather, technology should be envisioned, and implemented, as an aid to reaching other core district objectives. This perspective is one that should be at the heart of the shared vision and strategic technology plan that the evaluators recommend that Sample District create.

A useful framework for viewing the relative importance of the various components of Sample District's technology integration initiative is the set of "Essential Conditions" developed by ISTE as a support for creating learning environments where national standards such as NETS standards can be reached. As shown below (**Figure 3**), these 14 conditions categorically address nearly every domain covered by the evaluators' recommendations as well as the district's indicators. *It is worth noting that the district is doing well in a number of these categories* (e.g., Technical Support and Consistent and Adequate Funding). Therefore, the evaluators recommendations pertain to those areas where the district could make additional progress and thereby improve performance in meeting its four indicators. These areas and related recommendations are summarized below. Further detail on these recommendations is provided in **Chapter III** of this report.

In summary, the evaluators recommendations are:

Shared Vision – The evaluators feel strongly that Sample District needs to engage in a comprehensive effort to develop a vision for technology's role in teaching and learning. This vision needs to tie to the broader district vision for student outcomes and to make credible connections between the thinking and learning (21st century) skills supported and developed by technology use and the type of student that the district wants to produce. This vision needs to be developed by Sample District stakeholders and then communicated (shared) broadly throughout the community. While this is a recommendation that specifically ties to meeting the district's Infrastructure indicator, it is in fact central to the performance in all four indicators.

Implementation Planning – A shared vision is only the first step in creating a meaningful plan for implementing technology as a tool for teaching and learning. The vision must be supported by a detailed, comprehensive implementation plan. This plan needs also to be developed by district stakeholders. It also needs to tie into the broader district strategic/improvement plan and thereby leverage activities across the multitude of initiatives in which the district and its community are engaged.

Skilled Personnel – Sample District needs to engage in work to improve teacher skills with regard to the integration of technology. Teachers need to move beyond "adapting" existing pedagogies and into a place where they can design entirely new instructional environments that are supportive of district goals and initiatives (not just technology integration!). Doing this will require a vision and a strategic plan. It will naturally require considerable teacher professional development (see below). Ultimately, when teachers have been provided with the appropriate professional development, the district will need to establish clear expectations for teacher accountability around the effective use of technology for meeting student learning goals.

Equitable Access – Sample District needs to address two types of inequities that currently exist in the district. The first inequity is a lack of equal exposure that students receive in terms of technology skill development and the use of technology to support 21st century learning. This inequity should be addressed through the development of uniform technology skills should be addressed through the development of a K-12 technology skills scope and sequence and a mapping of technology-infused learning experiences to the district's core academic curriculum (see "Curriculum Framework", below).

The second inequality is a lack of equitable access to the technology devices that all students need for learning in a technology-infused learning environment such as that which Sample District seeks to develop. To remedy this inequity, the evaluators recommend that the district work toward a 1:1 student/device ratio. The district should develop a policy that supports students bringing in their own, suitable, devices for personal educational use. For those students who do not have devices to bring to school, the district will need to develop a way of supporting those students either by supplying a school-owned for their personal use, or by providing them with discounts/financial support to buy or lease such a device at a reduced rate.

Ongoing Professional Learning – As noted above, teacher professional development is critical to developing skilled personnel. In this regard, the district needs to expand its current instructional support staff to include Instructional Technology Specialists at all grade levels (elementary, middle, and high school). Further, the district should create clear expectations for professional learning around using

technology to support core curriculum and 21st century learning. Administrators need to lead their staff toward meeting these expectations. It is essential that staff understand that most professional learning around technology integration will be job-embedded. The district needs to support this type of job-embedded professional learning through the provision of common planning time for teachers and the expectations that such time will actually be used for professional learning and reflection.

Curriculum Framework – The district should create a mapping of NETS-based student technology skills to the existing curriculum framework. This should also include a scope-and-sequence of student technology skills (including typing) by grade level so that teachers can be assured that their students will have the appropriate technology skills to engage in meaningful use of technology to meet core curriculum objectives.

Student-Centered Learning – The evaluators recommend that Sample District work – based in a shared vision and improved teacher professional development – to expand teachers' understanding of true student centered learning. Such a revised understanding would move beyond Sample District's teachers' existing definition of "differentiation" and shifts emphasis to the development of a learning environment where students take ownership over the learning process to individually or socially construct knowledge from a wide range of resources and learning interactions. In practice, this shift involves the implementation of a project-based learning approach (which is implicitly specified in Sample District's indicators) to mastery of higher order learning skills aligned with overarching curriculum objectives.[1] Through this approach, Sample District's teachers should serve as facilitators and guides to the learning process and not as directors of student activity. The evaluators believe that many Sample District teachers basically understand this student-centered approach to learning, but that they are unclear as to exactly how student technology use can support it. Developing this teacher knowledge of practice is a function of teacher professional development and instructional leadership that sets clear expectations for teacher knowledge and classroom practice.

In conclusion, the evaluators urge Sample District to undertake a systemic re-design of the district's technology program. This re-design will ideally take place along the lines of the best-practice-informed recommendations contained in this program review report. Through such work, it is highly likely that the district will be able to meet the indicators laid out at the beginning of this program review work. Although this work will take considerable time, resources, and community support, the payoff is one that will allow *all* Sample District students to learn in an environment reflective of the district's student skills and outcomes indicator:

> *In line with national standards, all students are able to synthesize and develop knowledge and express their ideas creatively using and producing a variety of media. Students are proficient in basic technology skills and are information and media literate. They are able to acquire knowledge through research and technology, and take ownership of their own learning, collaborate and problem solve with others, while exploring different perspectives utilizing a variety of instructional technology tools within a personalized learning environment.*

[1] See Figure 6, in Chapter I for a side by side comparison of key features of traditional versus student-centered learning environments.

The evaluators believe that that indicator represents an exciting and powerful image for a technology-infused learning environment. It is hoped that this program review work is a strong step toward meeting that vision.

Shared Vision	Proactive leadership in developing a shared vision for educational technology among all education stakeholders, including teachers and support staff, school and district administrators, teacher educators, students, parents, and the community
Empowered Leaders	Stakeholders at every level empowered to be leaders in effecting change
Implementation Planning	A systematic plan aligned with a shared vision for school effectiveness and student learning through the infusion of information and communication technologies (ICT) and digital learning resources
Consistent and Adequate Funding	Ongoing funding to support technology infrastructure, personnel, digital resources, and staff development
Equitable Access	Robust and reliable access to current and emerging technologies and digital resources, with connectivity for all students, teachers, staff, and school leaders
Skilled Personnel	Educators, support staff, and other leaders skilled in the selection and effective use of appropriate ICT resources
Ongoing Professional Learning	Technology-related professional learning plans and opportunities with dedicated time to practice and share ideas
Technical Support	Consistent and reliable assistance for maintaining, renewing, and using ICT and digital learning resources
Curriculum Framework	Content standards and related digital curriculum resources that are aligned with and support digital age learning and work
Student-Centered Learning	Planning, teaching, and assessment centered around the needs and abilities of students
Assessment and Evaluation	Continuous assessment of teaching, learning, and leadership, and evaluation of the use of ICT and digital resources
Engaged Communities	Partnerships and collaboration within communities to support and fund the use of ICT and digital resources
Support Policies	Policies, financial plans, accountability measures, and incentive structures to support the use of ICT and digital learning resources for learning and in district school operations
Supportive External Context	Policies and initiatives at the national, regional, and levels to support schools and teacher preparation programs in effective implementation of technology for achieving curriculum and learning technology (ICT) standards

Figure 3 – ISTE Essential Conditions

I. Methodology and Conceptual Framework

This evaluation report is designed to serve several purposes for Sample District Public Schools. At its most basic level, the data herein exists as a record of the "current status" of instructional technology integration within the district. The findings and recommendations contained in this report are intended to fuel a lively discussion and priority-setting process related to technology's role in teaching and learning in Sample District. This discussion is a key part of framing the district's use of instructional technology within the broader context of teaching and learning in the district. Given the overlap and shared emphasis of initiatives such as the Common Core, 21st century learning, and technology integration, this evaluation offers insight into a more comprehensive set of issues than simply the use of technology, and keeps pace with current educational practice and research around the use of technology within a student-centered educational environment that encourages the development of essential thinking and life-long learning skills.

Methodology

Indicators and Data Collection

The following report presents data and findings related to how Sample District's teachers and students use technology to support learning in line with a set of visionary performance indicators created by the district. These indicators exist in four basic domains – Student Skills and Outcomes, Teacher Skills/Pedagogy, and Administration and District Policy and Infrastructure. These domains frame the basic areas of investigation of Sample District's instructional technology evaluation. In order to determine the district's performance within each of these areas, the evaluators collected data about teacher, administrator, parent, and student work, beliefs, and attitudes related to the indicator in each category. Analysis of the collected data resulted in a set of findings, presented in the next chapter, and ultimately considered against the evaluators' knowledge of relevant educational research and best practice. The resulting recommendations are reported in the final chapter of this report.

Sample District's evaluation indicators were developed with a committee of district stakeholders (see list of committee members in **Figure 4**) in March 2013. This meeting, follow-up discussions with district leaders, as well as the overall evaluation process and work, has been facilitated by Sun Associates, an external educational program evaluation firm with specific expertise in instructional technology evaluation and planning. Subsequent to the indicator development, the evaluators created a range of data collection instruments (see **Appendix**) such as surveys, interviews and observation protocols. These instruments were utilized for data collection. The evaluators also conducted teacher and parent focus groups, and principal interviews in every building. The evaluators visited every classroom in each of the five school buildings, and recorded observations in a large number of classrooms in each building. In addition to the in-person data collection, the evaluators also administered teacher and parent online surveys. **Figure 5** shows the *n* values for data collected.

Technology Advisory Committee Members

Elementary Teachers	**Middle & High School Teachers**
Technology Staff	
Administrators	

Figure 4 – Evaluation Committee Members.

Elementary	
Observations	53
Teacher Survey Responses	102
Teachers in Focus Group	6
Parent Survey Responses	69
Middle School	
Observations	22
Teacher Survey Responses	37
Teacher Focus Group Participants	2[2]
Parent Survey Responses	27
High School	
Observations	40
Teacher Survey Responses	62
Teacher Focus Group Participants	8[3]
Parent Survey Responses	30

[2] These two teachers were actually part of the Secondary teacher focus group which included HS and MS teachers.
[3] The Secondary teacher focus group was largely composed of HS/MS department heads (six). There were only two HS participants who were not department heads.

Other Staff, Principals, Administrators and Community Members Interviewed[4]	9

Figure 5 – Table of data collected

Please note that all quotes presented as indented *italicized* text in this report are offered in the format they were received. The evaluators have made no effort to correct spelling, capitalization, grammar or other aspects of the data subjects' original written or spoken comments. Where edits have been made for clarity or to ensure confidentiality, those edits are enclosed in [ ] symbols. Quotes are not attributed to individuals per the evaluators' data confidentiality agreements with all data subjects.

[4] In addition to district-level administrators, community members and other staff, the evaluators interviewed all building principals as well as the technology staff.

Conceptual Framework for Sample District's Indicators

The ISTE NETS Standards

Sample District's technology evaluation has at its core a set of standards developed by the International Society for Technology in Education (ISTE) known as the National Education Technology Standards (NETS). Widely adopted in the United States, and increasingly recognized worldwide, the ISTE NETS integrate educational technology standards across all educational curricula and at all levels of the educational organization. At the classroom level, the NETS present a transformed view of teaching and learning with a unique set of standards outlined for students, teachers, and technology specialists. Additional standards exist for outlining the skills and knowledge that school administrators and other district leaders need in order to support the integrated use of technology and transform education in the way that the NETS-S (students) and NETS-T (teachers) describe.

The NETS-S standards are:[5]

[5] The full text of the NETS-S standards can be found online at http://www.iste.org/standards/nets-for-students . The complementary NETS-A standards are provided in the Appendix to this report.

1. Creativity and Innovation

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

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.

3. Research and Information Fluency

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

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.

5. Digital Citizenship

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

6. Technology Operations and Concepts

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

ISTE has also created a set of teacher technology standards – NETS-T – that exist in parallel to the student standards (NETS-S). While the main effort in Sample District's evaluation is to determine the extent to which students participate in experiences that support NETS-S related learning outcomes, it is clear that teachers need to meet the NETS-T standards if they are to facilitate the type of learning reflected in NETS-S. Therefore, the evaluators examined teacher attitudes towards the use of technology to achieve particular types of student learning experiences.

The NETS-T standards are:[6]

[6] The full text of the NETS-T standards can be found online at http://www.iste.org/standards/nets-for-teachers .

1. Facilitate and Inspire Student Learning and Creativity

Teachers use their knowledge of subject matter, teaching and learning, and technology to facilitate experiences that advance student learning, creativity, and innovation in both face-to-face and virtual environments.

2. Design and Develop Digital Age Learning Experiences and Assessments

Teachers design, develop, and evaluate authentic learning experiences and assessment incorporating contemporary tools and resources to maximize content learning in context and to develop the knowledge, skills, and attitudes identified in the NETS·S.

3. Model Digital Age Work and Learning

Teachers exhibit knowledge, skills, and work processes representative of an innovative professional in a global and digital society.

4. Promote and Model 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.

5. Engage in Professional Growth and Leadership

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

In the context of Sample District's technology program review, the NETS S standards constitute an ideal against which the data is compared. As such, this section of the program review evaluation report provides some detail on the background context and implications of the NETS standards. This discussion is intended to then provide the basis – when considered in light of the data collected – for the recommendations found in Chapter III of this report.

Background to the NETS Standards[7]

ISTE NETS are clearly built upon current accepted standards of accomplished teaching and leadership. Although the standards include the necessary technology components, they also are grounded in application of technology as it supports sound pedagogical theory and practice. All of the ISTE standards prepare teachers, administrators, and technology specialists to provide the environments, experiences, and resources that will help P-12 students effectively apply technology for learning, communications, problem-solving and decision-making.

The ISTE standards for teachers, technology leaders, and administrators all are designed to support the development of technology-capable P-12 students, who must, in today's world, become:

- Capable information technology users,
- Information seekers, analyzers, and evaluators,
- Problem-solvers and decision-makers,
- Creative and effective users of productivity tools,
- Communicators, collaborators, publishers, and producers, and
- Informed, responsible, and contributing citizens. (NETS, 1998)

Technology applied appropriately throughout the schooling process can provide educators with strong support for preparing students to achieve these goals. The ISTE standards support the development of technology-capable students through the application of constructivist learning theory as described in six principles of constructivism identified from literature review by the ATRL Project team (Dimock, V., Southwest Educational Development Laboratory, 2000)

- Learners bring unique prior knowledge, experience, and beliefs to a learning situation.
- Knowledge is constructed uniquely and individually, in multiple ways, through a variety of authentic tools, resources, experiences, and contexts.
- Learning is both an active and reflective process.
- Learning is a developmental process of accommodation, assimilation, or rejection to construct new conceptual structures, meaningful representations, or new mental models.
- Social interaction introduces multiple perspectives through reflection, collaboration, negotiation, and shared meaning.
- Learning is internally controlled and mediated by the learner.

These constructivist principles provide a context for the integration of technology to support learning in powerful ways. The following diagram (**Figure 6**), included in all ISTE standards documents, illustrates movement from application of traditional learning strategies, to strategies aligned closely with constructivist learning principles. The strategies identify observable characteristics of constructivist learning environments that can be facilitated with technology.

[7] The following is excerpted from an ISTE publication and provides further detail and context for the student, teacher, and administrator NETS standards.

Traditional Learning Environments		New Learning Environments
Teacher-centered instruction	→	Student-centered learning
Single sense stimulation	→	Multisensory stimulation
Single path progression	→	Multipath progression
Single media	→	Multimedia
Isolated work	→	Collaborative work
Information delivery	→	Information Exchange
Passive learning	→	Active/exploratory/inquiry-based learning
Factual, knowledge-based learning	→	Critical thinking and Informed decision-making
Reactive response	→	Proactive/planned action
Isolated, artificial context	→	Authentic, real-world context

Figure 6 – Establishing new learning environments and incorporating new strategies.

Although the strategies for the new learning environments described do not specifically denote use of technology, it is clear that technology can very effectively support the implementation of these strategies. All of the ISTE standards and curriculum integration materials focus on building new learning environments that use technology to support research-based strategies to improve student learning.

ISTE Essential Conditions – Another Lens

A useful framework for viewing the relative importance of the various components of Homewood's technology integration initiative is the set of "Essential Conditions" (**Figure 7**) developed by ISTE as a support for implementing the sorts of learning environments where NETS standards can be reached. Therefore, the Essential Conditions make perfect sense as a framework for thinking about how Sample District's environment impacts achievement of NETS. It is worth noting that "Shared Vision" is at the top of the list of conditions. In the evaluators' opinion, vision, expressed by strong leadership, within the context of a strategic plan, is essential for meaningful progress in any district.

Shared Vision	Proactive leadership in developing a shared vision for educational technology among all education stakeholders, including teachers and support staff, school and district administrators, teacher educators, students, parents, and the community
Empowered Leaders	Stakeholders at every level empowered to be leaders in effecting change
Implementation Planning	A systematic plan aligned with a shared vision for school effectiveness and student learning through the infusion of information and communication technologies (ICT) and digital learning resources
Consistent and Adequate Funding	Ongoing funding to support technology infrastructure, personnel, digital resources, and staff development
Equitable Access	Robust and reliable access to current and emerging technologies and digital resources, with connectivity for all students, teachers, staff, and school leaders
Skilled Personnel	Educators, support staff, and other leaders skilled in the selection and effective use of appropriate ICT resources
Ongoing Professional Learning	Technology-related professional learning plans and opportunities with dedicated time to practice and share ideas
Technical Support	Consistent and reliable assistance for maintaining, renewing, and using ICT and digital learning resources
Curriculum Framework	Content standards and related digital curriculum resources that are aligned with and support digital age learning and work
Student-Centered Learning	Planning, teaching, and assessment centered around the needs and abilities of students
Assessment and Evaluation	Continuous assessment of teaching, learning, and leadership, and evaluation of the use of ICT and digital resources
Engaged Communities	Partnerships and collaboration within communities to support and fund the use of ICT and digital resources
Support Policies	Policies, financial plans, accountability measures, and incentive structures to support the use of ICT and digital learning resources for learning and in district school operations
Supportive External Context	Policies and initiatives at the national, regional, and levels to support schools and teacher preparation programs in effective implementation of technology for achieving curriculum and learning technology (ICT) standards

Figure 7 – ISTE Essential Conditions

II. Findings

In this chapter, the evaluators analyze the data collected from teachers, staff, administrators, and parents (see **Figure 5**) compared against the district's indicators.

Student Learning and Outcomes

Sample District's performance indicator for student learning and outcomes states:

> *In line with national standards, all students are able to synthesize and develop knowledge and express their ideas creatively using and producing a variety of media. Students are proficient in basic technology skills and are information and media literate. They are able to acquire knowledge through research and technology, and take ownership of their own learning, collaborate and problem solve with others, while exploring different perspectives utilizing a variety of instructional technology tools within a personalized learning environment.*

This indicator logically breaks down into three broad categories of analysis:

- Student use of and proficiency in basic technology skills
- Student technology use aligned with national standards (NETS)
- Students taking ownership over their learning in a personalized learning environment

Student Technology Proficiency

The evaluators gathered data on student technology proficiency by querying teachers and parents and by observing students working in their classrooms and other instructional environments. For example, teachers were surveyed as to their beliefs related to student technology skills. This data is shown in **Figure 8**, below. Here it can be seen that teachers mildly agree (i.e., the average falls between "neutral" and "agree") that students "demonstrate proficiency with technology tools and operations appropriate to their grade level" (question 4d). On the other hand, teachers on average mildly disagree that students "arrive in my classroom each fall with the technology skills necessary to successfully use technology for learning".

The evaluators observed students working with a wide variety of technology devices (workstations) throughout the district. In elementary schools, there is considerable use of iPads to create presentations (PowerPoint) and iBooks, and to access a wide variety of computer-based-instruction (CBI) programs for basic skills development. For example:

> *I did an iBook with my kids. They record and I do the typing.*

Students use technology to create original works and products (e.g., movies, presentations, digital media, stories and artwork to support thematic units.

math games are used to help children learn math facts, counting and alphabet games are used to support our phonics and fundation program

Using the iPads as Math stations at times allows them to do this more frequently.

RESEARCHING INFORMATION TO ADD FACTS TO THEIR NON FICTION UNIT OF STUDY // TYPING THIER OWN POEMS TO CREATE A POETRY BOOK // USING ROSETTA STONE TO ENHANCE THIER LANGUAGE SKILLS // USING RAZ KIDS TO IMPROVE THIER READING SKILLS

Parents echo these examples by providing similar information about their students' use of technology in school.

Writing homework letters. Navigating Google Docs. Doing homework. Playing math games. Playing various educational games. Completing "Pearson Success Net" assignments. Working with "Type to Learn". Accessing and using many more sites.

I was very impressed that my 3rd grader was able to create his own power point presentation.

Most meaningful experience has been during Challenge camp where my daughter learned how to tell stories through powerpoint. She uses the ipad at school to play math games which she enjoys.

Educational applications on the iPads and programs such as Castle Learning on the school computers for Math and ELA.

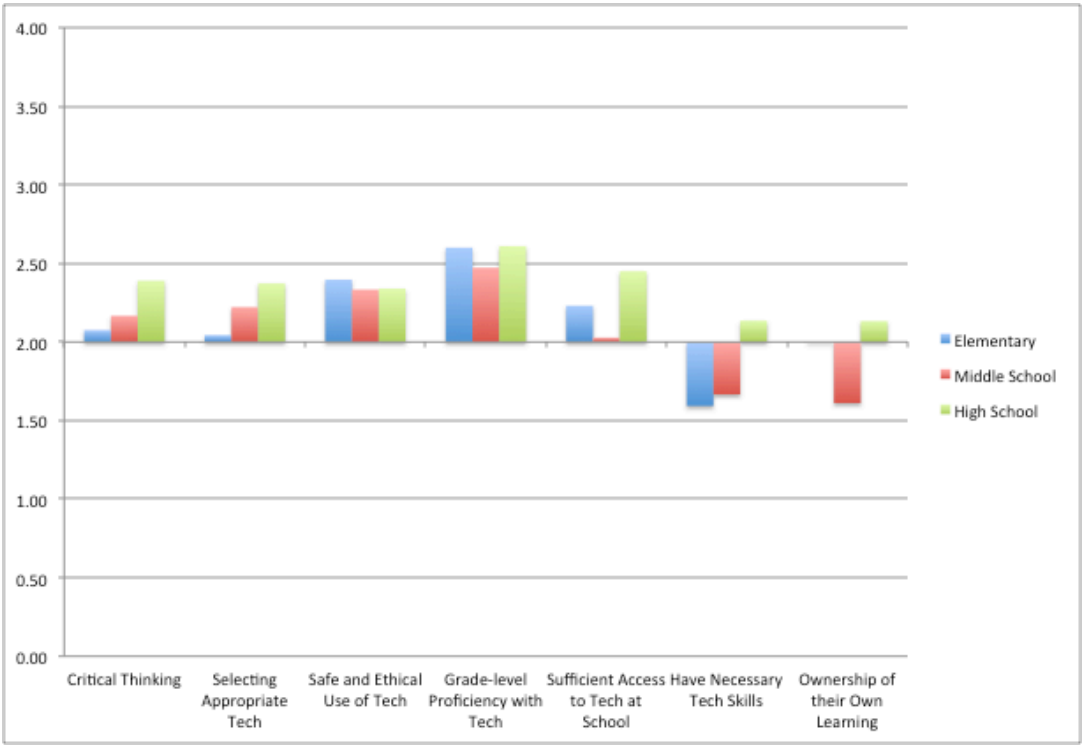

Figure 8 – Teacher belief statements, survey questions 4a – 4g. 4 = Strongly Agree, 3 = Agree, 2 = Neutral, 1 = Disagree, 0 = Strongly Disagree

At the secondary level, the evaluators observed and heard about very similar student uses of technology. Once again, there seems to be a very often-noted use of PowerPoint for presentations. There is also frequent mention of students using online information. In the classroom, secondary students seem to make frequent use of classroom laptop carts. Many carts were observed by evaluators throughout the high school and middle school buildings. Examples of secondary student technology use cited by Sample District teachers, administrators and parents include:

> *We use technology with our group projects – Google docs allows our students to collaborate. Lots of teachers come to the library to use Google Docs.*
>
> *We use iPads in math classes for student groups to create presentations for the class.*
>
> *There is actually very little in the classroom that doesn't use technology – student presentations are done using the Smartboard and students use laptops to put their presentations on the Smartboard.*
>
> *We have clickers that can be used wih the Smartboard to get quick responses from students about how well they understand the lesson.*
>
> *Simulated online labs like gel electrophoresis and DNA extraction*

Students created original news productions on events in the Roman Empire. They varied from taping their productions to using powerpoint to support an in class presentation.

In short, the evaluators find that Sample District students at all levels frequently use, and are thus familiar, with basic technology tools.[8] Overall, it appears that the Sample District elementary students begin to use basic productivity applications – notably PowerPoint – at an early age to produce work product. From elementary school onward, students have access to technology devices and seem to use them routinely throughout their K-12 career in the district. At the high school, the evaluators observed numerous classes where students utilized classroom carts of laptops to type papers.

Information and Media Literacy

One particular student skill that is called out in the district's Student Skills and Outcomes indicator is information and media literacy.[9] The indicator states that students should be "*information and media literate…and they are able to acquire knowledge through research and technology*."

The evaluators find that Sample District teachers at all levels K-12 state that students participate in "research". For example elementary teachers note:

Students can use technology to research information and then create a presentation to present what they have learned.

Students can conduct online research and evaluate whether websites are appropriate

A student could be given an idea/topic to develop and be given choices as to how to go about creating a project i.e. making a Smartboard Presentation, Slide Show and then research, develop and present to the class

A student can do a research project on a specific topic and then create an iBook on the iPad to later present to the class. They can type the information, add pictures, and voice over their writing. I have used this with my students and they are excited to create projects using technology.

An example would be if a student was interested in a topic, that student could use technology to find our more information about that topic, or to research the answer to a question.

Similar examples exist in secondary teacher data.

Sometimes if students create a question in class that no one knows the answer in. I will give bonus points if they can do research using technology to find the answer to share with the class.

[8] An exception to this, which will be discussed later in this chapter in relation to "K-12 Technology Integration Map" is typing and keyboarding.
[9] The evaluators note that this is also a NETS-S skill.

I encourage all of my students to continue to ask questions related to our classroom lessons and go home to research on their own. They have extra assignments that can be turned in that focus on this "home research" idea.

Researching databases provide opportunities for students to safely research and thoughtfully respond to questions/projects that require research

Students have become familiar with several online encyclopedias and periodicals that the library has subscriptions that improve their research skills.

Students can choose the type(s) of technology tools that work best for their personal learning styles, for example, online research instead of "book" research.

It is clear from teacher comments that assigning "research" is understood by most Sample District teachers as yet another way to differentiate student learning. Still, there is concern that not all students have the information and media literacy skills to be able to conduct effective research on their own. The question here is whether students can think critically about the information they encounter and thereby make appropriate decisions as to the validity and usefulness of online information. As the NETS-S Standard 3 – Research and Information Fluency – states, students have achieved this standard/have information and media fluency when they are able to:

- Plan strategies to guide inquiry
- Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media
- Evaluate and select information sources and digital tools based on the appropriateness to specific tasks
- Process data and report results[10]

In regard to these fluencies, the evaluators find that a number of Sample District teachers and parents have concerns as to whether their students are able to effectively perform all of these tasks. As teachers noted:

It's all about Google. They have no idea how to use another search engine. We talk about Wikipedia and how it's not so factual. This year we have not taught research skills at all.

We talk about plagerism and how it's wrong to copy from a website. It usually comes after they get caught.

I think the majority of our students feel that any content on www is legitimate

Well, at the high school they seem to know the difference between legitimate and not so valid resources. I think there is a difference in maturity between the ms and hs and even between regents and honors students

[10] ISTE NETS and Performance Indicators for Students (NETS-S). Standard 3. 2007.

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My concern is that students do not read well enough to wallow through the mire of the internet. They are always in a hurry to get to the one answer even if one answer is not what is being asked. I am also concerned that keyboarding skills are not being reinforced and that students are slowing down because they do not know how to type correctly. Not enough emphasis is being put on reading and many of the teachers at the high school level do not have expectations or knowledge or time to teach the students how to correctly research a question/idea/topic.

As the above quotes show, a number of teachers (and parents) are concerned that students do not receive instruction in information literacy. It appears that this sort of instruction traditionally falls in the domain of the school librarian.

In the library there are projects where a class comes in and we direct them to specific sites and discuss how to evaluate sites - try to make a point that using a database for research is best because it's written by an expert and is fact-checked

While the librarian is indeed praised for work in this area, it is nevertheless the case that some schools do not have librarians or therefore any specific way of addressing information literacy outside of instruction in the classroom.

We used to have a librarian who taught them this, but we don't have a librarian any more. We have a great TA who's running the library, but she's not a librarian

Students should receive formal classroom instruction in the use of different media available to them in school; such as, e-books, library databases, etc.

Parents note that information literacy and digital citizenship are subjects that ideally should be covered in the classroom.

Aside from safe practices in using the internet (which I have taught my child, since school does not seem to provide this) I wish the teachers could help develop the awareness of a wide range of tools, sites, techniques, that will help her be on the appropriate level for a 21st century learner.

[I would like to see] more instruction about how to assess information safely and properly

The evaluators note that in the classroom, information and media literacy should theoretically be closely aligned with the teaching of critical thinking, although it is often the case that teachers do not make this connection. As shown in **Figure 8**, above, Sample District teachers are largely neutral in terms of their belief that their students "demonstrate critical thinking skills by evaluating and selecting appropriate information resources" (question 4a). Likewise, as will be discussed further below, Sample District teachers typically only assign instructional tasks where students use "digital tools to gather information and conduct research" (Figure 6, question 2d) less than "several times a semester". Therefore, the evaluators find that while many teachers reference the idea of media and information literacy as relating to research, the actual frequency with which these tasks are assigned is actually rather infrequent.

Student Technology Use Aligned with NETS

As shown in **Figure 9**, Sample District teachers on average report that they engage their students in various activities supportive of NETS-S-related skills "several times a semester". This average holds true across grade levels, with generally higher rates seen at the secondary level. Parent data (**Figure 10**) essentially confirms the teacher data.

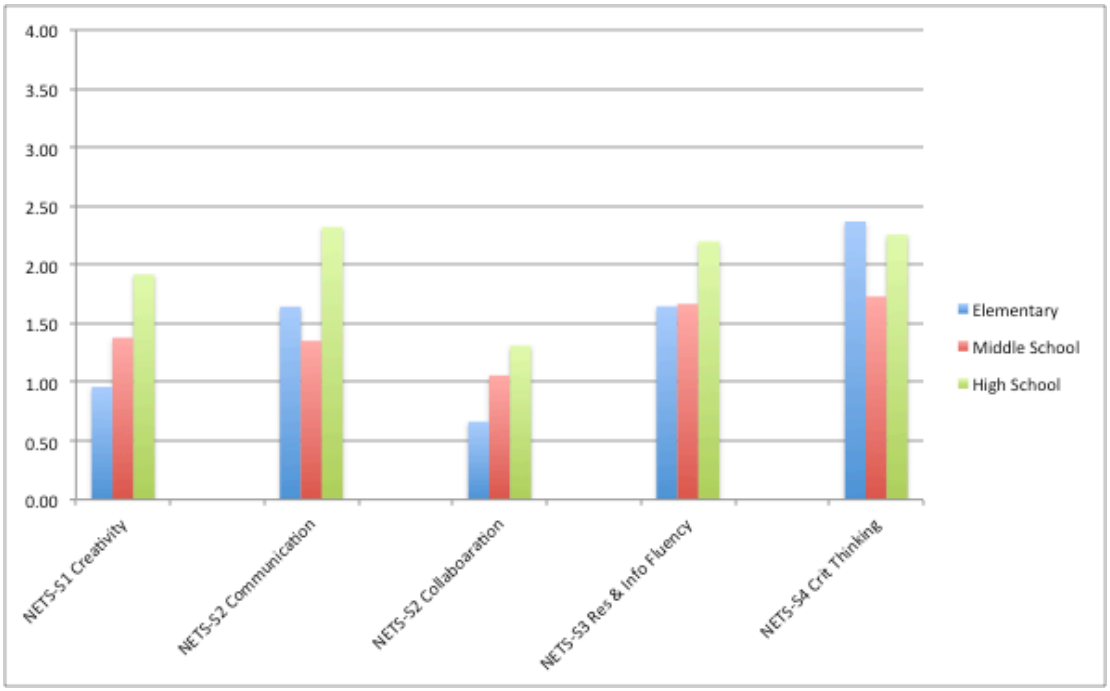

Figure 9 - Teacher responses to online survey question 2, about the frequency with which they use technology to perform and inspire various instructional (student) tasks. For analysis, these tasks are then mapped to NETS-S standards. Scale: 0 = Never, 1 = Several times a year, 2 = Several times a semester, 3 = Two or three times a month, 4 = At least once a week.

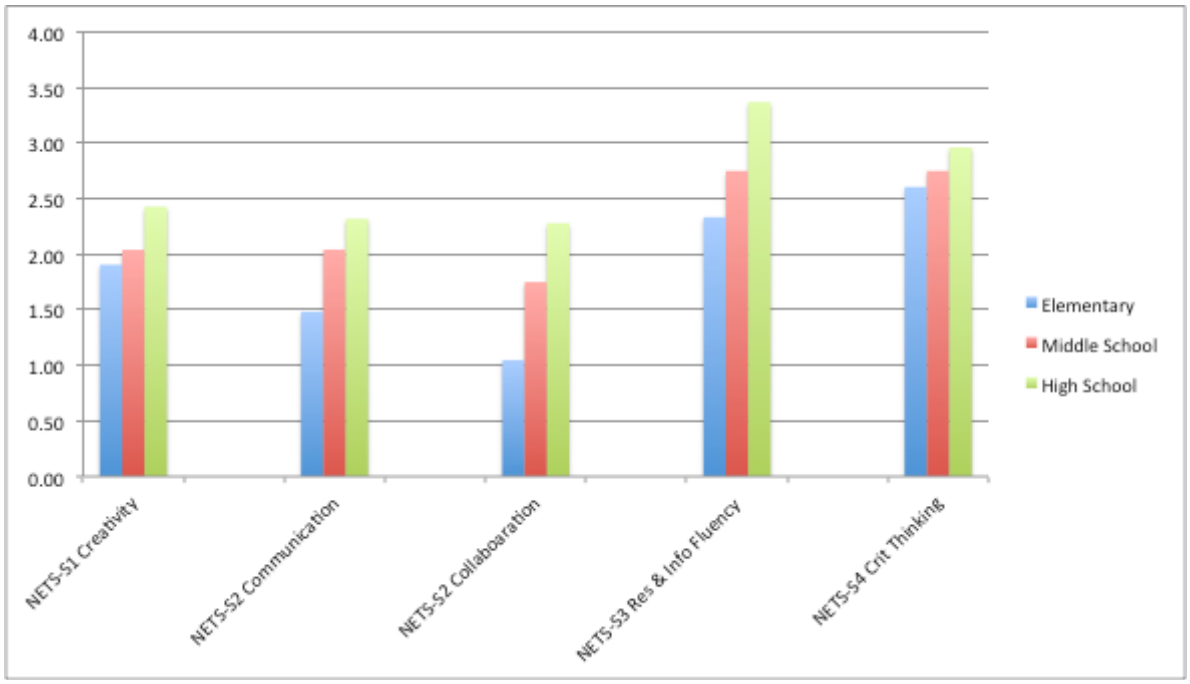

Figure 10 – Parent responses to online survey question 2, about the frequency with which students use technology to perform and inspire various instructional (student) tasks. For analysis, these tasks are then mapped to NETS-S standards. Scale: 0 = Never, 1 = Several times a year, 2 = Several times a semester, 3 = Two or three times a month, 4 = At least once a week.

The evaluators' observation and interview data also confirms the survey data through the variety and frequency with which specific NETS-S-generative activities were reported and observed. Typical teacher comments/examples of these instructional activities include:

> *In 3rd we study countries. So last year for Brasil they worked in teams to present on differnet sets of countries. Lots of critical thinking and collab.*
>
> *In a nutshell, the technology that is available for helping us learn to analyze, read, and perform music is used by every professional musician. In today's world, a musician can (1) hear how a song is played (Youtube), (2) use software to aide them in recognizing their mistakes (Smart Music), (3) record their playing(Garage Band) to accurately assess their progress, and (4) share what they have done (Internet). As young musicians, we strive to emulate the top players, even if it is scaled down to fit our level of playing.*
>
> *[We] SKYPE with students and teachers in other districts and/or locations.*
>
> *[We] Skype, Face-time with other grades/countries*

The evaluators note that some teachers wrote speculatively about what they would use technology. For example:

I would love to use technology in the classroom. I think technology can assists in building authentic learning connections to real life applications, it can promote creativity, it promote social skills, it can help concepts not be so compartmentalized and brdige that gap between the classroom and real world.

I would like to see students communicating with science professionals, maybe even some distance labs that stduents can complete guided by researchers involved in projects with larger scopes. It would be great to have presenters that could communicate online and databases that students can add to, allowing them to contribute to long-term projects related to genetics or ecology. I am already using the computer for simulated online labs that are too expensive or time-consuing to do in the classroom.

In each of these (immediately) above examples from the online teacher survey, the secondary school respondents provided Question 2 frequency of use responses indicating that they seldom to never use technology in ways that support NETS-S. Barriers cited were as follows:

I am very interested in improving techonology use in SDPS but we need a technology leader/director to set the course for the district to take us into the 21st century and beyond.

There should be more common training provided maybe on staff days where several options for technology use/new technologies canbe explored based on what a teacher might require

In later sections of this chapter, there will be further discussion about the barriers and challenges Sample District's teachers face in implementing the kinds of instructional environments that support NETS. Nevertheless, it is clear to the evaluators that the vast majority of the student technology use that occurs in Sample District classrooms (and outside of school on school-related work) is more centered around basic productivity tasks than it is generative of higher order thinking and learning skills such as those described by NETS.

For example, of the over 110 classroom observations conducted by the evaluators, only 10 involved any student hands-on use of technology, and in nearly all of those cases the students were simply using the computers for typing, creating presentations, or working on skills re-enforcement apps/programs. Survey data again supports this point about how Sample District students are using technology. As seen in **Figure 11**, the term "PowerPoint" (and the related term "presentation") was the most frequently used term in teacher survey responses describing both what their "ideal" use of technology would be as well as what their students are currently doing with technology. Following this is "Google Docs" which is mostly described by teachers (in context within the data) as being a way for students to create documents and "turn in work" online.[11] Note how these terms very much over-shadow terms and concepts such as simulation or "collaborate". These terms *are* used by some teachers to describe activities such as science simulations or student-to-student collaborations, but the terms, and therefore the activities they represent, are rare.

[11] Some secondary teachers do note the collaborative benefits Google Docs brings to student work, but this is a connection that is largely restricted to secondary teachers. Further discussion of Google Docs and collaboration will come later in this chapter.

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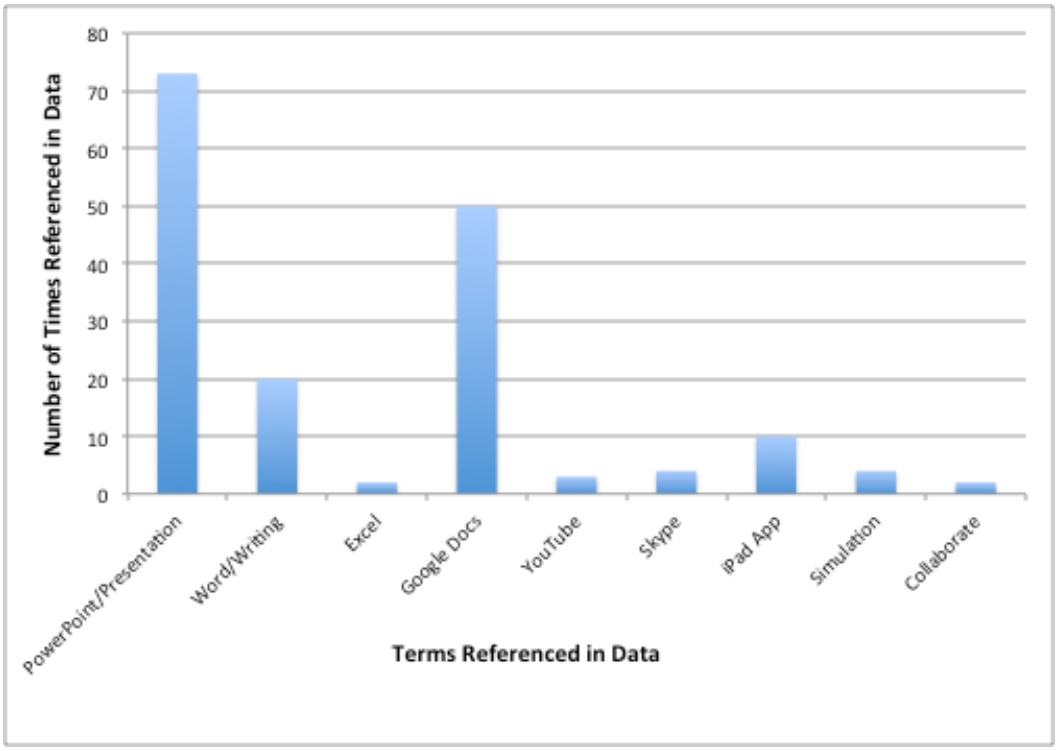

Figure 11 – Frequency of specific terms and concepts appearing in teacher survey data describing the "ideal" (Question 1) and actual (Question 2) uses of technology within their classrooms.

Clearly it is the case that most Sample District students do indeed have hands-on exposure to technology in school, but it is equally clear from the survey and interview data that the vast majority of student technology work relates to teacher-directed use of technology to access information and to produce work product.

Ownership of Learning and Personalized Learning Environment

Sample District's Student Skills and Outcomes indicator describes students who

> *...take ownership of their own learning...utilizing a variety of instructional technology tools within a personalized learning environment.*

To determine the extent to which this is occurring, the evaluators posed a variety of questions to district teachers, administrators and parents. Not only have the evaluators asked teachers and parents whether or not they agree that students have taken ownership over their own learning, but the evaluators have also sought to determine what the common definition of "ownership over learning" might be.

Figure 8, discussed earlier in this chapter, shows teacher responses to survey question 4g where teachers were asked if they agreed that their students currently have ownership over their own learning. **Figure 12**, below, shows parent data for the same question (3g in the Parent survey). As can be seen, while

most Sample District teachers and parents were more or less neutral in their opinions on this question, teachers were less in agreement that students have ownership than are parents. Parents on average mildly agree that students do have ownership.

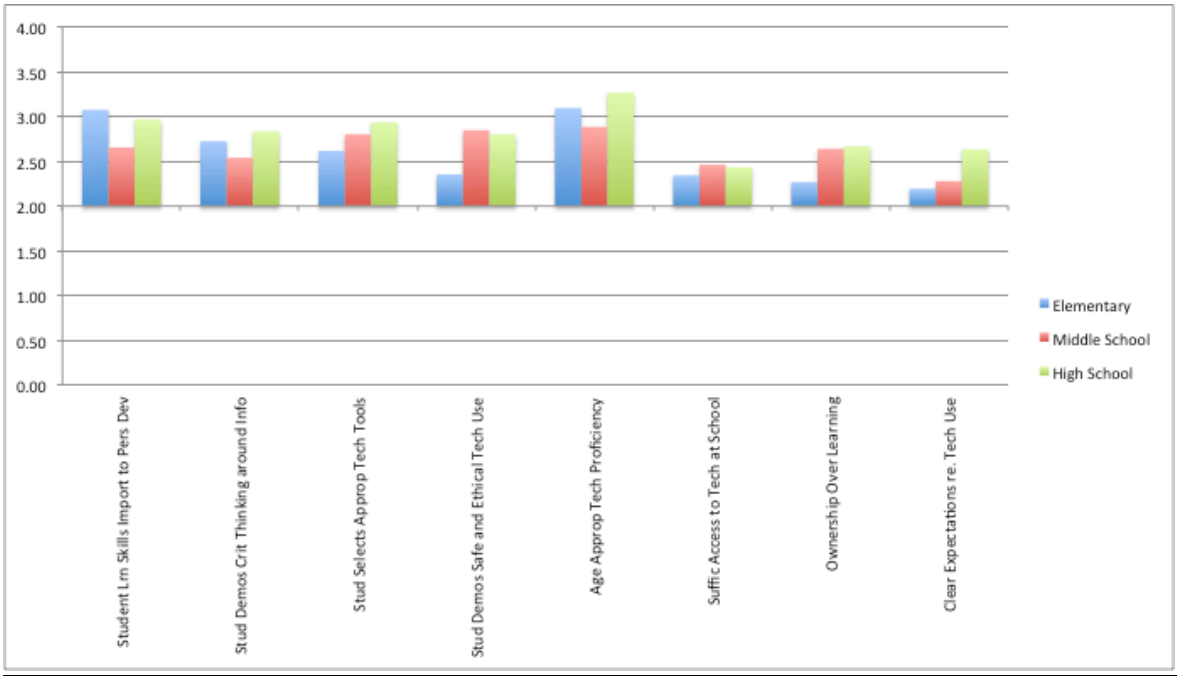

Figure 12 – Parent agreement with belief statements, survey questions 3a – 3h. 4 = Strongly Agree, 3 = Agree, 2 = Neutral, 1 = Disagree, 0 = Strongly Disagree

The evaluators asked teachers and parents for examples of what they understand "ownership over learning" to mean. Typical teacher definitions are:

> *Students can use technology in multiple ways to take ownership of their own learning. With the use of technology, students have access to an abundance of information that is relevant to their educational needs. In addition, they can use a wide variety of educational applications or programs to enhance their understanding of confusing concepts. Students can individualize their instruction by using technology to self-differentiate learning and focus on areas that may need additional support.*
>
> *A student can do a research project on a specific topic and then create an iBook on the iPad to later present to the class. They can type the information, add pictures, and voice over their writing. I have used this with my students and they are excited to create projects using technology.*
>
> *When the student is asked to research an animal as part of a genre study and the teacher allows the student to either use books or the internet to gather more information.*

Students can use ipads or accessible websites at home to help internalize and reinforce skills taught in school.

Pearson (our Math Envisions program) provides the chance for the teacher to assign and track individual students. I can give them remediation work, enrichment, or assign review. There are also assessments and games. Each child has his/her own account and logs on weekly.

That there are tiered levels of additional practice concepts from one level to the next level. Also, that opportunities for struggling students are available for multiple practice experiences until success is achieved.

A struggling student could access the many opportunities that technology provides to fill in voids and gaps, while an advanced student could do the same for enrichment purposes

As these teacher comments show, the most common definition for what it means for a student to take ownership over his/her learning is that the student is able to utilize technology to access different types and levels of material according to his/her needs or interests. In this regard, the definition is very much related to teachers' belief that the primary value in utilizing technology within the classroom is in support of "differentiation" (this will be discussed further in the Teacher Skills and Pedagogy indicator below).

Many parents provided similar examples:

My daughter's teacher gives her appropriate options so that she can make choices and feels empowered over what she is learning.

If a student does not understand what was taught in school they can look up a tutorial on the computer and go through the process of understanding how it is done, at their own pace.

Despite the consistency of most teacher and parent definitions, several teachers and parents did express an idea that is more about student agency and direction. In other words, student-centered learning:[12]

A student could easily do this through the creation of an independent study project, where the topic was selected by the child (with teacher guidance as needed). If a child is fully engaged in learning, he/she will be very motivated to investigate a topic of his/her choosing. The child could be guided by teaching staff to develop a worthwhile research question to investigate, and he/she should set up a timeline for completion of various components of the independent study.

[12] For an excellent overview of the concepts and premises behind student-centered learning, and how this goes beyond simply providing resources matched at different student ability levels, see Hannafin and Land (1997) "The foundations and assumptions of technology-enhanced student-centered learning environments". This article is available online at http://nrega.nic.in/writereaddata%5CLabour_budget%5Clb_0314001001_1213.pdf

The internet provides us with the ability to extend learning and go beyond what is being placed in front of our students. It teaches students early on how to critically evaluate and prioritize their thoughts in order to synthesize what they are looking for and grasp their exact goal in researching topics.

A student could use technology to take ownership over their own learning by using it to further their studies of something learned in school. Through the internet (on reliable websites) children now have so much information at their fingertips. Technology helps students to feel empowered.

They can watch videos of lessons (flipped classroom) and then develop questions based on what they have seen instead of being "fed" information by a teacher. They can try different activities at different levels based on current understanding and they can increase the level of difficulty as their learning increases.

Several teachers indicate that while it might be desirable for students to take ownership, this is not possible given a variety of restrictions to access.

I love the flipped classroom. I would like to assign a short video for them to review at home. Then the class time would be spent working problems that stem from the video or rely on the information in the video. I can't do this in SHHS because many of my children do not have access to technology outside of school.

I feel that our students do not have appropriate access to do certain types of research. Our system manages to block a majority of the sites needed within our field of study.

Teachers can use for demonstration purposes, but students rarely have a chance to do exploration on their own. The computer labs are usually reserved for science classes and select social studies classes.

Other teachers, while discussing the concept of student ownership over learning, noted that they question whether their students are doing this due to what these teachers perceive of as a lack of student ability to transfer skills and knowledge. These teachers noted that students are learning how to use particular technologies for the purposes they are provided (e.g., producing assigned work product) but that they do not necessarily choose to apply these skills to other thinking, learning or life tasks. For example:

I don't think that technology is playing a huge part other than learning how to navigate the iPad and iPhone. I don't have kids going home and saying 'let's make an imovie'. Are they becoming more tech savvy?

This comment points to what the evaluators again find to be a very limited and largely teacher-directed orientation to much of Sample District's instructional environment. Students are indeed provided with multiple ways to address their learning needs, but these "ways" are prescribed by teachers. Even when the "teacher" is in fact a computer – as is the case in a CBI interaction – students are more channeled

than would ideally be the case in an educational environment where there was a high degree of student ownership over the learning process.

Ownership over learning is a concept that most Sample District teachers tie to another idea expressed by Sample District's indicator – that is, the "personalized learning environment". Here teachers typically define such an environment as:

> *My definition of a personalized learning environment is one where the individual's learning styles are accented so the individual can utilize resources that benefit his or her learning.*
>
> *A place where a student can find success with tasks that are appropriate for their needs.*
>
> *My definition of a "personalized learning environment" is one that supports the individual learning MODALITY of a particular student.*
>
> *Each child has their own learning style (Gardner). As I am able to assess how a child learns, I personalize their learning environment to work on their weaknesses and accent their strengths.*
>
> *A learning environment where differentiation is present and actively pursued.*

In short, Sample District teachers define a personalized learning environment as yet something else that results from differentiation.

So, given these definitions, to what extent do Sample District's students use a variety of technologies (take ownership over their learning) within a learning environment that is the result of differentiation (a personalized learning environment)? The evaluators unfortunately find that this ideal – as defined by Sample District teachers – is actually seldom met. Most technology use by Sample District's students is very much teacher directed and relates to simply producing work product or development of basic skills. To the extent that students are able to interact with some basic skills development CBI software – e.g., Castle Learning, RazKids, Math Envisions, Study Island, etc. – "at their own pace" and to develop different levels of skills, then technology is supporting differentiation; but CBI is still very teacher-directed and is not an environment where students truly exercise choice. "Multiple choice" is not choice in the sense of a true student-centered learning environment where choice (and therefore ownership) is defined as involving and encouraging "divergent reasoning, problem solving, and critical thinking".[13] Therefore, the evaluators find that Sample District students are only meeting a very narrow interpretation of the spirit of the district's indicator for Student Skills and Outcomes.

[13] ibid

Teacher Skills and Pedagogy

Sample District's performance indicator for teacher skills and pedagogy, states:

> *Teachers demonstrate fluency in available instructional technologies and strategies and use these to establish personalized learning environments for all students. Teachers design and adapt relevant, real-world, learning experiences that incorporate available digital tools and resources to promote creativity, communication, collaboration, and critical thinking in line with best pedagogical practices (i.e. differentiation, home-school connections, accountability and assessment). Teachers utilize technology to continuously improve their professional practice.*

Analysis of Sample District's performance in this indicator breaks down into two broad themes. These are:

- Teacher fluency in the use of technology to create personalized learning environments
- Teacher skill in designing learning experiences that support best practice

Each of these is considered below.

Personalized Learning Environments

As discussed at length in relation to the Student Skills and Outcomes indicator, Sample District teachers define the term "personalized learning environments" within the context of instructional technology integration as largely being about students using technology tools to access information appropriate to and supportive of their educational needs. Further, Sample District teachers believe that students in a personalized learning environment have the opportunity to produce work product that interests and engages them. Therefore, this section of Sample District's indicator is about the degree to which teachers are skilled in being able to create such environments for their students.

The evaluators find that for the most part, Sample District's teachers are using technology in the ways aligned with their understanding of how best to create a personalized learning environment for their students. Nevertheless, the evaluators also find that teachers' definitions and understandings of personalized learning are quite rigid and fixed and not inclusive of what is actually "best practice" related to this concept/pedagogy. This rigidity in understanding, and the limits it brings to implementation, is found to be a barrier to teacher improvement in both parts of the Teacher Skills and Pedagogy indicator.

It is clear that district teachers see differentiation as the primary goal for instructional technology, and that they defined differentiation as:

- students using technology for basic content skill building and remediation, and
- students using technology to produce work product that engages their interest.

Teachers are quite vocal, and uniform, in their stating of these definitions.

It can assist in differentiating instruction and be extremely motivating.

Computers and Smartboards are great tools for creating activities and lessons for the classroom. The Smartboards are engaging and interative for the students. The iPads provide apps that can review and reinforce skills.

Technology can ideally support the learning in my classroom by lending itself to those students whom will benefit from the integration of different modalities in learning. The Technology will aide the learning of those students whom relate to a more inovated form of learning.

Differentiation -- enough computers in the classroom available so students can work at their own pace on lessons and activities that are advanced or remedial. Online quizzing for teacher assessment during class and student self-assessment.

Technology can allow students to research many different sources and gives students the opportunity to obtain information about subject matter in various formats (video, sound, images, documents etc). In addition, technology can aid the construction of their own work and offers them choice and range (Photoshop, MovieMaker, etc).

I think that it can help students work at an individual pace, which allows for differentiation. Specific apps can also help a teacher get instant feedback on how well students are grasping a topic. It also enhances student engagement and allows for different types of creativity in producing work.

Using technology as a teaching tool in the classroom, allows the instructors to teach in a way that appeals to students. Technology allows instruction to be presented in a multitude of ways, better reaching the various learning styles of students.

The evaluators observed students throughout the district using technology in ways that fit with these teacher definitions. It would appear that most teachers do engage their students in hands-on technology use (in ways described in the above examples) at least "several times a semester" as noted in the online survey data (see **Figure 9**, above). It is clear though that most use of technology to differentiate still falls into the realm of teachers using technology to show and demonstrate things to students. This is born out through survey comments and the evaluators' observations. Teachers note:

Presentation -- with SmartBoards supported by interactive response devices such as TI-NSpire; Internet access to show videos of real-life applications. Additionally, document projectors so student work can be shown "in-situ" (not the next day because the teacher had to scan the document later in the day).

It has become an essential part of our learning process from video demonstrations, exposure to museums/ art historical pieces, research, digital creations such as movies, print media, animation.

I use an I-Pod for music during class as well as using it for assessments such as the Pacer Test. When in the classroom I can use the smartboard to do a lesson on nutrition or health related topic.

Smartboard interactive presentations are invaluable in the diverse classroom. // Ipads allow students to practice necessary skills.

As noted in teacher comments, Smartboards are a central device in most Sample District classrooms. In the vast majority of cases where the evaluators observed teachers using Smartboards, teachers utilized the boards in a mode similar to the traditional overhead projector – that is, by projecting some sort of slide on the board and perhaps marking on the image during a lecture or demonstration. The evaluators also observed many teachers using their Smartboards as a straight forward replacement for traditional chalk or white boards, essentially writing freehand on the electronic board. It is clear from teacher comments that the Smartboard is considered to be highly "engaging" for students in that it fulfills what teachers assume to be students' desires to watch instruction transpire over some sort of technology device. As an administrator notes:

I think we can best motivate students through visual stimuli and lots of the teachers do their own activities with kinesthetic activities that makes their lessons more effective. Our children have grown up in a digital and visual society and you need to use the same type of activities to engage our students.

As this administrator mentions, a number of Sample District teachers noted an intended "kinesthetic" function of Smartboard use. This is described as when students are asked to come up to the board and manipulate information or to write on it themselves (much as students have been coming to the front of a classroom to write on boards for hundreds of years). Nevertheless, this is apparently something that happens relatively rarely as compared to teachers' standard practice of using the boards essentially as overheads. When asked if teachers were skilled in using the Smartboard to its optimal function, another building administrator noted:

I think some [can]. Many don't. I think that some teachers are very skilled at bringing in many different forms of tech to make a very well rounded lesson. Many teachers don't really know the benefits. They use the Smartboard, but they aren't using it for what it was designed to do….The Smartboard is designed to pull in lots of different things. E.g., if a teacher is doing a lab on dissection and there are kids who are opposed to dissection, then they could do a virtual dissection. Instead of just projecting their notes on the board they can make the lesson more interactive.

The evaluators' observations support this administrator assessment. Many Sample District teachers seek to engage their students through what is largely "showing" them materials projected on a large screen computer monitor. There are certainly examples to the contrary, and the idea of a teacher using the

Smartboard to conduct a virtual simulation – one that ideally would involve students doing the simulation, hands-on, at the board – is something that some Sample District teachers reportedly do. Nevertheless, this appears to be a rather rare occurrence.

A number of parents note what they feel is a too-great dependence on the Smartboard, and even in some cases students who are bored with Smartboard use.

> *Even the kids call the smart boards dumb boards.*
>
> *I'm deeply dismayed when I hear about Smartboards being used for long stretches of imbecilic YouTube entertainment by some teachers. This is a disservice to our children, served up by those we entrust. A little fun is fine once in a while, but I think it happens way too much, and not only wastes that time for entire classrooms, but also degrades the student-teacher relationship, which in turn makes the "regular" class time less effective.*
>
> *My biggest concern is that in the lower grades I worry that they rely TOO much on the smartboard, youtube videos, and other things to pass time.*

The evaluators note that these sorts of negative comments about the Smartboards were absent from teacher data. Teachers at all levels express delight in having access to Smartboards, profess to use them "constantly", and often ask for "more Smartboard training".[14]

Teachers also note that another aspect of a personalized learning environment is the use of various software applications for skill-building. Sample District's teachers make note of a wide range of apps (on elementary school iPads) and CBI programs such as Castle Learning, RazKids, Math Envisions, Study Island, Rosetta Stone, etc. It appears that most Sample District teachers feel confident in their ability to assign use of these applications to their students, and that their students frequently use such technology in the course of their learning.

Designing Learning Experiences that Support Best Practice

Sample District's indicator states:

> *Teachers design and adapt relevant, real-world, learning experiences that incorporate available digital tools and resources to promote creativity, communication, collaboration, and critical thinking in line with best pedagogical practices (i.e. differentiation, home-school connections, accountability and assessment). Teachers utilize technology to continuously improve their professional practice.*

[14] The evaluators are unclear as to what else teachers might learn how to do with their Smartboards other than what they are currently able to do. Teachers do not offer specifics in comments beyond many stating that they have "only begun to scratch the surface" with what could be done with a Smartboard. The evaluators find this sort of comment frequently in teacher data from many districts and feel that this is based in teacher belief that the Smartboard is a "revolutionary" device and therefore must be capable of some heretofore unrealized benefit to student learning.

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While it is not directly stated as such in the indicator text, what this indicator text describes are teachers who have the skills identified in the ISTE NETS-T standards. As is described in **Chapter I**, NETS-T and NETS-S are mutually supportive sets of national standards that describe "best practice" for teachers using technology to support the development of 21st century learning skills in students. In addition, several of the NETS-T standards (specifically NETS-T 3 and 5) specifically apply to teacher practice and the use of technology for authentic assessment and professional growth.

The evaluators queried Sample District teachers as to the frequency with which they engaged in various instructional activities that align with the NETS-T standards. As **Figure 13** shows, teachers report "creating opportunities for students to use technology to create original, innovative work and products" (question 3a) and creating "student-centered learning opportunities that integrate technology tools" between several times a year and somewhat more than several times a semester. These two questions align with NETS-T Standard 1, and what the data shows is that teacher activities aligned with NETS-T 1 do not occur very frequently in Sample District classrooms.

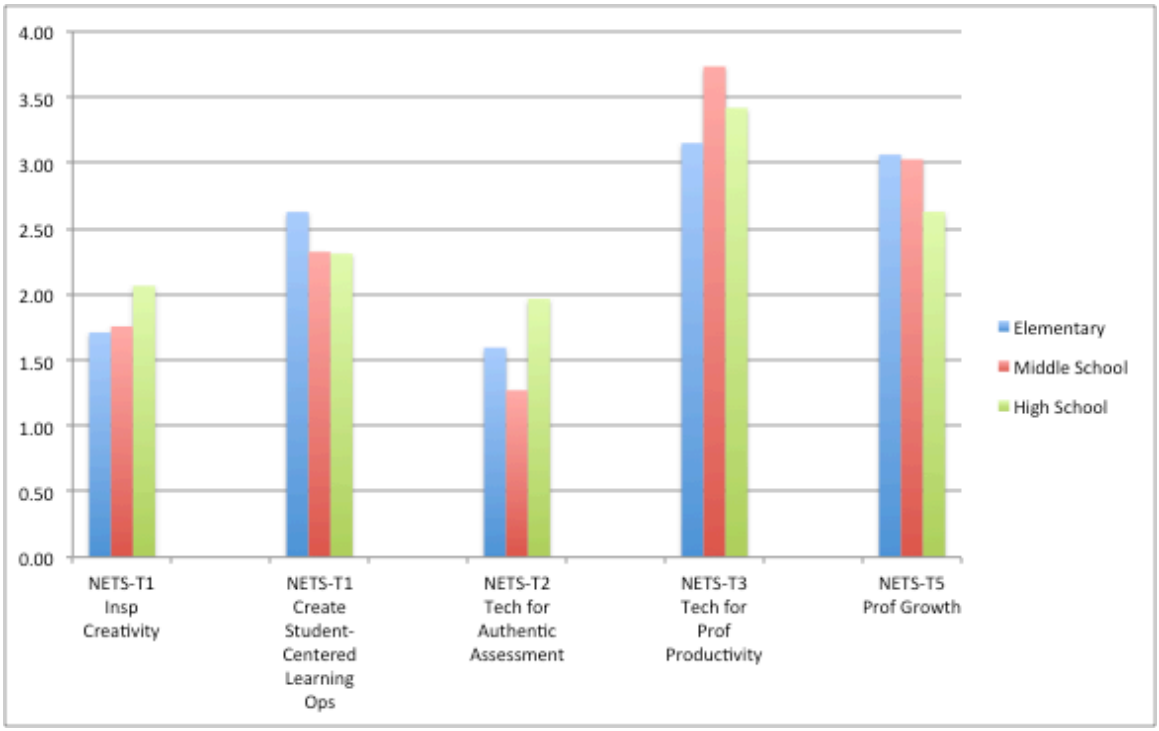

Figure 13 – Teacher responses to survey question 3 on the frequency with which teachers utilize technology to support various NETS-T-mapped instructional strategies and professional activities. 4 = At least once a week; 3 = 2-3 times a month; 2 = several times a semester; 1 = several times a year; 0 = virtually never

The evaluators find that elementary teachers note a somewhat greater frequency than teachers at the secondary levels in creating student-centered learning opportunities. The evaluators find that this meshes with the finding that Sample District elementary teachers tend to define "student-centered learning" as that which surrounds the use of various CBI-based skill-building apps and programs. There is clearly more use of such technology in the district's elementary classrooms than there is among secondary students.

The evaluators find once again that most Sample District teachers equate using "*resources to promote creativity, communication, collaboration, and critical thinking*" to the teacher-directed application of technology as a tool for differentiation. This connection to differentiation comes up repeatedly in teacher descriptions of their "ideal" for technology use and integration. For example:

> *The use of technology allows me to create my materials and present them using different modalities. I can also create alternative assessment to allow my students to demonstrate their knowledge. Technology facilitates engagement, interaction, and communication. It could provide assessment tools that can be used to evaluate student knowledge and participation instantly.*
>
> *Allow for more varied instruction and bring in images and ideas outside the classroom and from outside even the community. Talking about a volcano is great, seeing pictures of it is nice, but watching it move through video and if possible interactive is best.*

Even when Sample District teachers describe activities that students do – e.g., research and using simulations – the implication is that these are activities assigned by teachers to address student interest and "different modalities" of learning.

Accountability and assessment are specifically mentioned in Sample District's Teacher Skills/Pedagogy indicator and map to NETS-T standard 2 – Design and Develop Digital-Age Learning Experiences and Assessments. In the teacher survey, teachers were asked the frequency with which they use technology as "a means for authentic assessment". As shown in **Figure 13**, above, teachers report doing this rather infrequently. Surprisingly, even those teachers who did state that they use technology for authentic assessment provided examples that were nearly uniformly related (at all grade levels) to the use of Castle Learning. For example:

> *I have used Castle Learning to assess students on regents-style multiple choice questions.*
>
> *Castle Learning is used to assess student progress.*
>
> *I have used castle learning as a way to test my students understanding of topics in Earth Science.*
>
> *We use laptops and ipads to review with CastleLearning.*
>
> *I don't know what this refers to. Castle learning? If so, yes, they use in Lab.*

The few exceptions to Castle Learning relate to RazKids, TurnitIn, and the use of clickers. The evaluators find these responses notable in that none of these are actually examples of authentic assessment, but are rather about computer-based instruction which focuses on preparing students for tests (though a series of questions, answers, and multiple-choice assessments driven by the computer as "teacher").[15] This is an important point as it goes back to an overall evaluator impression surrounding Sample District teacher data and how teachers define various aspects of technology integration. In this case, Sample District teachers have affixed their understanding of technology-integrated assessment to

[15] As a further note, the evaluators find (and detailed analysis of the survey data shows this) that Castle Learning is something that a number (about 20%) of Sample District teachers use very frequently (at least once a week) whereas over 50% virtually never use it. In this case, an average by grade level does not accurately reflect actual usage.

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be computer-based instruction and testing. This is a similar concept to how (as noted above) teachers have tied "differentiation" to using technology to produce work product and (again) to using CBI to address different student skill levels. The evaluators note that these definitions are not particularly in line with best practice and the NETS (see **Chapter I**) and are representative of traditional learning environments rather than the new learning environments intended to support 21st century learning and skills (see **Figure 6**).

In terms of NETS-T standard 3 – Modeling Digital-Age Work and Learning, or "As a tool for professional productivity" as it was listed on the teacher survey – Sample District teachers noted that they engage in such activities very frequently. Examples cited are posting to blogs, emailing, accessing websites and engaging in various online discussions with teaching peers. Certainly, teachers do seem fluent in creating materials such as worksheets and materials for sharing via their Smartboards. Similarly high survey scores were seen for NETS-T standard 5 – Engaging in Professional Growth and Leadership, or "To participate in professional learning opportunities" as it was stated on the teacher survey. Examples provided by teachers were largely the same as were provided for NETS-T standard 3. Teachers largely point to using email and participating in online courses.

Administration and District Policy

Sample District's indicator for the Policies and Procedures Related to Technology states:

> *The District ensures the development of a clearly defined K-12 plan for technology integration, aligned to national and local standards with measurable essential learning outcomes. The district ensures equal access and learning opportunities for all students and staff. Resources and policies are established to foster teacher leadership, monitor accountability, celebrate success, and encourage risk-taking. The district maintains and constantly reviews policies necessary to ensure safe and ethical technology use.*

Sample District's indicator focuses on several themes. These are:

- Existence of a clearly defined K-12 plan for technology integration
- Equal access for all students and staff
- District policies that support teachers
- Safe and Ethical technology use

The findings related to these themes are discussed below.

K-12 Technology Integration Plan

The evaluators do not find that there is currently any sort of district "plan" for how instructional technology is to be used or integrated across the K-12 spectrum. To be sure (as has discussed at length in this chapter), technology *is* being used by Sample District students, and there is a certain uniformity to that use (CBI and basic applications such as PowerPoint), but this does not seem to be connected to a plan or a curriculum map. One way that this lack of a map is evident is in the variety of teacher and

parent comments concerning the lack of uniformity of student technology skills. As seen in **Figure 8**, above, teachers are only slightly above neutral in their agreement that their students have grade level technology proficiency and they mildly disagree that their students "arrive in my classroom each fall" with the technology skills necessary for their learning. Parents (**Figure 12**, above) are slightly more positive in their assessment of student technology skill, but are neutral in their belief that there are "clear expectations" for student technology use.

Teacher and parent comments provide more detail:

> *Years ago, when we had computer classes they had typing skills and they really could use what they knew to create presentations and movies and other creative work that they really took ownershop over. But we don't see that now because they really don't have basic skills and aren't taught that. When we tak them to the compouter lab in 3rd grade we have to start by talking how to turn on the computer.*
>
> *Familiarize them more with the keyboard, typing is becoming a lost art.*
>
> *It used to be very helpful to the students when they received computer classes in a systematic way (every week). They were able to navigate technology in a very efficient way. Their keyboarding skills were so good that they didn't need to worry about that and could concentrate more on the writing piece. We really miss that!*
>
> *I have 2 children, one in 11th grade the other in 7th. Both are at approximately the same level of intelligence, both taking honors programs and both had taken enrichment in elementary school. I can see a MARKED difference in each child's level of skill in using technology. My eldest was taught specifically how to use a computer and is very proficient with a keyboard as well as the general use of a computer. My youngest is much more reluctant to use computers, his keyboarding skills are hunt and peck etc. I KNOW this is directly due to what was taught one child and not the other!*

These comments highlight the fact that there are inequities between students and classrooms as far as the degree to which students are "exposed" to technology and develop technology skills. This is evidence that there really is no K-12 plan for technology integration. Furthermore, whereas in the past there as an elementary computer teacher who (as the above comments indicate) used to teach all students a standardized technology curriculum, this position has not existed for the past three years. While elementary students should be acquiring the same technology skills through classroom integration of technology and regular visits to the computer lab, this is clearly not currently the case.

The evaluators emphasize that the function of a K-12 technology integration plan should be about more than simply ensuring that all students have equal opportunity to develop basic technology skills. While this is important, the evaluators believe that the true intent behind the plan described in the indicators is to create a mapping of 21st century learning/NETS skills to the core academic curriculum. In this way,

students can acquire the full range of NETS skills (including basic technology skills – which are NETS-S standard 6) within the context of learning activities that support the general curriculum.[16]

Equity for All Students and Staff

> *While I know that clearly there is a place for technology in the classroom, I still struggle to understand exactly how it should be ideally used to support learning. Although I conduct all of my lessons on the SmartBoard, I worry about our students' oversaturation when it comes to time spent in front of screens, even when it is for the purposes of learning. At the same time, I worry about a growing polarization in technological "equity." If we do not provide our students with repeated, daily practice with the multitude of uses for various technological devices, we will be encouraging a disparity between our students higher and lower socioeconomic backgrounds.*

As the above quote exemplifies, there is a concern among Sample District teachers and parents related to equity. This concern is often expressed in terms of access to technology devices, but extends to concerns about inequities around the degree to which students receive exposure to technology-infused instruction (as discussed above). For example, a number of parents note that some students simply do not have access to computers and other technology outside of school:

> *Given the demographics of our school district, I think it's essential we consider the impact of decisions regarding the use of technology for any work that takes place outside of school. While it's wonderful that some children have access to computers, tablets, smartphones, eReaders, etc. at home, that's not the case with many of our students. // Yes - they are able to stay after school and make use of the school's facilities or use the local library. But I see who is using the library computers - and it's a limited group.*

> *If projects in school require use of a computer, the children should be given time in school to work on this. It should not be assumed that all students have access to a computer at home.*

The evaluators note that it is not entirely clear as to what percentage of students truly do not have access to the Internet and an Internet-connected device outside of school. A number of teachers note that "most" and an "increasing" number of students have smartphones (and other similar devices) that do indeed provide access outside of school. Nevertheless, this is not hard data and it appears that concerns about lack of outside-of-school access provide a basis for some teachers to refrain from asking their students to engage in tasks that would require technology access outside of school. For example:

> *We do not share at a distance. Many of my students do not have access to technology outside the school - no home computer. I do have a twitter and try to update so that kids with data on their phone and keep track of the class.*

[16] There are a number of models for such plans available. One is the ISTE NETS "Profiles for Technology Literate Students", attached in the Appendix of this report and online at http://www.iste.org/docs/pdfs/nets-s-2007-student-profiles-en.pdf?sfvrsn=4 . Another example is the "Classroom Scenarios" document developed by the State of Vermont. This document can be found online at http://transformation-technology.wikispaces.com/ .

Students have little access to technology, so it would be unfair to demand projects that require computer use.

One area within school where teachers note that equity problems exist is in ESL and special education areas. Here, teachers note that a lack of technology in some special areas (such as ESL and Special Education, as well as other non-academic areas such as Physical Education) has disadvantaged students.

There are 4 ipads in a regular classroom, but in an ESL classroom there isn't one. [In my school] ESL is a pullout. They don't have iPads.

many of my students in ESL don't have tech at home, so we need to make sure they have access

ESL students do not always own a computer, they require longer to do activities and to open account, for example, for Google Doc. The librarian has been very helpful in teaching them how to research using our database.

I don't think many of my sped ed students have tech at home either, but the real issue is not access but understanding how to use tech.

District Policies that Support Teachers

Sample District's indicator states:

> *Resources and policies are established to foster teacher leadership, monitor accountability, celebrate success, and encourage risk-taking*

These facets of district performance will be discussed in detail in the section of findings that relate to teacher professional development and instructional support covered in the Infrastructure indicator, below.

Safe and Ethical Technology Use

The data gathered by the evaluators does not contain many references positive or negative in relation to the safe and ethical use of technology. Where this topic does come up is in relation to "information and media literacy" as discussed earlier in this chapter (in the Student Skills and Outcomes indicator). Here, the evaluators found that a number of teachers are concerned about the degree to which their students are able to make appropriate choices about technology use and information validity. Several parents (of elementary students) raised this issue specifically in relation to concerns about "Internet safety". Nevertheless, terms such as "cyber-bullying" (commonly referenced in other districts' data and in the general culture) do not appear in Sample District's data. The evaluators find that Internet safety is likely important to Sample District's teachers and parents, but that there simply have not been any significant problems in the schools with this issue and therefore it is not a present concern.

Infrastructure

Sample District's indicator for infrastructure states:

> *The technology infrastructure is essential to the current and future success of our students, teachers, and district. All stakeholders understand the district's strategic vision for instructional technology. The district advocates for a budget that supports the continual upgrade and maintenance of technology infrastructure. The technology infrastructure is bolstered by both technical supports and effective teacher/staff professional development. The district supports an environment with the necessary resources for usage, communication and collaboration between home and school environments.*

This indicator contains several concepts that go well beyond the traditional notion of "infrastructure" as pertaining only to technology hardware, networks, and technical support. While these are covered in this indicator, the indicator also includes:

- Teacher professional development
- Existence of a strategic vision for instructional technology
- Home-school communication and collaboration

Each of these issues will be considered below, after a discussion of Sample District's technology hardware, network and technical support.

Hardware, Network and Technical Support

In survey and focus group data, Sample District teachers made few references to any inadequacies in their own access to technology hardware and software. This is notable in that the evaluators find it quite common in other districts for teachers to express concern over their own workstations, commonly used software applications (e.g., systems for grade books, etc.), and network access. In Sample District, this sort of concern seems relatively absent. In fact, many teachers make a strong point out of commending the district for how it has supported school technology needs:

> *I think SDPS is doing a great job with technology. I have taken advantage of technology classes that the district provides and incorporate them into the curriculum. Sometimes my class has to borrow iPads from other teachers...we could benefit from another iPad for the room.*

> *The Sample District schools are really ahead of the curve regarding instructional technology. Not only do we have the latest technology available to us, but we have the staff to help and support us. ... If anything, we still have technology that we want to use and have to find the time for. We are so lucky with all that is available to us.*

As the first comment above notes, it mostly seems to be the case that if there are difficulties experienced by teachers in relation to technology access these are in relation to not having sufficient hardware available to ensure that all students who are assigned to use the programs can use the programs.

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For example:

> *I think we need more resources to allow more of our students to utilize technology when the computer lab is booked.*
>
> *If the ESL department had IPADS, like many classroom teachers, I would be able to integrate technology as a learning tool on an individual level for each student.*
>
> *We also do not have enough access to technology. The computers need to be updated. You need to be able to keep a laptop cart in your room for a day - there is not enough time to go get/find the cart and get it to your room while still watching students that are coming in and leaving your class. Having one cart per grade level team to share would be great. Lack of access for all classes for a day or several days in a row limits what I do or could do.*
>
> *We have two computer labs -- they almost always have classes in them. The library computers are too slow. Laptop carts are difficult to move around and some of the laptops are out of date and very slow. Ipad carts are also often reserved -- can't count on availability of any kind of technology consistently. On the plus side, the SmartBoards are very useful for presentation purposes and can make lessons more engaging for students.*

As shown in **Figure 8**, above (question 4e), teachers at elementary and high school only very slightly agree that their students have sufficient access to technology at school, and middle school teachers are essentially neutral on this issue. Parents (**Figure 12**, above, question 3f) provide equivalent data. For example:

> *Unfortunately, there are not enough computers in school for everyone at Washington Irving to use. Therefore, gaining any kind of technology needed for learning, I believe, is minimal.*
>
> *Get more pc's in the school so they do not have to share 1-2 ipads during their free time.*

Despite the rather prevalent teacher comments (and quantitative survey data) that their students do not have sufficient access to technology, the evaluators found no building administrators who stated that lack of equipment was a barrier to their students and teachers using technology. Furthermore, in focus group discussions teachers did not note lack of equipment as a barrier. The evaluators note that the district has recently purchased 300 Chromebooks and that laptop carts, iPads, and computer labs were observed throughout buildings, often not actively being used. There are 11 laptop (not counting iPad) carts in the High School alone. The district's technical support consultant notes that the district has 1500 computers, and this number does not include all of the Apple devices (e.g., iPads and iPod Touches at the elementary level). District enrollment is approximately 2500 students. Therefore, it is unclear as to why so few teachers in the survey seem to agree that their students have adequate access to technology to learn.

It is quite possible that a number of teachers have integrated technology tools into their practice in such a way that it is difficult to "schedule" use in a lab or to arrange for use of a laptop/iPad cart. As several teachers note:

Sharing one computer lab for grades 3-5, makes it almost imposible for teachers to create lessons in need of weekly or frequent lab visits.

There needs to be equity when signing up for the computer lab. Certain programs are allowed to "take over" most of the time, and it is frustrating to be in the middle of a project and not be able to use the lab. Also, the library computers and use of the library for research is in need of adjustment as it is unavailable most of the day!

Even the use of the laptop/iPad cart might not address scheduling issues for some teachers. For example, the evaluators observed several classes where teachers seemed to be engaged in a rather complex procedure for calling students up to the cart in small groups to retrieve and sign-out machines. In one high school class, this process took well over 10 minutes of teacher time at the beginning of class (and was repeated in reverse at the end of class). One imagines that this would be difficult to sustain on an ongoing or daily basis as retrieving and returning machines took approximately a quarter of the 90-minute class period.

Similar experiences may be at the root of a number of teacher and parent comments that express the notion that an idea situation would be for every student to have a laptop or iPad for his/her personal use in school.

Every child should be required to have their own laptop or iPad in 8th grade to last them through senior year of high school. The community should agree to fund the tech for the children who can't afford it. Each child should have the same equipment and it should be insured by the district. In the long run, this will likely save money and enhance the educational experience of our students.

Make sure each kid has a laptop to use during the year.

Provide each student their own 'school' laptop to carry from class to class. Check out the laptop in the morning at a centralized desk. Check the computer back in at the desk at the end of the day.

The superintendent and his administration a few years ago felt that everyone should get an individual device, but money didn't allow this to happen. Not sure what the vision is now.

The evaluators also note some difficulty experienced – also at the high school – with the computers in the video production lab. This lab is used in association with a class that produces a highly regarded weekly video news show in the school. These machines appear to be quite old PCs and do not represent close to the state of the art for computer-based video production work. This lab seems to have been established by a single teacher (who is no longer with the district) and is not well integrated into the overall district infrastructure. A similar situation was found by the evaluators in relation to other "special purpose" labs in the secondary schools. The real issue here seems to be that these specialty labs exist largely on their own and given the lack of a comprehensive district technology plan (see below). It is

therefore easy for these sorts of resources to fall off the radar while attention is given to more mainstream and common infrastructure.

In terms of technical support, teachers and administrators across the district have nothing but praise for the services of the contract technical support consultant who oversees most of the district's infrastructure. This one individual is both network manager and on-call desktop support technician for approximately 1500 devices (the PC-based devices primarily) in the district. Teachers report that most problems reported to the technical consultant are solved "within the day" (if not sooner).

The contract technician notes that most of his attention is paid to the PC-based workstations and laptops, and that these devices are largely (but not exclusively) in the middle school/high school building. Further, most of these devices still run Windows XP. While a move to Windows 7 is imminent, the consultant notes that one way in which user satisfaction has been maintained is via keeping the number of technology changes that impact end-users (teachers) down to a minimum. Therefore, infrastructure changes such as the migration to a modern operating system and centralizing of printing services[17] could create temporary user dissatisfaction even as they result in overall improvements to the district infrastructure.

Support for Apple devices – MacBook's, iPads, iPod Touch devices, and some Apple workstations – is largely provided by the district's Instructional Technology Specialist.[18] There is just one ITS who covers the entire district (with the assistance of two teaching assistants who largely work in relation to particular labs). The ITS has taken a lead in supporting Apple devices in elementary schools and notes that there are currently more iPads than PCs in the elementary schools. It would appear that this one individual is physically supporting nearly the entire Apple infrastructure – and hence most of the technology infrastructure – in Sample District's elementary schools. As is the case though with PC and network technical support at the secondary level, teachers and administrators are highly complimentary of service they receive from technical support. Nevertheless, the evaluators note that for a network the size of Sample District's (approximately 2000 connected devices, PC and Apple), industry guidelines call for approximately five technicians plus a network manager/administrator.[19] It is clear that despite the fact that Sample District teachers are currently satisfied with their technical support, the district is operating with just a fraction of the recommended level of technical support.

Teacher Professional Development

Sample District's indicator calls for "*effective teacher/staff professional development*". The evaluators find mixed reports concerning technology professional development.

[17] The district currently maintains one printer per classroom as well as a printer tied to each laptop cart. This costly and maintenance-intensive arrangement could be simplified with via the use of shared printers.
[18] Reportedly, the district's technical support contract with CCC can be extended to Apple devices if necessary, but the district's contract (CCC) consultant says that such support has seldom been required to-date.
[19] See the Texas STaR chart as one example of this guideline. http://starchart.epsilen.com/docs/TxCSC.pdf

As shown in **Figure 14**, teachers very mildly agree with the notion that they have adequate technology professional development (question 4h) and that they have adequate professional development to develop student centered learning environments (question 4i). As a related matter, they also are largely neutral to only mildly agreeing to the statement that they are encouraged to take risks (question 4j) and that there are clear expectations in the district for how technology should be used to support student learning of the core curriculum (question 4k). The evaluators note that all four of these points tie back to the effectiveness of the district's professional development environment.

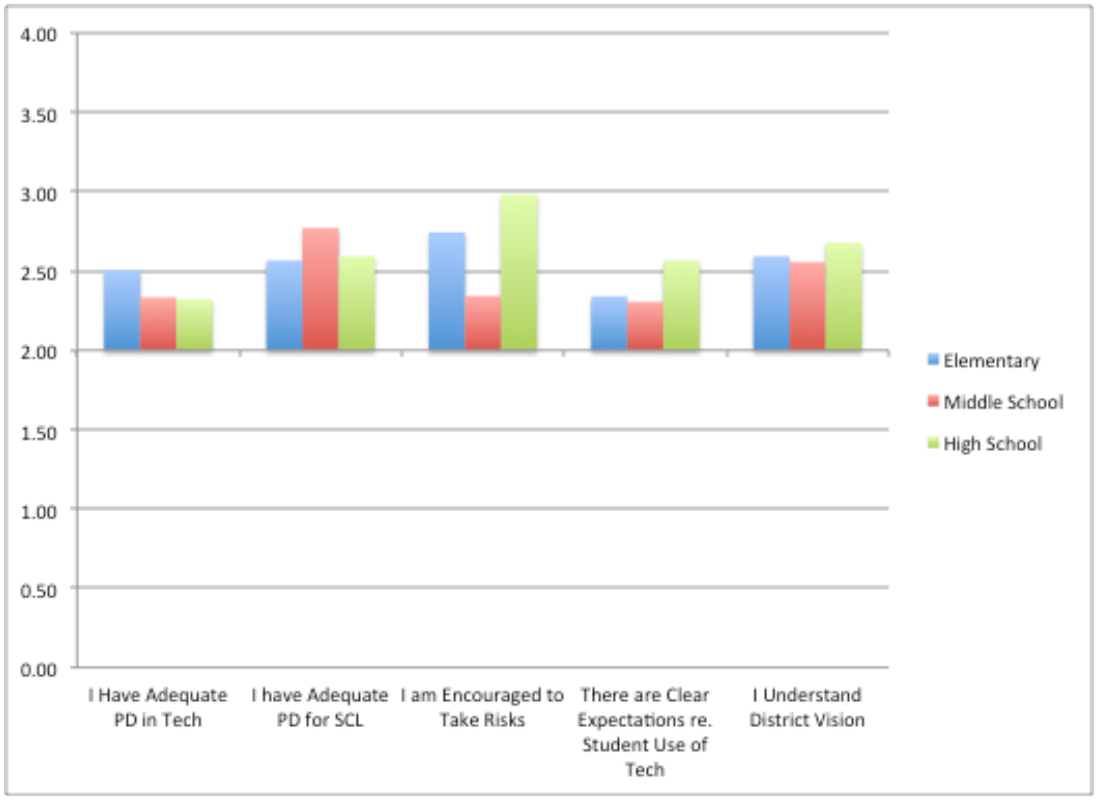

Figure 14 – Teacher belief statements, survey questions 4h – 4l. 4 = Strongly Agree, 3 = Agree, 2 = Neutral, 1 = Disagree, 0 = Strongly Disagree

First, it should be noted that somewhat counter to the data provided on the survey, teachers in their various comments to the evaluators note strong satisfaction with professional development. Typical comments include:

> *The professional development offered in SDPS is excellent and plentiful. I have had the opportunity to participate in classes providing instruction, however, with so many other demands, there is not always the time available to implement and use technology in the classroom other than what was noted in areas 2 and 3. As anything new, if it is not used on a regular basis, information needs to be refreshed.*

Sample District Public Schools have provided opportunities for professionals to improve their craft by offering workshops, tech support, professional development, newer technological medias.

I feel that we have benefited from a variety of professional development opportunities with regard to technology. "Turn key" presentations by fellow faculty members have been especially helpful.

I feel the Sample District is always ahead of the curve when it comes to technology and technolgy training.

The evaluators find that some of the most praised teacher workshops are apparently held after school and in evenings. This does seem to cause problems for a number of teachers.

There needs to be sufficient time to train the teachers on how to use the technology that is expected to be used. The training needs to take place during the school day or during PD times. It should not be ONLY offered as a class. Some teachers do not have the time to take advantage of these opportunities.

Teachers point to the fact that while they appreciate the actual training provided in sessions and via technologies such as Nearpod (being used in several elementary schools), what they most value is time to collaborate and share with peers. It is felt that this should be more a part of each teacher's day.

I enjoy watching tutorials, but besides e-mail I prefer to communicate w/peers and collaborating w/ professionals in person.

Technology should be a regular part of staff development days and monthly meetings just as literacy and math are.

A prep period has to be coordinated with other teachers and collab with a dual lang teacher means that there's no time for me to sit down and collab with another teacher.

I would like to see more technology instruction be extended to the support staff at SDPS. TAs and aides should also participate in this sort of staff development.

Discussions of teacher professional development naturally turn back to the role of the district's ITS as a teacher trainer and instructional support person. In this regard, the evaluators find that Sample District's ITS is a very respected member of the community who is credited widely for supporting teachers. Nevertheless, as the ITS is the first to admit, there is way too much work for a single person (the two teaching assistants who work with the ITS have different roles and do not focus on teacher training). The evaluators note that best practice indicates that a district with the number of teachers that Sample District has should employ between two and four ITS.[20]

[20] Common guidelines such as the various STaR (School Technology and Readiness) charts developed by states indicate that there should be a .5 FTE ITS per every 30 to 60 instructional staff. Sample District has approximately 200 teachers.

In short, the evaluators find that while Sample District teachers have access to after-school technology workshops that are generally highly regarded, they do not have access to job-embedded professional development. This is due to a lack of resources (ITS) that would provide such professional development. Furthermore, while it seems that administrators are generous in approving teacher requests for training, there are not clear or strong expectations as to what training teachers will take, how it will be provided, or exactly how it will connect to any sort of broader school or district goals. The main sort of professional development that would benefit teachers is more time to collaborate with peers, and more time to "practice" with and reflect upon technology use. Teachers do not seem to have such time, or make use of currently available planning time to engage in such activities.

A Strategic Vision for Instructional Technology

As shown in **Figure 14**, above, teachers are largely neutral on their believe that they understand the district's vision for instructional technology. Much as is the case with teacher belief that there not "clear expectations" for technology use (see discussion in the previous indicator), there simply does not appear to be stated district vision for technology. It is notable that there is no technology plan linked to the district's website, and in fact no direct information on technology staff, department, or policy. Not surprising, parents report – see **Figure 15**, below -- that they do not know of a district vision for technology.

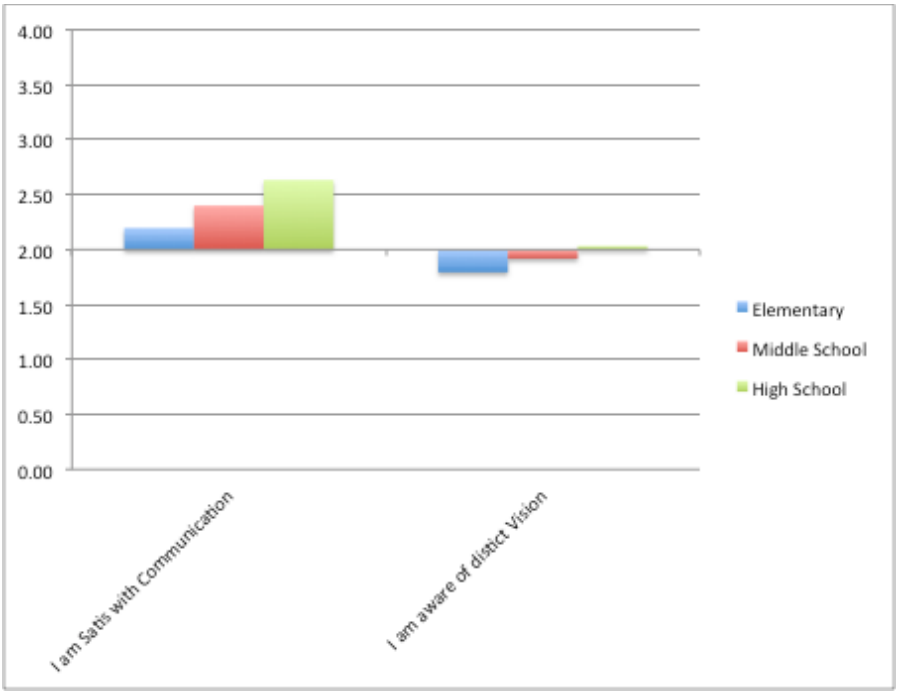

Figure 15 - Parent belief statements, survey questions 3i and 3j. 4 = Strongly Agree, 3 = Agree, 2 = Neutral, 1 = Disagree, 0 = Strongly Disagree

As several parents note:

> *SDPS needs to step beyond just having technology to having a technology vision and plan that takes risks but positions the district as a leader.*
>
> *Better explain the district's "vision" - I didn't know it had one. Also, there is very little consistency among teachers; some are VERY tech-savvy, or at least willing to work with technology...others seem much less so.*

Still, despite the fact that most teachers and parent do not profess to understand the district's vision for technology, there is not a strong, and direct, call from teachers or parents that there actually be a vision or a plan. What teachers do want is more professional development, better access to devices for their students, ways to address possible inequities in student access to technology, and standards for grade

level student technology competencies. The evaluators observe that all of these "wants" (as documented throughout this chapter) are in fact things that are traditionally addressed in a vision-based strategic technology plan. It may therefore simply be that Sample District teachers do not realize what benefits might accrue from a technology vision and plan if the district had these things.

Home-school communication and collaboration

As shown in **Figure 15**, parents are mostly neutral in their satisfaction with how the district uses technology communicate between school and home (question 3i). There were several comments about communication in parent data:

> *I just don't see a lot of it going on - at least, from what is communicated home. Teachers could promote communication in such simple ways. STudent work should be up on website and kids should be using google docs on projects so we can see what they are writing when working on a large project.*

> *SDPS.org needs an update. There is so much going on in the schools - curricular and extra-curricular, but so little of that good news is shared in a meaningful, accessible way. I feel that the district can do a much better job of building an on-line community. We need to embrace social media to improve communication and celebrate our wonderful district.*

Teachers had no comment about communication at all. The overall impression this leaves is that while the district does indeed have a communications solution (Infinite Campus and the district website), neither of these attract much negative or positive attention among teachers and parents.

In terms of systems for collaboration, the evaluators find that Google Docs is frequently mentioned by teachers and some parents as a platform for students to submit and share work. This year, students in grades 3 through 12 were given Google Apps accounts and there is evidence that teachers and students are increasing their use of this online environment. Google will be expanded to grades 1 – 2 next year. Also next year, students in grades 9 -12 will receive Gmail addresses and access.

What is unclear is the extent to which Sample District teachers and students will use the Google platform for collaboration versus simple creation of individual work product (papers, presentations and the like). There is some evidence in secondary school teacher comments that some teachers are aware of the collaborative potential of the cloud and have already put this to use in their classes.

> *Students have used google docs to interact with each other and share materials via cyberspace.*

> *My students often use google docs, facebook and twitter to share ideas and to work on papers together. They post all video projects on youtube.*

> *Students are on Google Docs daily, working on group projects.*

We use Google Docs quite a bit because of the share function; it enables students to edit and revise each other's work.

III. Recommendations

In consideration of the previous chapter's findings, the evaluators have a range of related recommendations for the district to consider as it advances its use of technology to support teaching and learning. These recommendations relate to the findings that have been organized categorically in the previous chapter by the district's indicators in Student Skills/Outcomes, Teacher Skills/Pedagogy, Administration and District Policy and Infrastructure. Nevertheless, given the interconnectedness and overlap of the various conceptual strands within indicators, the evaluators find that a more useful way of organizing recommendations for Sample District is to tie these recommendations back to conceptual framework for systemic technology integration in school districts. Such a framework is the ISTE Essential Conditions for "effectively leveraging technology for learning".[21]

Recommendations Framed by ISTE Essential Condition

Shared Vision

> *Proactive leadership in developing a shared vision for educational technology among all education stakeholders, including teachers and support staff, school and district administrators, teacher educators, students, parents, and the community*

The evaluators recommend that Sample District establish a clear and shared vision for instructional technology that is effectively aligned with the district's mission and overall strategic plan.

In all likelihood, this vision will emphasize technology as a tool for differentiating instruction, as this seems to be largely what the district's teachers and administrators currently believe is technology's primary value within the educational environment. While this is a good beginning, the evaluators recommend that the vision be expanded to include technology's value as a catalyst for thinking and learning (21st century) skills. Specifically, the vision should be comprehensive and systemic and not limited to just what is being done, but expanded to include what could be done with instructional technology within the educational environment.

Just as the vision needs to encompass multiple purposes and values for technology, it should be created by a broad representation of district stakeholders. In this way, it is essential to bring the community to the table for vision creation. This not only will bring in varied perspectives and ideas, but it will also result in a vision that has broad stakeholder support and is effectively shared with (and by) the entire community.

[21] ISTE, 2009. See the appendix as well as **Figure 7** for a full listing and description of the Essential Conditions.

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Implementation Planning

A systematic plan aligned with a shared vision for school effectiveness and student learning through the infusion of information and communication technologies (ICT) and digital learning resources

A shared vision is simply the cornerstone for a comprehensive, strategic, plan for instructional technology. Sample District needs such a plan as it apparently does not have a technology plan of any sort at present. While it may not be apparent to many teachers or even administrators in the district, a technology plan would do much to expand support and resources and bring focus to the district's technology efforts. For example, the district is woefully understaffed in instructional technology support, has no clear plan for expanding student technology access to 1:1, does not effectively incorporate teacher professional development into teachers' work day, and is simply not offering a number of supports to students and teachers that are "best practice" features of the instructional technology program in other similar school districts. All of these aforementioned items are things that should naturally be accounted for in a strategic technology plan. If Sample District had such a plan, it too could expect to strategically integrate these supports and features into its instructional technology program.

The evaluators recommend that Sample District create a district-wide committee of stakeholders (teachers, administrators, parents, board members) and charge this committee with the creation of vision for instructional technology (see above) and then a clear, multi-year, plan for implementing the vision. Like the vision, this plan should be shared broadly with the Sample District community.

Consistent and Adequate Funding

Ongoing funding to support technology infrastructure, personnel, digital resources, and staff development

While funding for technology infrastructure does not seem to have been a particular problem in the district, it is quite possible that one of the reasons why the district does not have a number of the features of a full-fledged instructional technology program (e.g., adequate instructional support or a district technology coordinator) is that it does not have the funding to maintain these features. This would point to the need for more a more adequate level of funding for technology; specifically, funding for various things that many teachers (and administrators) may not know should exist in the district.

The evaluators note that a clear, shared, vision and a detailed and comprehensive strategic plan must predicate any effective request for additional funding.

Equitable Access

Robust and reliable access to current and emerging technologies and digital resources, with connectivity for all students, teachers, staff, and school leaders

As has been noted in the findings, there is a perceived lack of equity of access to technology in Sample District schools. Further, there is also a certain degree of inequity in terms of the currently uneven

exposure that students receive so far as technical skill development. The district should work to address both of these issues.

Inequity in terms of student in-school exposure to technology and the development of uniform technology skills should be addressed through the development of a K-12 technology skills scope and sequence and a mapping of technology-infused learning experiences to the district's core academic curriculum (see "Curriculum Framework", below). In terms of the other type of inequity – that is, the lack of equitable access to technology devices -- the evaluators recommend that the district work toward what would ultimately be a 1:1 student/device ratio. While this ratio could be reached solely through the purchase of additional devices to be placed in schools, it is likely more cost-effective for the district to develop a policy that supports students bringing in their own, suitable, devices for personal educational use. Implementation of a so-called BYOT/D ("bring your own technology/device") program will involve modifications in the district's Acceptable Use Policy, the development of a technical "standard" for acceptable/suitable devices, and of course teacher training on how to manage a 1:1 classroom computing environment. For those students who do not have devices to bring to school, the district will need to develop a way of supporting those students either by supplying a school-owned for their personal use, or by providing them with discounts/financial support to buy or lease such a device at a reduced rate (much as free-and-reduced lunch is handled at present).

Whether or not to develop a BYOT program -- and if so, what that program should look like -- should be the topic of a lively debate by the Sample District educational community. Ideally, this sort of debate should be part of the district's technology planning process.

Skilled Personnel

Educators, support staff, and other leaders skilled in the selection and effective use of appropriate ICT resources

Sample District needs to engage in work to improve teacher skills with regard to the integration of technology. Further, the district needs to find ways to increase the amount of instructional technology support provided to teachers via job-embedded professional development. This will require an expansion of the current number of instructional support staff in the district.

In terms of their instructional technology skills, Sample District teachers need to move beyond "adapting" existing pedagogies and into a place where they can design entirely new instructional environments that are supportive of district goals and initiatives. It is through the design of these new environments that Sample District teachers will realize success in pulling together various initiatives ranging from differentiation, to the Common Core, to improving student performance on basic academic content. In order to address these varied demands, teachers need to find new ways of teaching and cannot rely upon a strategy of "adding things" into and onto existing strategies. Developing these new ways of teaching will require a strong vision and a truly comprehensive strategic plan. It will naturally require considerable teacher professional development. Ultimately, when teachers have been provided with the appropriate professional development, the district will need to establish clear expectations for teacher accountability around the effective use of technology for meeting student learning goals.

Also in the area of personnel, the evaluators recommend that the district reconsider its apparent decision to forego the position of District Technology Coordinator (DTC). At present, there does not appear to be any one individual at the central office level who is charged with providing specific leadership around instructional technology. Rather, some of the various tasks traditionally associated with a DTC have been assigned to other staff (e.g., monitoring technical support operations has been assigned to a consultant), and many functions (e.g., overseeing implementation of a district strategic technology plan) simply do not occur. The evaluators believe that the district is not well served by attempting to make technology integration so transparent that there is no longer a need for technology leadership. In fact, Sample District teachers could use leadership, guidance, and organization related to technology; and this is underscored by the currently limited perspective – a simple definition of differentiation and a pervasive use of basic productivity applications -- that teachers have about the value of technology in the instructional environment. To a large extent, Sample District teachers simply do not know what they do not know, and technology leadership could provide significant expansion of teacher horizons and thereby move the district toward a much more impactful implementation of technology.

The evaluators recommend that the District Technology Coordinator be part of the district's curriculum and instruction organization. It is essential that oversight for district instructional technology be led by curriculum and instruction.

Ongoing Professional Learning

Technology-related professional learning plans and opportunities with dedicated time to practice and share ideas

As has been noted throughout this report, teacher professional development is critical to the implementation of Sample District's instructional technology program. Teachers across the district need to expand their existing notions of what it means to integrate technology into instruction, and most importantly, need to understand the connection between student use of technology and the development of higher-order thinking and learning skills (21st century skills and/or NETS standards). This will involve a considerable escalation of Sample District's existing teacher professional development efforts.

As noted in the "Skilled Personnel" section above, the district should expand its current instructional support staff to include Instructional Technology Specialists (ITS) at all grade levels (elementary, middle, and high school). These should be individuals who work in a mode reflected by the ISTE NETS-C standards.[22] Their primary function is to push-in to classrooms and model effective technology integration practices for teachers. The ITS should be professional developers who focus on providing teachers with the skills necessary for effectively implementing the district's technology skills curriculum mapping (see below).

In order to enable the ITS to effectively do their job-embedded work, the district should establish clear, district-wide, expectations for teacher professional learning around using technology to support core curriculum and 21st century learning. In other words, technology use to improve student outcomes should not be optional for Sample District teachers, and therefore neither should be participation in the professional learning designed to develop these skills. Sample District administrators need to lead their

[22] "C" is for "Coach". A copy of this set of standards is found in the Appendix of this report

staff toward meeting these expectations. It is essential that staff understand that most professional learning around technology integration will be job-embedded and therefore take place during the school day. The district needs to support this type of job-embedded professional learning through the provision of common team and/or grade level planning time for teachers and the expectations that such time will actually be used for professional learning and reflection around the development of 21st century learning.

Curriculum Framework

Content standards and related digital curriculum resources that are aligned with and support digital age learning and work

In order to fulfill the part of its indicator that calls for "a clearly defined K-12 plan for technology integration", Sample District should create a mapping of NETS-based student technology skills to the existing curriculum framework. This mapping should also include a scope-and-sequence of student technology skills (including typing) by grade level so that teachers can be assured that their students will have the appropriate technology skills to engage in meaningful use of technology to meet core curriculum objectives.

Student-Centered Learning

Planning, teaching, and assessment centered around the needs and abilities of students

The evaluators recommend that Sample District work to expand teachers' understanding of true student centered learning. Such a revised understanding would move beyond Sample District's teachers' existing definition of "differentiation" and shifts emphasis to the development of a learning environment where students take ownership over the learning process to individually or socially construct knowledge from a wide range of resources and learning interactions. In other words, Sample District teachers could move beyond differentiating for individual students of various abilities and learning styles to creating learning environments that address the wide range of learning modalities inherent in all students.

In practice, this shift involves the implementation of a project-based learning approach to mastery of higher order learning skills aligned with overarching curriculum objectives.[23] Through this approach, Sample District's teachers should serve as facilitators and guides to the learning process and not as directors of student activity. The evaluators believe that many Sample District teachers basically understand this student-centered approach to learning, but that they are unclear as to exactly how student technology use can support it. Developing this teacher knowledge of practice is a function of teacher professional development and instructional leadership that sets clear expectations for teacher knowledge and classroom practice.

[23] See Figure 6, in Chapter I for a side by side comparison of key features of traditional versus student-centered learning environments.

Prioritized Recommendations

The majority of the recommendations discussed above can be condensed into a few over-arching recommendations that should ideally be undertaken in a strategic order. These are:

1 – Organize a district-wide committee of stakeholders that will develop a technology vision and implementation plan. Develop this plan.

2 – Expand instructional technology staffing in the district – per the dictates of the strategic technology plan – to include more ITS's and a District Technology Coordinator who is part of the district's curriculum and instruction infrastructure.

3 – Develop a K-12 plan for technology integration. This involves developing a "scope-and-sequence" of student technology skills as well as a mapping of desired technology skills (NETS and 21st century learning skills) onto the existing core academic curriculum.

4 – Develop and outline a plan for moving to a 1:1 student/device ratio.

IV. Appendices

Sample District's Technology Program Review Indicators

Student Skills and Outcomes

What do we want students to know and be able to do with regard to the use and integration of technology?

Indicator: *In line with national standards, all students are able to synthesize and develop knowledge and express their ideas creatively using and producing a variety of media. Students are proficient in basic technology skills and are information and media literate. They are able to acquire knowledge through research and technology, and take ownership of their own learning, collaborate and problem solve with others, while exploring different perspectives utilizing a variety of instructional technology tools within a personalized learning environment.*

Teacher Skills/Pedagogy

What skills – pedagogical and technical – do we want teachers to have to support the development of student skills and outcomes?

Indicator:

Teachers demonstrate fluency in available instructional technologies and strategies and use these to establish personalized learning environments for all students. Teachers design and adapt relevant, real-world, learning experiences that incorporate available digital tools and resources to promote creativity, communication, collaboration, and critical thinking in line with best pedagogical practices (i.e. differentiation, home-school connections, accountability and assessment). Teachers utilize technology to continuously improve their professional practice.

Administration and District Policy

What should be the role of administrators and district policies in supporting teachers and students in leveraging technology to support in the development of the desired student outcomes?

Indicator:

The District ensures the development of a clearly defined K-12 plan for technology integration, aligned to national and local standards with measurable essential learning outcomes. The district ensures equal access and learning opportunities for all students and staff. Resources and policies are established to

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foster teacher leadership, monitor accountability, celebrate success, and encourage risk-taking. The district maintains and constantly reviews policies necessary to ensure safe and ethical technology use.

Infrastructure

Broadly, what sorts of technology- supported learning environments, should the district have in place so as to support students, teachers and administrators in their work to reach the desired student outcomes?

Indicator:

The technology infrastructure is essential to the current and future success of our students, teachers, and district. All stakeholders understand the district's strategic vision for instructional technology. The district advocates for a budget that supports the continual upgrade and maintenance of technology infrastructure. The technology infrastructure is bolstered by both technical supports and effective teacher/staff professional development. The district supports an environment with the necessary resources for usage, communication and collaboration between home and school environments.

Other NETS Standards

NETS - A

1. Visionary Leadership

Educational Administrators inspire and lead development and implementation of a shared vision for comprehensive integration of technology to promote excellence and support transformation throughout the organization.

a. Inspire and facilitate among all stakeholders a shared vision of purposeful change that maximizes use of digital-age resources to meet and exceed learning goals, support effective instructional practice, and maximize performance of district and school leaders
b. Engage in an ongoing process to develop, implement, and communicate technology-infused strategic plans aligned with a shared vision
c. Advocate on , state and national levels for policies, programs, and funding to support implementation of a technology-infused vision and strategic plan

2. Digital Age Learning Culture

Educational Administrators create, promote, and sustain a dynamic, digital-age learning culture that provides a rigorous, relevant, and engaging education for all students.

a. Ensure instructional innovation focused on continuous improvement of digital-age learning
b. Model and promote the frequent and effective use of technology for learning
c. Provide learner-centered environments equipped with technology and learning resources to meet the individual, diverse needs of all learners
d. Ensure effective practice in the study of technology and its infusion across the curriculum
e. Promote and participate in , national, and global learning communities that stimulate innovation, creativity, and digital age collaboration

3. Excellence in Professional Practice

Educational Administrators promote an environment of professional learning and innovation that empowers educators to enhance student learning through the infusion of contemporary technologies and digital resources.

a. Allocate time, resources, and access to ensure ongoing professional growth in technology fluency and integration
b. Facilitate and participate in learning communities that stimulate, nurture and support administrators, faculty, and staff in the study and use of technology
c. Promote and model effective communication and collaboration among stakeholders using digital age tools
d. Stay abreast of educational research and emerging trends regarding effective use of technology and encourage evaluation of new technologies for their potential to improve student learning

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4. Systemic Improvement

Educational Administrators provide digital age leadership and management to continuously improve the organization through the effective use of information and technology resources.

a. Lead purposeful change to maximize the achievement of learning goals through the appropriate use of technology and media-rich resources
b. Collaborate to establish metrics, collect and analyze data, interpret results, and share findings to improve staff performance and student learning
c. Recruit and retain highly competent personnel who use technology creatively and proficiently to advance academic and operational goals
d. Establish and leverage strategic partnerships to support systemic improvement
e. Establish and maintain a robust infrastructure for technology including integrated, interoperable technology systems to support management, operations, teaching, and learning

5. Digital Citizenship

Educational Administrators model and facilitate understanding of social, ethical and legal issues and responsibilities related to an evolving digital culture.

a. Ensure equitable access to appropriate digital tools and resources to meet the needs of all learners
b. Promote, model and establish policies for safe, legal, and ethical use of digital information and technology
c. Promote and model responsible social interactions related to the use of technology and information
d. Model and facilitate the development of a shared cultural understanding and involvement in global issues through the use of contemporary communication and collaboration tools

NETS - C

1. Visionary Leadership

Technology Coaches inspire and participate in the development and implementation of a shared vision for the comprehensive integration of technology to promote excellence and support transformational change throughout the instructional environment.

a. Contribute to the development, communication, and implementation of a shared vision for the comprehensive use of technology to support a digital-age education for all students

b. Contribute to the planning, development, communication, implementation, and evaluation of technology-infused strategic plans at the district and school levels

c. Advocate for policies, procedures, programs, and funding strategies to support implementation of the shared vision represented in the school and district technology plans and guidelines

d. Implement strategies for initiating and sustaining technology innovations and manage the change process in schools and classrooms

2. Teaching, Learning & Assessments

Technology Coaches assist teachers in using technology effectively for assessing student learning, differentiating instruction, and providing rigorous, relevant, and engaging learning experiences for all students.

a. Coach teachers in and model design and implementation of technology-enhanced learning experiences addressing content standards and student technology standards

b. Coach teachers in and model design and implementation of technology-enhanced learning experiences using a variety of research-based, learner-centered instructional strategies and assessment tools to address the diverse needs and interests of all students

c. Coach teachers in and model engagement of students in and global interdisciplinary units in which technology helps students assume professional roles, research real-world problems, collaborate with others, and produce products that are meaningful and useful to a wide audience

d. Coach teachers in and model design and implementation of technology-enhanced learning experiences emphasizing creativity, higher-order thinking skills and processes, and mental habits of mind (e.g., critical thinking, meta-cognition, and self- regulation)

e. Coach teachers in and model design and implementation of technology-enhanced learning experiences using differentiation, including adjusting content, process, product, and learning environment based upon student readiness levels, learning styles, interests, and personal goals

f. Coach teachers in and model incorporation of research-based best practices in instructional design when planning technology-enhanced learning experiences

g. Coach teachers in and model effective use of technology tools and resources to continuously assess student learning and technology literacy by applying a rich variety of formative and summative assessments aligned with content and student technology standards

h. Coach teachers in and model effective use of technology tools and resources to systematically collect and analyze student achievement data, interpret results, and communicate findings to improve instructional practice and maximize student learning

3. Digital Age Learning Environments

Technology coaches create and support effective digital-age learning environments to maximize the learning of all students.

a. Model effective classroom management and collaborative learning strategies to maximize teacher and student use of digital tools and resources and access to technology-rich learning environments

b. Maintain and manage a variety of digital tools and resources for teacher and student use in technology-rich learning environments

c. Coach teachers in and model use of online and blended learning, digital content, and collaborative learning networks to support and extend student learning as well as expand opportunities and choices for online professional development for teachers and administrators

d. Select, evaluate, and facilitate the use of adaptive and assistive technologies to support student learning

e. Troubleshoot basic software, hardware, and connectivity problems common in digital learning environments

f. Collaborate with teachers and administrators to select and evaluate digital tools and resources that enhance teaching and learning and are compatible with the school technology infrastructure

g. Use digital communication and collaboration tools to communicate locally and globally with students, parents, peers, and the larger community

4. Professional Development & Program Evaluation

Technology coaches conduct needs assessments, develop technology-related professional learning programs, and evaluate the impact on instructional practice and student learning.

a. Conduct needs assessments to inform the content and delivery of technology-related professional

learning programs that result in a positive impact on student learning

b. Design, develop, and implement technology-rich professional learning programs that model principles of adult learning and promote digital-age best practices in teaching, learning, and assessment

c. Evaluate results of professional learning programs to determine the effectiveness on deepening teacher content knowledge, improving teacher pedagogical skills and/or increasing student learning

5. Digital Citizenship

Technology coaches model and promote digital citizenship.

a. Model and promote strategies for achieving equitable access to digital tools and resources and technology-related best practices for all students and teachers

b. Model and facilitate safe, healthy, legal, and ethical uses of digital information and technologies

c. Model and promote diversity, cultural understanding, and global awareness by using digital-age communication and collaboration tools to interact locally and globally with students, peers, parents, and the larger community

6. Content Knowledge and Professional Growth

Technology coaches demonstrate professional knowledge, skills, and dispositions in content, pedagogical, and technological areas as well as adult learning and leadership and are continuously deepening their knowledge and expertise.

a. Engage in continual learning to deepen content and pedagogical knowledge in technology integration and current and emerging technologies necessary to effectively implement the NETS·S and NETS·T

b. Engage in continuous learning to deepen professional knowledge, skills, and dispositions in organizational change and leadership, project management, and adult learning to improve professional practice

c. Regularly evaluate and reflect on their professional practice and dispositions to improve and strengthen their ability to effectively model and facilitate technology-enhanced learning experiences

NETS – S Student Profiles

A major component of the NETS project is the development of a general set of profiles describing information and technology (ICT) literate students at key developmental points in their precollege education. The profiles highlight a few important types of learning activities students might engage in as the new NETS•S are implemented. We hope these examples will bring the standards to life and demonstrate the variety of activities possible. The profiles are divided into four grade ranges. Because grade-level designations vary in different countries, we also provide age ranges.

The numbers in the parentheses after each item identify the standards (1–6) most closely linked to the activity described. Each activity may relate to one indicator, to multiple indicators, or to the overall standards referenced.

1. **Creativity and Innovation**
2. **Communication and Collaboration**
3. **Research and Information Fluency**
4. **Critical Thinking, Problem Solving, and Decision Making**
5. **Digital Citizenship**
6. **Technology Operations and Concepts**

Grades PK–2 (Ages 4–8)

The following experiences with technology and digital resources are examples of learning activities students might engage in during PK–2 (ages 4–8):

1. Illustrate and communicate original ideas and stories using digital tools and media-rich resources. (1,2)
2. Identify, research, and collect data on an environmental issue using digital resources and propose a developmentally appropriate solution. (1,3,4)
3. Engage in learning activities with learners from multiple cultures through email and other electronic means. (2,6)
4. In a collaborative work group, use a variety of technologies to produce a digital presentation or product in a curriculum area. (1,2,6)
5. Find and evaluate information related to a current or historical person or event using digital resources. (3)
6. Use simulations and graphical organizers to explore and depict patterns of growth, such as the life cycles of plants and animals. (1,3,4)
7. Demonstrate safe and cooperative use of technology. (5)
8. Independently apply digital tools and resources to address a variety of tasks and problems. (4,6)
9. Communicate about technology using developmentally appropriate and accurate terminology. (6)
10. Demonstrate the ability to navigate in virtual environments such as electronic books, simulation software, and websites. (6)

Grades 3–5 (Ages 8–11)

The following experiences with technology and digital resources are examples of learning activities students might engage in during grades 3–5 (ages 8–11):

1. Produce a media-rich digital story about a significant event based on first-person interviews. (1,2,3,4)
2. Use digital imaging technology to modify or create works of art for use in a digital presentation. (1,2,6)
3. Recognize bias in digital resources while researching an environmental issue with guidance from the teacher. (3,4)
4. Select and apply digital tools to collect, organize, and analyze data to evaluate theories or test hypotheses. (3,4,6)
5. Identify and investigate a global issue and generate possible solutions using digital tools and resources (3,4)
6. Conduct science experiments using digital instruments and measurement devices. (4,6)
7. Conceptualize, guide, and manage individual or group learning projects using digital planning tools with teacher support. (4,6)
8. Practice injury prevention by applying a variety of ergonomic strategies when using technology. (5)
9. Debate the effect of existing and emerging technologies on individuals, society, and the global community. (5,6)
10. Apply previous knowledge of digital technology operations to analyze and solve current hardware and software problems. (4,6)

Grades 6–8 (Ages 11–14)

The following experiences with technology and digital resources are examples of learning activities students might engage in during grades 6–8 (ages 11–14):

1. Describe and illustrate a content-related concept or process using a model, simulation, or concept-mapping software. (1,2)
2. Create original animations or videos documenting school, community, or events. (1,2,6)
3. Gather data, examine patterns, and apply information for decision making using digital tools and resources. (1,4)
4. Participate in a cooperative learning project in an online learning community. (2)
5. Evaluate digital resources to determine the credibility of the author and publisher and the timeliness and accuracy of the content. (3)
6. Employ data-collection technology, such as probes, handheld devices, and geographic mapping systems, to gather, view, analyze, and report results for content-related problems. (3,4,6)
7. Select and use the appropriate tools and digital resources to accomplish a variety of tasks and to solve problems. (3,4,6)
8. Use collaborative electronic authoring tools to explore common curriculum content from multicultural perspectives with other learners. (2,3,4,5)
9. Integrate a variety of file types to create and illustrate a document or presentation. (1,6)
10. Independently develop and apply strategies for identifying and solving routine hardware and software problems. (4,6)

Grades 9–12 (Ages 14–18)

The following experiences with technology and digital resources are examples of learning activities students might engage in during grades 9–12 (ages 14–18):

1. Design, develop, and test a digital learning game to demonstrate knowledge and skills related to curriculum content. (1,4)
2. Create and publish an online art gallery with examples and commentary that demonstrate an understanding of different historical periods, cultures, and countries. (1,2)
3. Select digital tools or resources to use for a real-world task and justify the selection based on their efficiency and effectiveness. (3,6)
4. Employ curriculum-specific simulations to practice critical-thinking processes. (1,4)
5. Identify a complex global issue; develop a systematic plan of investigation, and present innovative sustainable solutions. (1,2,3,4)
6. Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address personal, social, lifelong learning, and career needs. (4,5,6)
7. Design a website that meets accessibility requirements. (1,5)
8. Model legal and ethical behaviors when using information and technology by properly selecting, acquiring, and citing resources. (3,5)
9. Create media-rich presentations for other students on the appropriate and ethical use of digital tools and resources. (1,5)
10. Configure and troubleshoot hardware, software, and network systems to optimize their use for learning and productivity. (4,6)

Data Collection Instruments

Principal Questions

This interview is part of Sample District's review of how instructional technology is used to support teaching and learning in the district. Sun Associates has been tasked with conducting this review. In addition to my visit to your building today, we are conducting an online survey and will ultimately be visiting all classrooms in the district. We are also conducting teacher, student and parent focus groups. Ultimately, the results of this review – analyzed against a set of descriptive indicators developed by a team of district stakeholders (the principal should know this as all principals were involved in the indicator development) - will be reported to the district later in the spring.

You should know that your responses to these questions will be confidential. Details of today's conversation will not be reported to the district. So feel free to be frank and to speak your mind here.

Principal's Name and Background (e.g., how long they've been principal, history in the district, anything they have to say about their personal philosophy, etc.)

1. As a way of getting started, could you give me an example of a student activity that you have seen taught (by a teacher in this building) that does what you feel does an exemplary job of integrating technology as an aid in student learning?

   Why was this effective? (*and if they talk about technology, probe for why they feel that the use of technology in particular was effective*)

2. Could you articulate what you believe to be the district's plan for technology integration? What are the key features (in your opinion) of this plan or vision?

   Do you feel that the teachers in you building currently have the technology and pedagogical skills to support this plan/vision?

3. Specifically, in what ways do you feel that technology integration supports the development of critical thinking skills? How is this demonstrated by students? (if it doesn't come up, probe here for information/media literacy)

4. What challenges do your teachers face in integrating technology in your classroom? (this is the "barriers" question that usually elicits comments about infrastructure, support, etc.)

5. What opportunities do your teachers have to develop skills in integrating technology? (prompt for planning time, tech spec, PD)

6. Is there anything else that you would like me to know that has not come up in our conversation…or are there any other questions that you have for me?

Teacher Focus Group Questions

This focus group is part of Sample District's technology program review. The point of this review is to take a snapshot of how instructional technology is typically used to support teaching and learning in the district. Sun Associates, the organization I represent, has been tasked with conducting this evaluation. In addition to this focus group, we are running online surveys of teachers and parents and over the course of this month will be visiting all classrooms in the school. We are also interviewing principals and parents. Ultimately, all of this data will go – in aggregate - into a report that will be reviewed by the district later in the spring. What they'll be doing is looking at this aggregate data against a set of descriptive indicators that a team of district stakeholders (teachers such as yourself, administrators, etc.) have created.

Your responses in this focus group will be confidential. Details of today's conversation will not be reported to the district. We will never report any individual response in a way that attributes it to a specific person. So feel free to be frank and to speak your mind here. Further, it is not necessary for each person to answer each question. Rather, the questions are conversation starters. Respond as you wish, and I will prompt the group to provide more detail and/or to move on as necessary. We will complete this activity within an hour as promised.

Any questions? OK, let's go!

1. How are the 4Cs (Communication, Collaboration, Critical Thinking, Creativity) developed in your classroom? How are they assessed? (*look for anything they have to say about differentiation*)

   (*If they talk about technology, probe for why they think that technology was a particularly effective way of developing these student skills*)

2. What does it mean to you for a student to "take ownership over their own learning"?

   How does technology support a student "taking ownership"?

   What's your opinion on the degree to which Sample District students are using technology to take ownership over their own learning?

3. How skilled do you feel your students are at evaluating information resources online?

   What would improve this?

4. Could you give me an example of how your practice has changed through the use and integration of technology? (*If they're confused by "practice" probe for instructional design…we want to know how they've changed the way they teach and create student experiences*)

5. What opportunities do you have to develop your own fluency in technology skills and practices? (*we're looking for info on how they use planning time, collaborate with other teachers, etc.*)

6. What's your understanding of the district's plan or vision for technology integration?

(*if this doesn't come up naturally*) Is there anything that you could suggest that would improve the district's ability to implement or articulate this plan?

7. (*this has probably already come up, so just ask this question to get them to summarize*) What barriers exist to your ability to integrate technology in your classroom?

8. Is there anything else that you would like to tell me that has not yet come up in this discussion? Do you have any additional questions for me or anything that you want to be sure I get for the report?

Classroom Observation Protocol

Observation Date | Observer | School | Grade/Classroom

Teacher

Girls | Boys

Science | ELA | Math | Social Studies | PE/Health | SPED Class

Art/Music | Technology | Foreign Language | General Elementary | Other

Observation Notes

Check all that apply! | Students Using Tech | Student Centered Learning | Students Using CBI | Teacher Lecture | Student Groups | Students Working Alone

What is the teacher doing/what's happening in this class?

Teacher Discussion

Technology in Room

IWB | Teacher Workstation | Student Laptops | Student Desktops | Printer

Document Camera | Projector (not part of IWB) | iPad/Smartphone (note which, below)

Other tech present

Additional Comments

Additional Comments

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