Instructional Technology Program Review

Croton-Harmon Schools

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Contents

Executive Summary

When asked what students should know and be able to do with regard to the use and integration of technology, a group of stakeholders in Croton-Harmon Schools developed a response, articulated as a highly descriptive performance indicator, that centers on the effective use of technology to problem-solve, communicate, collaborate, and engage a range of other tasks in support of an inquiry-based mode of learning. Many of the specific learning tasks associated with technology use align well with national standards and frameworks ranging from the Common Core for Learning to the ISTE National Educational Technology Standards (NETS), and the Framework for 21st Century learning. In addition, the stakeholders identified a range of dispositions they would ideally see reflected in student technology use. These dispositions center on media and information literacy, critical thinking (particularly as related to choosing technology tools to apply to learning), and safety and responsibility related to technology use.

The stakeholders were clear as to the role expected of teachers in assisting students toward meeting student expectations. Teachers are first and foremost responsible for inspiring and facilitating interdisciplinary engaged learning environments within which students could use technology resources to reach well-defined student outcomes. This indicator for teachers was also reflected in the linked indicator for administrators and district policy. Here, the district is expected to provide a wide array of teacher professional development opportunities and district-wide resources (e.g., a curriculum map) that support teachers in developing interdisciplinary, project-based learning activities at all grade levels.

These three indicators – one for Student Skills and Outcomes, another for Teachers Skills and Pedagogy, and one for Administrators and District Policy – formed the conceptual framework around which Croton-Harmon's Instructional Technology Program was reviewed by Sun Associates in November – December, 2012. Sun Associates is a professional educational program evaluation firm that specializes in Instructional Technology program review and strategic planning. Sun Associates worked with Croton-Harmon administrators to gather a wide range of survey, interview, focus group and classroom observation data from throughout the district. Included in this collection was data from teachers, administrators, the Croton-Harmon School Board, parents, and students. With data in-hand, the evaluators (Sun Associates) analyzed the district's performance against its developed performance indicators. The findings and associated recommendations from that evaluative analysis are the basis of the following report.

As an over-arching finding, the evaluators note that Croton-Harmon is clearly a high performing district with a very dedicated teacher workforce. Likewise, district administrators and the School Board speak with a unified voice concerning basic expectations for technology's positive role in student learning. Parents also have insightful comments on potential value of technology as a tool for learning. It is clear that the district's parent community is very engaged in how their schools serve their children's learning needs. Across all three schools, the evaluators found a very reflective group of teachers who think hard about what they are doing with technology and make the most informed decisions they can related to how they employ technology in service of curriculum and pedagogy. Finally, it is evident that the district (and the parent community) has supported teachers' technology needs rather well. The district's infrastructure is widespread, largely up-to-date, and seems reasonably well supported from a technical and maintenance perspective.

Ironically, this generally very positive picture still represents challenges for Croton-Harmon schools. It is obvious that the district did not get to where it is now by simply sitting back passively and not being continually self-critical of its progress and accomplishments. Therefore, while many districts might be satisfied with the degree of success that the district has reached, Croton-Harmon wishes to push farther and to become even more deliberative in thinking about how instructional technology can support a truly transformative approach to learning. Some of this approach is already well-articulated in the district's aim to integrate inquiry across the curriculum and to use this pedagogical approach to engender the development of higher order thinking skills that will truly be lifelong skills for its students. The challenge now for instructional technology is to develop ways for technology to catalyze and support a new pedagogy that builds new skills. This implies moving beyond a simple (and widespread) "tools" approach to student and teacher technology use. Such work will not be easy and it will require considerable reflection on current educational practice and no doubt the expenditure of time and money. The findings and recommendations resulting from this instructional technology program review are intended to inspire such reflection.

Summary Findings

Student Skills and Outcomes

Students are engaged communicators, problem-solvers and researchers within a technology-rich student centered learning environment that emphasizes inquiry. Within this environment, students safely and responsibly utilize a range of technologies appropriate to their need. Students at all levels are skilled in making judicious choices as to what technologies – or not - best serve the educational objective at hand.

Specifically, students are media and information literate, highly engaged, and clearly use technology for problem-solving, communication, collaboration, modeling, simulation, data gathering, and work product production. Students are able to transfer their technology skills to new and real-world problems. There is a student technology skills scope and sequence that realistically connects to the actual technology skills students develop and practice.

In relation to this indicator, the evaluators find:

- Croton-Harmon students are indeed learning in an environment that is consciously oriented toward student inquiry. The evaluators found many teachers who could identify student activities that supported engaged, hands-on learning. Building administrators clearly emphasized a role for technology as a tool for inquiry. Overall, (i.e., across all grades and subjects) it would appear that technology is utilized as a tool for learning within projects at least several times per school year.

- While project-based learning is commonplace in the Croton-Harmon instructional environment, it appears that most are individual activities that produce an individual work product. Collaboration does not seem to be the norm within this project-based approach. Likewise, most student use of technology appears to be 1-1.

- Croton-Harmon students have access to a variety of technology tools throughout the instructional day. These tools range from classroom computers to iPads, and include a wide range of peripherals.

Student use of Internet-based information, including online texts, blogs, and educational social media seems widespread, particularly at the secondary level.

- Students themselves note a variety of technology uses that mirror those noted by their teachers. Most students have few suggestions for improvement in the district's use of technology beyond "more" and "faster" devices (in particular, many students voiced a desire for "iPads").

- A working group of elementary teachers has created a mapping of instructional activities onto the NETS-S standards. This mapping only seems to exist for the elementary grades and not all teachers seem aware of it or work to implement it. Various technology activities are included in the district's Atlas Curriculum Maps, but this also is by no means complete or comprehensive (of the NETS-S standards)

Teacher Skills/Pedagogy

Croton-Harmon teachers are skilled in inspiring and facilitating interdisciplinary engaged learning by balancing students' individual needs, choice, and rigor. Teachers are well-versed in finding and utilizing technology resources that ensure maximum student outcomes. Among teachers, there is a broad definition of how to engage students while using a variety of different technologies, with the overall target being a student who is highly engaged with learning.

In relation to this indicator, the evaluators find:

- The majority of Croton-Harmon teachers seem versed in a project-based approach to learning. Nevertheless, an overarching element to this approach in Croton-Harmon seems to be toward teacher-directed projects that result in the production of individual student work. The rather teacher-directed approach to project-based learning is not necessarily advantageous for full development of the "4Cs" (communication, collaboration, critical thinking and creativity) which are at the core of the NETS standards.

- Teachers in the elementary school in particular, but to an only slightly lesser extent also at the secondary level, are focused on the use of the Smartboard for "student engagement". Nevertheless, the evaluators find that in nearly every case, the Smartboard and related document camera is essentially used to replace a standard whiteboard and overhead projector (e.g., for projecting worksheets that students then complete on paper at their desks). As such, teachers are really using this technology primarily as a support for traditional teacher-centered pedagogies such as lecturing and demonstration. Teacher efforts to engage students in more hands-on uses of technology are somewhat limited and are circumscribed by the district's limited ability to provide additional teacher professional development.

- It is clear that the majority of Croton-Harmon teachers wish to integrate technology more fully and effectively into their instructional environment, but teachers are also limited in hands-on experience doing this. Professional development opportunities and models that would support increased use are in short supply across the district.

Administrators and District Policy

There are clear district-wide expectations and a vision for how teachers will leverage technology as a tool for student learning and teacher professional practice. Teachers are supported in their work by a curriculum map that encourages interdisciplinary, project-based, engaged learning at all grade levels. There are a wide array of professional development opportunities available to teachers and these help teachers meet their professional learning goals with regard to technology integration. District policies related to safe and ethical technology use and teacher-parent communication with technology are well established and clearly understood by all.

In relation to this indicator, the evaluators find:

- While there is an elementary grade mapping of NETS-S standards onto suggested curriculum activities, there are not "clear expectations" as to how teachers are to integrate technology. Teachers and parents report that whether or not a student uses technology in the classroom/lab is entirely dependent upon individual teacher inclination.

- There do not seem to be many concerns about particular problems related to safe and ethical technology use, although the School Board is currently re-working the district's AUP.

- There is a very notable feeling among a significant percentage of elementary parents that there is "too much" exposure to technology and that learning should be more hands-on and less reliant upon any sort of digital media/device. These issues do not seem to exist for secondary parents (although a number of these parents note that the district does not have a "technology focus").

- Parents basically seem satisfied with the use of technology to support home-school communications, with some exceptions noted where teachers do not regularly update class websites.

Infrastructure

The district's technology infrastructure is robust and reliable and is well supported both technically and instructionally. Technology is available throughout the learning environment and supports anywhere-anytime, engaged, student-centered learning.

In relation to this indicator, the evaluators find:

- Smartboards are nearly ubiquitous across the district

- WiFi exists nearly everywhere in all buildings

- There are laptop carts available throughout the buildings, and although teachers and students report that the machines on the carts are quite slow, it is noted that the district has upgraded the carts within the past month (since data was collected). This should improve performance considerably.

- Classroom computers exist throughout the elementary school and seem to be in regular use for simple tasks such as word processing and tutorial software use.

- There is a pilot iPad project in operation in the district. Teachers note that they could use assistance in finding more ways to utilize these with students, particularly in how to share small classroom sets of iPads with full classes.

Summary Recommendations

The evaluators' findings have given rise to several basic recommendations for how Croton-Harmon could improve its Instructional Technology program.

- The district should engage teachers, the assistant superintendent for curriculum and learning, and the technology integration specialist in the work of generating a truly comprehensive mapping of suggested student technology experiences onto grade level curriculum with a strong emphasis on truly student-centered (not necessarily 1-1) project-based learning. Specifically, this mapping should be a living document that identifies key NETS-S based, student technology skills, dispositions and activities by grade level and then "maps" those experiences onto the district's academic curriculum.

- The district should explore ways to provide job-embedded instructional technology professional development to teachers *in each building.* There are a variety of ways to accomplish this task, including the hiring of Instructional Technology Integration specialists, creating teacher-coaches within the existing teacher workforce, or leveraging the current Curriculum Coordinator positions to model and support instructional technology integration. However this function is filled, the primary mission would be to provide job-embedded professional development (modeling, mentoring, instructional support) to teachers in that building around the implementation of the aforementioned curriculum map.

- With a curriculum map in place and the necessary instructional support structures in place to support its implementation, the district should be in a good position to articulate a unified vision for technology's role in teaching and learning. This vision needs to be coherently voiced at all levels (K-12, by all administrators, and the School Board) and made clear to the parent community. Establishing a unified vision will do much to quell elementary parent concerns over inappropriate technology use and secondary parent concerns over inadequate technology use. Likewise, a vision articulated broadly throughout the Croton-Harmon community would ensure that the Board is in step with the concerns/beliefs of the parent and teacher community.

I. Introduction

This evaluation report is designed to serve several purposes for Croton-Harmon Schools. At its most basic level, the data herein exists as a record of the "current status" of instructional technology integration within the district. This current status provides an essential baseline for the instructional technology strategic planning effort that will transpire in the coming months and will be incorporated into the technology plan itself. Equally important, 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 Croton-Harmon schools. This discussion is a key part of generating the technology plan itself, and of framing the plan within the context of the broader issues 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 lifelong learning skills.

Methodology

Indicators and Data Collection

The following report presents data and findings related to how Croton-Harmon Schools teachers and students use technology to support learning in line with a set of visionary performance indicators created by the district. These indicators are shown in **Figure One**, below. As can be seen, these indicators exist in five basic domains – Student Skills/Outcomes, Teacher Skills/Pedagogy, District Policy and Administration, Infrastructure, and Community. These domains frame the basic areas of investigation of Croton-Harmon'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.

Croton-Harmon's evaluation indicators were developed with a committee of district stakeholders (see list of committee members in **Figure Two**) in August 2012. This meeting, 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, parent, and school board focus groups, and principal interviews in every building. The evaluators visited every classroom in each of the three 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, parent, student and community member online surveys. **Figure Three** shows the *n* values for data collected in all categories from all Croton-Harmon schools.

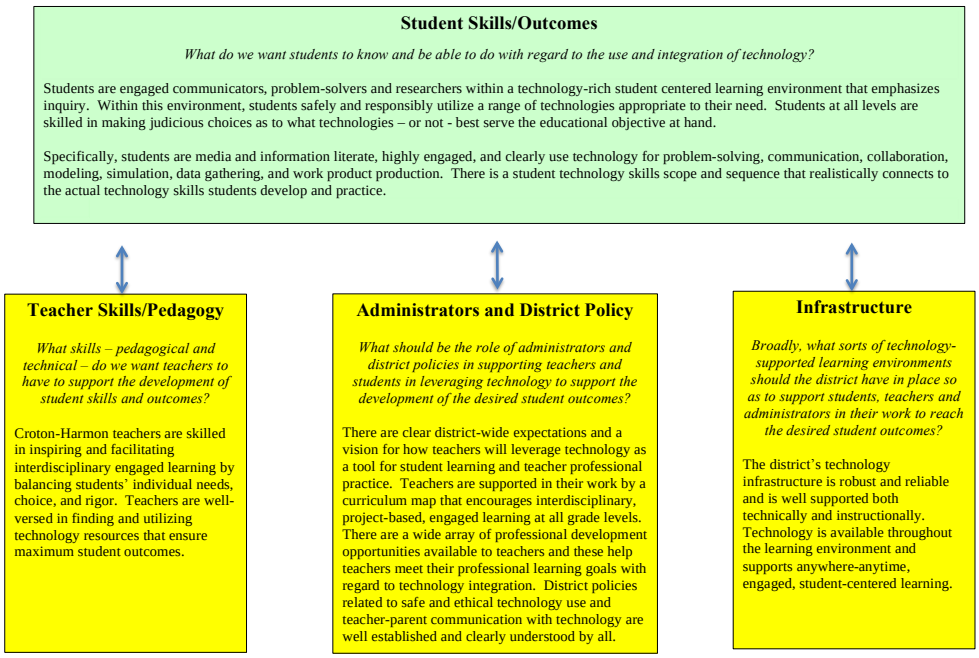

Figure One – Croton-Harmon's indicators.

Dr. Edward R. Fuhrman, Jr. – Superintendent of Schools
Dr. Deborah O'Connell – Assistant Superintendent
Ms. Kelly Maloney – Principal at Carrie E. Tompkins Elementary School
Dr. Barbara Ulm – Principal at Pierre Van Cortlandt Middle School
Mr. Alan Capasso – Principal at Croton-Harmon High School
Ms. Andrea Furey – Croton-Harmon Board of Education President/Representative
Ms. Deba August – Instructional Technology Coordinator
Ms. Eileen Deacy – Elementary Teacher
Mr. Stephen Palenscar – Secondary Teacher
Mr. Zach Crowell – Student Representative
Ms. Corey Lobel – Student Representative
Mr. Peter Lavery – Parent Representative

Figure Two – Program Review Committee members.

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School	Teacher Surveys	Parent Surveys	Student Surveys	Class Observations[1]	Principal Interview	Teachers in FG	Parents in FG
Croton-Harmon High School	27	11	36	20	Yes	6	5
Pierre Van Cortlandt Middle School	28	25	28	13	Yes	5	5
Carrie E. Tompkins Elementary School	20	32	37	11	Yes	6	12

Figure Three – Table of data collected.

Background to the Indicators

The ISTE NETS-S Standards

The current Croton-Harmon Schools 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.

[1] The number stated in this column reflects those observations that were detailed reports generated by the evaluators sitting in particular classrooms. In fact, every classroom in each school was observed, but the evaluators did not record the observation if it was of a single activity with no interaction between students and teachers (e.g., silent reading, individual work on worksheets, testing, etc.).

The NETS-S standards are:[2]

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 Croton-Harmon'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.

[2] The full text of the NETS-S standards, as well as the complementary NETS-T and NETS-A standards, are provided in the Appendix to this report.

The NETS-T standards are:

In the context of Croton-Harmon'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[3]

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 Four**), 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.

[3] 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 Four – 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.

Apple Classrooms of Tomorrow (ACOT) – Another Lens

Whereas the ISTE NETS offer a powerful, specific, vision for *what* students and teachers can do with technology within the learning environment, there is another tool that offers a useful lens through which one can view the *process* by which teachers adopt technologies. This is the well-regarded ACOT framework (**Figure Five**).[4] ACOT is based on over ten years of wide-scale, field-based, research on how teachers make use of instructional technology within their practice. The evaluators find it useful to consider the ACOT framework as a way of understanding different levels of teacher experience and for examining the processes by which teachers progress from lower levels to higher levels of technology use.

[4] Apple Computer, 1996

The ACOT framework is as follows:

Stage	Teacher Behavior/Example
Entry	Teachers learn the "basics" of using new technology
Adoption	Teachers use new technology to support traditional instructional methods such as lecturing, presentation, presenting/creating electronic versions of worksheets.
Adaptation	Teachers integrate new technology into traditional classroom practice, focusing on increased student productivity and engagement through the use of tools such as word processors, spreadsheets, and graphics tools.
Appropriation	Teachers focus on cooperative, project-based and interdisciplinary work which incorporates technology as needed and as one of many tools.
Invention	Teachers discover new uses for technology tools often by designing projects that combine multiple technologies.

Figure Five – ACOT stages of teacher adoption of technology. *From "A Report on 10 Years of ACOT Research" (Apple Computer, 1996)*

When documenting actual teacher behavior related to technology use, it becomes possible to place this behavior within the ACOT framework. The advantage of using a conceptual framework such as ACOT's levels of teacher appropriation is that it places current teacher behavior in contrast to other ways that teacher behavior might grow beyond its current level.

The ACOT framework is a technology-specific take on a broader body of research related to change, innovation, and adoption. Research on change provides a number of key points when considering how innovations such as technology are introduced to a teacher population, adopted by teachers, and how this adoption process can be managed. Specifically, one should consider that change is highly personal and is made first by individuals, then by institutions. Interventions -- such as professional development -- must be related first to *people*, and then secondly to the innovation itself. In the area of technology, this basically means that technology professional development needs to address the personal concerns of teachers as related to their individual practice. Training that is generic to the technology itself (e.g., applications training across grade and content levels) will not be particularly successful in moving teachers from lower to higher levels of adoption. Finally, change requires developmental growth. It is not possible to leap past or over stages of teacher concern and adoption. Rather, true and lasting change requires supports at all levels.[5]

In the evaluators' experience, most of the problems experienced in a school district related to introducing technology innovations are at their root problems related to change. When a district only addresses its technology problems (and provides solutions) at the *institutional* level versus that of the individual teacher, there will be problems in realizing real and lasting change. Further, when technology-related change does not account for the fact that different teachers move through a sequence of adoption steps *at their own or individual pace*, then problems will ensue. Therefore, as Croton-Harmon considers teacher technology use, it will be beneficial to consider how this use fits with research such as the ACOT framework and the broader issue of school change.

[5] Loucks-Horsley and Stiegelbauer, 1991

II. Findings

In this chapter, the evaluators analyze the data collected from Croton-Harmon's teachers, administrators, parents, students and community members (see **Figure Three**) compared against the district's indicators.

Student Skills and Outcomes

Croton-Harmon's performance indicator for student skills and outcomes states:

> *Students are engaged communicators, problem-solvers and researchers within a technology-rich student centered learning environment that emphasizes inquiry. Within this environment, students safely and responsibly utilize a range of technologies appropriate to their need. Students at all levels are skilled in making judicious choices as to what technologies – or not - best serve the educational objective at hand.*
>
> *Specifically, students are media and information literate, highly engaged, and clearly use technology for problem-solving, communication, collaboration, modeling, simulation, data gathering, and work product production. Students are able to transfer their technology skills to new and real-world problems. There is a student technology skills scope and sequence that realistically connects to the actual technology skills students develop and practice.*

This indicator logically breaks down into three broad categories of analysis – skilled use of technology to support an inquiry-based approach to learning, the use of technology aligned with standards, and the existence of a technology skills scope and sequence.

As a general point, the evaluators note that Croton-Harmon teachers, parents, and students were all asked (via online survey) to recollect something that they or their students had done with technology in the classroom that seemed to have a positive impact on learning. The results of these open-response questions are shown below in **Figures Six through Eight**. As seen in these word maps – larger fonts indicate a greater prevalence of the word in the text of the response – the terms "project", "learning", and "research" all emerge as often-used terms. These terms are significant to the evaluators in that they tend to sum up the findings related to how Croton-Harmon's students utilize instructional technologies; that is, they use technology within the context of projects largely as tool for "research" and the "learning" of content material. What exactly this looks like in the context of teaching and learning in Croton-Harmon schools is explored further in the sections below.

Figure Six – Word map of teacher response to survey Question 1

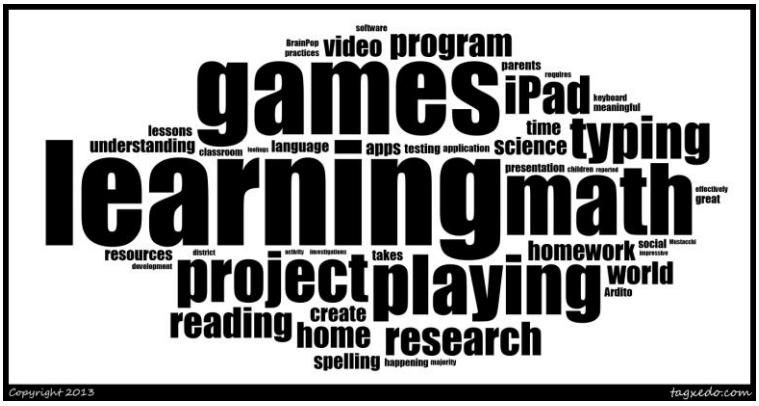


Figure Seven – Word map of parent response to survey Question 1

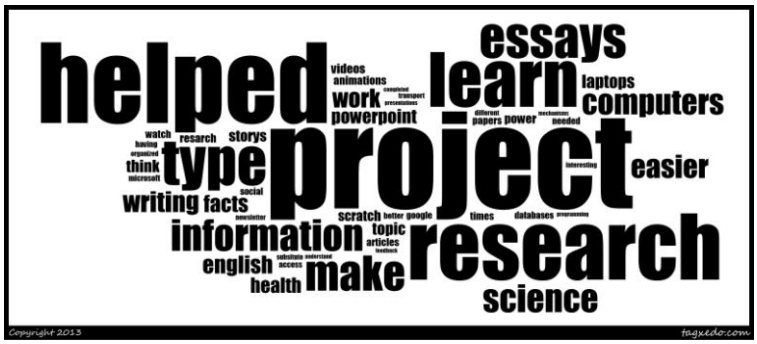


Figure Eight – Word map of student response to survey Question 1.

Use of Technology to Support Inquiry

Technology makes the learning in my classroom come alive. It not only engages my students in wondrous ways but also supports students in various ways…allowing students to view short video clips or conduct research on their own … computers allows for higher engagement and allows the teacher to scaffold/differentiate more material. Our class blogs offer an authentic audience for students to publish their work.

My son used "sim city" as part of his future city project. He was very engaged and it made it clear to him how small changes to a system can create big impact. Instead of a dry lesson - he felt he was playing a game and he really internalized what was happening. It was really the perfect application.

As these teacher comments exemplify, Croton-Harmon students utilize technology to support various engaging, authentic, learning activities. The evaluators' data documents a number of references to project-based learning as a key instructional strategy for Croton-Harmon students. The halls of CET (the elementary school) are full of examples of student work, most constructed as the final product in some sort of student project. It is clear that much of this work required some manner of investigation and the marshaling of information to construct and document knowledge. As might be expected though, not all of this project-based work involves the use, and particularly the meaningful use, of technology.

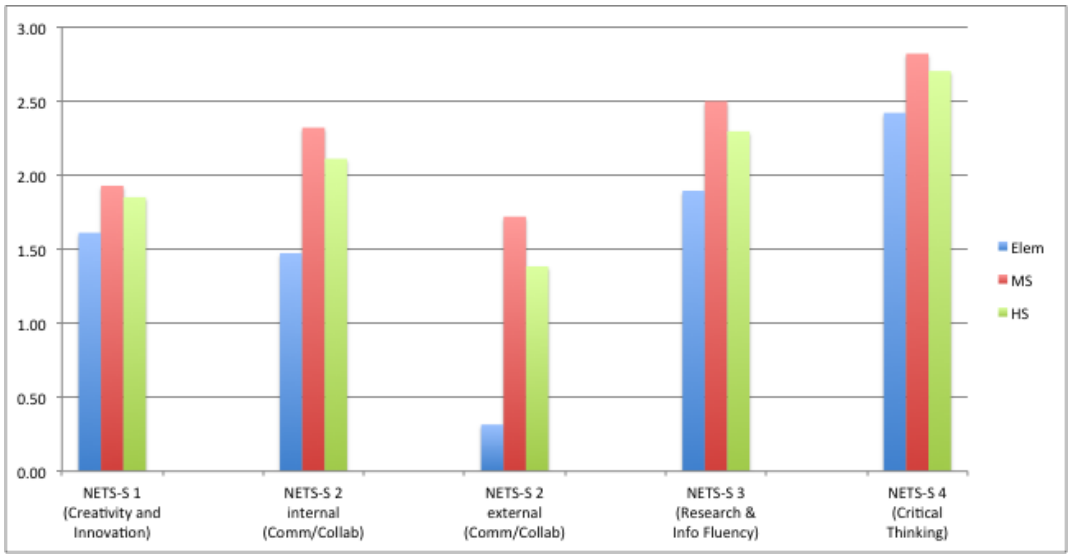


Figure Nine – Frequency that teachers report creating instructional activities that integrate technology to support specific (NETS-S aligned) student learning outcomes. 0 = virtually never, 1 = several times a year, 2 = several times a semester, 3 = two or three times a month, 4 = at least once a week

As shown in **Figure Nine**, Croton-Harmon teachers report that they utilize technology on average "several times a semester" to support the attainment of core NETS-S standards such as creativity, critical thinking, and research and information fluency. Based on the evaluators' observations and discussions

with teachers, this survey data appears to be valid. Examples of student project-based work cited by teachers include:

> *Students have begun doing inquiry based labs and [using] technological tools such as Vernier probes, laptops, software like LoggerLite, and Smart Boards play an integral role. Teacher training is now being effectively taught in online webinars or self paced on line video and interactive presentations. It makes a BIG difference to be able to assess these tools! … Designing a lab to measure heart rate at rest and during exercise becomes very different when, instead of simply taking a pulse before and after exercise, students can now monitor pulse changes over time with a Vernier probe heart rate monitor, the data of which can be recorded in real time on a laptop in Logger Lite*

> *Students are always researching in science and often in math as they design questions to guide their learning.*

> *Students analyze & synthesize current political and economic issues and present their findings via power point presentations*

> *One performance based assessment per unit such as a presentation on Ancient Egypt and a travel brochure or commercial for Athens and Sparta.*

The evaluators find that a theme in the majority of teacher comments and references to project-based learning and inquiry is the highly individual nature of these projects. It would appear that many Croton-Harmon teachers' definition of project-based learning is one of students working as individuals to research, analyze, and then present information through the creation of an individual work product. For example:

> *[My] students have made Photo Stories with voice recordings about items in their backpacks. Students have a choice to use PhotoStory or PowerPoint to write and record an family album. [Students in another of my classes] add entries to an E-Portfolio in PowerPoint on a regular basis. This program supports audio recording and Photo Story of Movie Maker projects can be inserted into PowerPoint.*

When asked specifically about collaboration, most teachers continued to focus on very individual uses of technology or expressed the belief that their students did relatively little collaborative work.

> *I have only a couple collaborative activities for my students to complete on the computer. The students often share a computer to read a book for center time.*

> *My advanced students use technology tools to communicate and share ideas at least 2-3 times a year, but not collaboratively.*

> *Students work in computer lab to prepare for vocab tests through studying flash cards and various games. They can see their results as well as the others. The competition makes gaming playing more fun and more interesting.*

[We did a]Speaking quiz on PowerPoint, where students record answers to questions initiated by teacher.

The evaluators' observations confirm survey and interview data that points to an overall lack of collaborative work among Croton-Harmon students. For example, a commonly observed classroom activity involved students working as a full class to interact with some sort of Smartboard lesson or worksheet, and then writing down the answer to posed question or problem in their own notebooks or worksheets. This basic model of teacher-driven instruction was found in all three of Croton-Harmon's schools and existed as the overwhelmingly dominant instructional model – and use of classroom technology – observed by the evaluators. Usually, the Smartboard (and Elmo) was used by teachers to project a worksheet and drive a related lesson. In similar example, a class of CET students was observed having a full-class discussion on "fact versus opinion" which involved a group edit of a projected essay (students called out whether variously highlighted text was fact versus opinion). When this group activity was over, the teacher asked each student to create a similar mark-up of a worksheet-based essay at their desk. In this case, and in many others observed by the evaluators, that the learning activity might involve group work, or even be hands-on inquiry, but that assessment needs drive many teachers toward the ultimate demand for individual student work.

It is clear that Croton-Harmon's students are interacting with instructional technology within the learning environment, and they are generally meeting the part of the district's indicator that speaks to the use of technology to support projects and inquiry. What's missing is a more open-ended, project-based, use of technology to collaboratively develop ideas and to produce knowledge. Collaboration is specifically noted in Croton-Harmon's Student Skills indicator and is a key element of the NETS-S standards on which Croton-Harmon's indicator is based. The use of technology to meet learning standards will be discussed further, below.

Technology Aligned With and Supportive of Standards

Croton-Harmon's Student Skills and Outcomes indicator states that "*students are media and information literate, highly engaged, and clearly use technology for problem-solving, communication, collaboration, modeling, simulation, data gathering, and work product production. Students are able to transfer their technology skills to new and real-world problems.*". These skills and outcomes are directly reflected in the ISTE NETS-S, a set of national standards for how students should utilize instructional technology as a tool for learning. In many districts, the NETS have become a shorthand framework for describing effective technology integration. This is in fact the case in Croton-Harmon, where a working group of elementary teachers has created a correlation of the NETS standards to sample classroom activities as a way of illustrating how students can meet these standards via classroom core curriculum-focused activities (see the Appendix for this correlation).

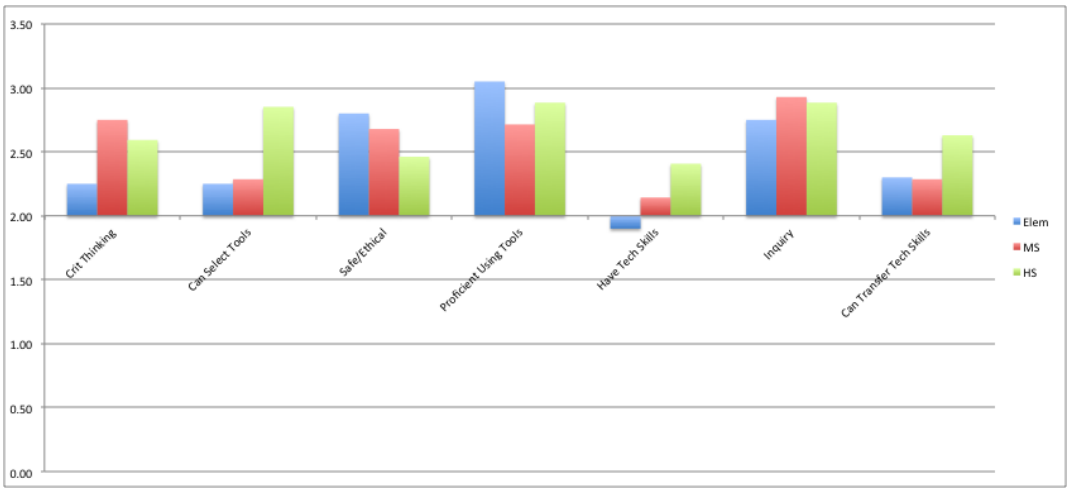


Figure 10 – Teacher survey question 4. Teacher agreement as to whether their students have the ability to use technology to support various learning tasks. 0 = Strongly Disagree, 1 = Disagree, 2 = Neutral, 3 = Agree, 4 = Strongly Agree.

As survey data in **Figure 10** shows, Croton-Harmon teachers generally, and mildly, "agree" that their students utilize technology to support critical thinking, support inquiry, and that they can transfer their technology skills use to the solving of real-world problems. These are all features of the district's Student Skills and Outcomes indicator and also represent NETS-S skills.

In considering the NETS-S standards, the evaluators find that Croton-Harmon's students for the most part meet the intent of NETS-S 6 (Technology Operations and Concepts). Although, it is clear (and as will be discussed later in this section) that not all students have equivalent technology operations skills at any given grade level.

What's less the case is student use of technology to meet NETS 1 (Creativity and Innovation), 2 (Communication and Collaboration), 3 (Research and Information Fluency) and 4 (Critical Thinking, Problem Solving, and Decision Making).[6] This is because these skills are those that are primarily developed when students take ownership over the use of – and the choice to use – technology in the course of their learning. For example, in the "Creativity and Innovation" standard (1), creativity is expressed through the ability to construct knowledge, develop *innovative* products, and the application of existing knowledge to generate *new ideas, products or processes*. These learning activities are quite different from being told to use a tool such as PowerPoint to make a presentation or to go to a particular website to locate information. Again, the evaluators find that the teacher-directed approach employed by many Croton-Harmon teachers is foreclosing to some extent their students' ability to meet the objectives of technology integration as defined by NETS and the district's indicators.

As has been discussed in the previous section of the findings related to the Student Skills and Outcomes indicator, the evaluators find that very little student work with technology involves collaboration (NETS-S 2). This is an odd finding in that the evaluators' expectation is that instructional environments

[6] See the Appendix of this report for a full listing of the NETS-S, and other NETS, standards.

that are strongly project-based (as Croton-Harmon's seems to be) would tend to involve *collaborative* project work. Croton-Harmon's teachers do seem to emphasize projects, just not collaborative projects. This contrast is best illustrated through the examples of collaboration that a relative minority of teachers provide.

> *Students work as peer editors as part of the writing workshop. With the use of laptop computers, writing drafts do not have to be continually printed out in order to edit and revise. Students can pass on their laptop to the teacher or student editor for feedback and/or support.*
>
> *When I did [a lesson where students used the Smartboard to drag pictures to the letters that connected to them] they got to see it immediately and we got to talk through how the answers could have been different and they could change things quickly. They were able to work things through together and talk that out.*
>
> *I encourage the use of Google docs and similar sites that allow students to collaborate on assignments from home.*

Some parents also noted the value in using technology for collaboration and discussion.

> *My son uses Edmodo in science and social studies. It is particularly helpful with out of school discussion on topics, and it also makes the learning into a more social (and therefore enjoyable for the middle schooler) experience.*

These examples illustrate the use of blogs for carrying on discussions and the use of various collaborative tools (Google Docs and Edmodo) to share ideas and gather feedback on their work. This is in marked contrast to what appears to be the dominant model of each student producing his/her individual work product as a largely solitary activity.

Once again, the evaluators find that needs and perceptions related to *assessment* may be responsible for what seems to be a teacher reluctance to engage in collaborative project-based learning. As one administrator noted:

> *For example, two teachers are integrating social science and science on floods, and I'm meeting with a parent today who asked why the kids aren't "learning" science. She expects her child to have specific science homework on the lessons she had in school. I would rather use project-based learning rather than subject-based worksheets; but even the teachers are finding this quite different from the model they know, and the standardized tests are not designed to be able to measure how much learning happens in a unit like this...*

Teachers picked up on this point about the difficulty of assessing the real work that goes into student projects. As these secondary teachers noted:

> *For me grading is an issue – there is a divide between the grading platform and developmental rubrics - I grade on 7 or 8 domains, and that's hard to boil down to a numeric grade - if there was a portal to display projects wouldn't have to finagle grades and would give parents more info on what their kids are producing*

[My] department would like to find a report card platform with a parent portal that better matches our data and rubrics. Currently, we use the old eSchool system that only allows for traditional grading. We mostly grade using rubrics and need a platform ... that allows us to grade each rubric on technology and post it on a parent portal. In this way, parents would receive a more complete vision of their child's work. The way it is now, we grade lots of assignments with the rubric, but only can post one set of grades for one project - and they are only posted as numbers...

While neither of these examples specifically mention *collaborative* projects, the sheer fact that teachers are struggling with how to assess any type of project means that activities that do not easily fit the classic "each student responds to test questions" model are challenging to conduct. It can readily be seen that collaborative projects – ones that produce asymmetrical (by student) products that multiple students contribute to – can be much more challenging that many teachers would want to do. The evaluators believe that these difficulties conspire against the engagement of many Croton-Harmon students in collaborative learning, and hence this explains the district's difficulty in meeting this part of its Student Skills indicator.

Finally, in relation to collaboration, sharing, and peer review, it bears noting that some parents have a particular issue with these sorts of activities. Some of these concerns are about the validity of peer review and assessment as learning strategies. In other cases, the concern seems to be related to a desire to limit the amount of technology used by students.

While I fully support the idea of expanding the opportunities to utilize technology to support learning, I think we need to be a bit wary of requiring extended participation in "blog" type assignments -- where students are reading (and judging) classmates' responses, esp. at the middle school level. While I recognize that an occasional presentation to classmates is part of the school curriculum, and pretty much always has been, I don't think it's a good idea to rely too heavily on this type of assignment.

Using a blog to "post" their weekly essay homework publicly to the class and parents is more pressure than necessary. I understand that they may need to get used to their work being public for the world as it is now. But they are young, and it doesn't need to be weekly.

The evaluators note that while these may not be majority opinions, they are nevertheless significant in that they express what is likely a lack of understanding of the underlying pedagogy involved in student collaborative work. This implies (as will be discussed later in this chapter) that the district could do a better job of engaging parents in developing an understanding of *why* certain classroom and technology activities occur and how they fit into the curriculum.

NETS-S 3, Research and Information Fluency, is another important student skill that impacts much of what students use information technology – specifically the Internet – for on a daily basis. This skill relates to the ability to "evaluate and analyze" information. Another often-used term related to this skillset is "media literacy". Survey data (**Figure Nine**) shows that Croton-Harmon teachers believe that they create instructional activities at least "several times a semester" that require students to demonstrate research and information literacy. The district's teachers and students state that "research" is a frequent and standard component of most project activities (**Figures Six and Eight**). Still, there is some concern

from parents and teachers around the teaching of effective skills for evaluating and analyzing technology-based information. As several parents noted:

> *When my older son came home with his first project, my first instinct was to go and find things on the Internet but my kid was told never to use Wikipedia. So he went to Answers.com…and that's worse! What is this fear of Wikipedia?*

> *The students need a LOT more support in learning how to effectively research a topic on the internet. How to find an appropriate (to the topic and to their grade level), reliable source.*

> *[A student's] ability to do "old fashioned" research in the library should be excellent before they should be allowed to look things up online. The Internet has proven to be an invaluable tool for accessing information, but people have really lost the skill to RESEARCH and assess the overabundance of information and informational sources.*

Many teachers agree, as this teacher comment exemplifies:

> *At the 5th grade level, students use the computers for writing, revision and editing assignments, as well as research for the content areas. Research is a new skill in 5th grade and it requires much guidance and time. It is an integral part of learning for students. If the expectation is that students can research more independently as they move through middle school and beyond, then I would love to see it introduced and implemented more in the upper elementary grades (3-4).*

Faced with the challenge of how to develop their students' information and media literacy skills, it appears that a number of teachers – particularly at the elementary level – have defaulted to telling students to avoid much Internet-based information due to its potential unreliability. Students are instead directed by their teachers and school media specialists toward "known" sources (e.g., Grolier's, materials pre-selected by teachers, etc.) and are told not to trust what they find via search engines. While it is certainly prudent to warn students of the perils of simply accepting what they find online as reliable, it seems incumbent upon teachers to actually *teach* information literacy so that students can successfully navigate the universe of information available online. Nevertheless, teachers find it difficult to make time for information literacy in their curriculum and tend to default to more teacher-directed/mediated activities. As one teacher noted:

> *A couple of years back we had a full time tech teacher and we had student authorization slips. We still have the slips, but it's not nearly as enforced as it used to be. It used to be students doing things with the tech teacher, but now it's all teacher based and we need to be more careful about what's appropriate and not. My students are not allowed to any research on the Internet unless they have an adult with them.*

Another aspect of NETS-S 3 (Research and Information Fluency) is that students "evaluate and select" appropriate technology tools for the various educational tasks or problems that confront them. This too is referenced directly in Croton-Harmon's Student Skills and Outcomes indicator where it is noted that students should be "skilled in making judicious choices as to what technologies – or not – serve the educational objective at hand". The evaluators' data shows that Croton-Harmon students are not typically meeting this aspect of the indicator or this part of the NETS-S 3 standard. The largely teacher-directed nature of most student technology use would tend to work against students having the choice as

to what technologies they might use to support or demonstrate their learning. Further, while teachers tend to soundly agree that their students are "proficient with technology tools and operations appropriate to their grade level" (see **Figure 10**), they are only slightly above neutral in their agreement that their students "arrive each fall with the technology skills necessary to support their learning". The evaluators' analysis of this finding, supported by other data (teacher comments) from focus groups and interviews, is that teachers generally feel that students are "proficient" in operating devices, but that they lack the understanding of what to do with these devices within an educational context.

In the "Critical Thinking, Problem-Solving, and Decision Making" standard (NETS-S 4), the emphasis is on students *identifying and defining* authentic problems for investigation. While it is clear to the evaluators that Croton-Harmon students frequently work with problems through a process emphasizing inquiry (investigation), it is not at all clear that students identify and define these problems for themselves. The need to do this is also reflected in NETS-S standard 2 ("Communication and Collaboration") where the standard asks that students "*contribute to project teams to produce original works or solve problems"*. Here again is the concept of collaboration as a pathway to learning and the development of higher order thinking skills. Further, the standard calls for students to take ownership over their learning in that they choose the type of investigation and the mechanism for solving the problem. The evaluators believe that it is not really possible to accomplish this standard, and to master higher-order thinking skills, in a teacher-directed environment.

Overall, a strand that ties together much of the evaluators' findings related to Croton-Harmon's ability to meet the bulk of the NETS-S standards is the *pedagogy* exercised by their teachers. As has been noted above, Croton-Harmon students are often working in a much more teacher-directed environment than one might assume given the highly differentiated and project-based classrooms constructed by many Croton-Harmon teachers. A closer examination shows that when students are being directed to produce individual work and to use specific technology tools that accomplish targeted purposes within lessons/activities, the actual mode of instruction is in fact teacher-directed, not truly student-centered. As will be discussed below, technology standards such as the ISTE NETS-S (which are largely about using technology as a catalyst and support for the development of higher order thinking and learning skills), emphasize students' taking ownership over their use of technology as a means to developing and demonstrating the types of skills supported by technology integration. This theme of self-direction is also a key feature of Croton-Harmon's Teacher Skills and Pedagogy indicator (and will be discussed later in this chapter).

Scope and Sequence

As mentioned earlier, the district has a set of "correlations" between the NETS-S standards and various grade-level identified curriculum activities. The correlations document (see Appendix) was developed in the summer of 2011, although it only covers elementary grades and it is not at all clear that all K-4 teachers know that these guidelines exist. No teacher mentioned the document in any of the data collected by the evaluators.

What is clear is that currently the use of technology in the classroom is entirely dependent upon individual teacher inclination. This means that while some teachers employ technology often as a hands-on tool for students, others do this very infrequently and instead focus nearly entirely on teacher uses of technology for presentation (e.g., the Smartboard). For example, during building observations, the evaluators spoke to one elementary teacher who was working with students to create multimedia

documents. When asked if her students had the basic skills to operate the word processor, she noted that some did but many did not and that this was dependent on whether they were in a class in previous years where the teacher expected students to know how to use Word. She therefore took it upon herself to teach her entire class basic word processing operations so that this class project could transpire.

The same problem persists as students move from elementary to middle to high school. Teachers express concern that they simply do not know what students are doing or know in terms of technology, from previous/other grade levels. For example:

> *Where I mentioned that my students did not have the skills/understanding of technology uses and such, it is simply because it is a brand new skill for them in 5th grade. I would like the opportunity to meet with the upper elementary grades to discuss ways that technology is being implemented so that we can better meet the students' needs. Hopefully we could have some cross building (3-6) grade meeting time to discuss such matters.*

> *There should be a standard technology curriculum that all elementary children have. This should include how to keyboard and the basics of word and maybe power point. The keyboarding is essential for them to be proficient users.*

Many elementary teachers note that the lack of standardization in student technology skills and experience started with the elimination of the elementary "computer teacher" position. Teachers believe that if there were a computer class for all students to attend in elementary school, there would be a greater level of standardization. Nevertheless, the evaluators note that true technology integration occurs *within* the classroom and not outside in a computer lab, taught by a computer teacher. This "within the classroom" notion is supposed to be addressed through teacher adoption of the NETS correlations, and an effort on the part of teachers within a building – and cross building – to collaborate on insuring that all students receive equivalent experiences through equivalent instruction and activities. It seems at present that Croton-Harmon's teachers <u>are not</u> coordinating with each other or with the teacher-developed correlations. Further, it seems that a number of elementary teachers have not yet come to the realization that it is indeed their responsibility to insure that their students uniformly attain basic technology skills. Some (such as the teacher in the above example involving multimedia documents) have done this. Others still reference the lack of a computer teacher as the problem.

> *In 6th grade they do a newspaper, in 7th a podcast…but for us not having a technology teacher, it's interesting to see how prepared our [elementary] kids would be getting to that class. It's a huge thing to have a specialist teacher working with this versus the general ed teacher.*

Parents note that a student's technology experience is highly teacher-dependent and that they are quite in the dark about just what they should expect so far as how their students will technology during the school year. For example:

> *My son is in 4th grade and I am unaware what exactly they do regarding technology at school - I know they use smart boards, and they get to use the computer if recess is indoors due to weather*

> *Make it easier for parents to monitor usage and better communication about how it is to be used and what expectations are. I also believe that keyboarding should be taught rather than the hunt and peck method that the kids use. My daughter is in third grade and has not had any*

keyboarding instruction in school. I am trying to use computer/online programs to teach her keyboard layout and typing.

In full fairness to Croton-Harmon's teachers, the evaluators note that teachers would naturally have difficulty meeting the demand to engage their students in meaning technology projects and in the development of standardized technology using skills without considerable professional development to that effect. Teacher skills and pedagogy, and the connection to professional development are covered in the next sections of this report.

Teacher Skills/Pedagogy

Croton-Harmon's performance indicator for teacher skills and pedagogy, states:

> *Croton-Harmon teachers are skilled in inspiring and facilitating interdisciplinary engaged learning by balancing students' individual needs, choice, and rigor. Teachers are well-versed in finding and utilizing technology resources that ensure maximum student outcomes. Among teachers, there is a broad definition of how to engage students while using a variety of different technologies, with the overall target being a student who is highly engaged with learning.*

Croton-Harmon teachers' ability to create project-based learning activities for their students has been addressed earlier in the Student Skills and Outcomes indicator discussion. The primary focus in the Student Skills and Outcomes indictor was the use of technology in ways that meet with the NETS-S student standards. In the Teacher Skills/Pedagogy indicator, the main emphasis is on the use of technology to support highly individualized student instruction.

Technology Use Supports Engaged, Individualized, Learning

Croton-Harmon teachers generally agree that technology supports engaged, and particularly individualized learning. In fact, as has been noted above, it is the evaluators' finding that teachers are perhaps over-emphasizing the "individual" aspect of student technology use, to the detriment of the development of a number of the NETS-S standards.

As has also been noted, Croton-Harmon teachers – as is typical of teachers everywhere – tend to emphasize how "engaging" technology is for their students; and it is clear that students enjoy working with technology and operating nearly any sort of device. Nevertheless, it is important for teachers to unpack their understanding of "engagement". While students may be more interested in the activity when it involves some sort of computer or technology-generated visual, this does not always imply that the student has actually engaged with the learning objective(s) that underlie the instructional activity. Several teachers commented upon this issue. For example:

> *The Smartboard has been a double-edged sword, at once providing teachers with a visually powerful medium through which to reach students, but at the same time encouraging a pedagogy in which kids are less involved and more passive.*

The evaluators agree with this assessment and note that in classroom observations the vast majority of teachers at all levels were observed using their Smartboards at some point during the day. In virtually none of those cases were the boards being used for anything that could not be accomplished via an overhead projector and/or standard white/chalk board. At one level, this is fine in that as experience shows, projecting, presentation, and other teacher-focused tasks *is* what a Smartboard does. At best, most teachers use Smartboards as very large computer monitors, projecting the output of various computer-based applications or resources for the whole class to see. Most "student interaction" with Smartboards is identical to what a traditional teacher would do when asking a student to come to the white/chalk board to solve a problem, write a sentence, etc. This is hardly revolutionary pedagogy, and largely meets with expectations of how teachers would use any "tool" in their classroom. The problem though is when the Smartboard becomes the focus of teacher/administrator expectations for "technology

use". In this regard, teachers feel that they are somehow effectively integrating technology so long as they are teaching from their Smartboard. The fact that students seem more excited by the subject matter because it is projected on a giant screen further complicates getting an answer to whether or not technology is being used in a meaningful way to "engage" students around teaching and learning objectives.

In light of the discussion earlier in this report about the need to more fully connect students to work where the students themselves guide their learning to reach well-defined objectives for the development of higher order thinking and learning skills, the evaluators find that many teachers have not fully "engaged" with the meaning of "student engagement". As one teacher noted:

> *My class is blessed to have an ipad, Smartboard, desktops and laptop cart to support ELA work. We use technology daily and it has enhanced and improved my curriculum and the students' work. I have incorporated many new forms of technology (blog, website, Edmodo) to enhance my language arts work. Teachers hope to have uninterrupted time to explore PVC alignment of Common Core skills across the grades. Also, there are so many new initiatives and teachers feel unable to focus deeply enough to become experts at any of them. We would like a clear and focused vision, hopefully with Common Core at the heart of our work.*

An administrator echoed this sentiment by saying:

> *Technology makes all that we do possible - and what we teach kids changes all the time. School has, in the past, been focused on teaching lower thinking skills; but now we can expect the kids to have a certain level of thinking skills when they get to the middle school, and we can move them to higher level thinking. ... technology helps us get to the next level quicker - the equipment takes away some of the tasks that teachers hate; so instead of regurgitating the same thing over and over, they can create lessons that are recorded and can be replayed by the students who need to see them again*

Establishing that vision, and supporting its implementation by all of Croton-Harmon's teachers is the focus of the next of the district's indicators.

Other Teacher Technology Skills

As shown in **Figure 11**, below, the most frequently noted teacher use of technology is for professional productivity. This would include the many worksheets, websites, web searches, emails, etc. generated by teachers. The fact that facilitating learning and creativity and student centered learning scored significantly lower in the survey data confirms the evaluators' observations that these uses of technology are relatively less common in Croton-Harmon classrooms.

Teachers were also surveyed as to their opinion on the degree to which they had the technology skills to accomplish certain instructional/curriculum tasks. This data (Figure 12) shows that teachers at all levels were neutral to mildly agreeing that they have skills to support differentiation and curriculum tasks such as supporting the common core. The strongest agreement came among middle school teachers who agreed that they had skills for project based learning (although many of these teachers noted that they did not have the technology tools necessary to differentiate instruction or support learning).

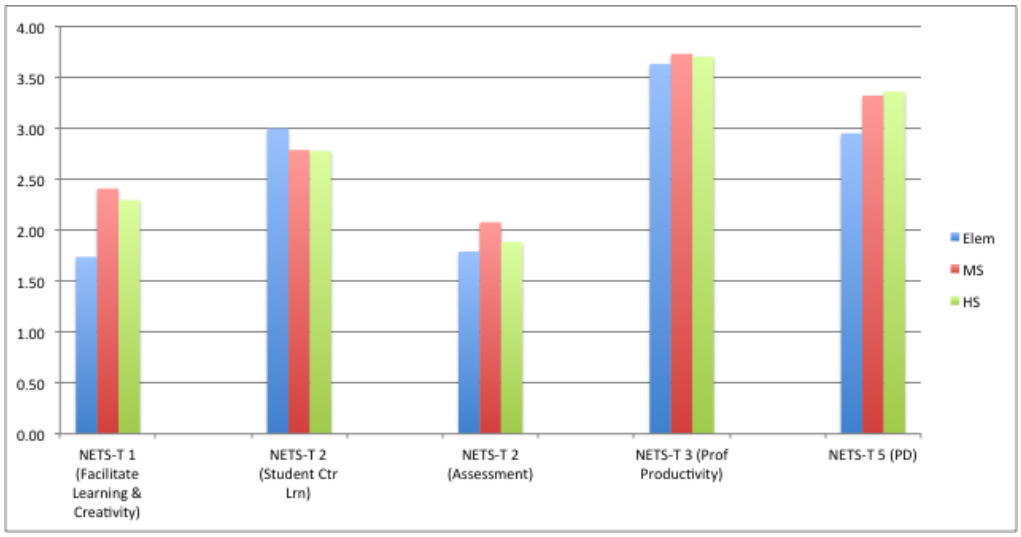


Figure 11 – Frequency with which teachers report using technology to support various NETS-T identified teaching tasks. 0 = virtually never, 1 = several times a year, 2 = several times a semester, 3 = two or three times a month, 4 = at least once a week.

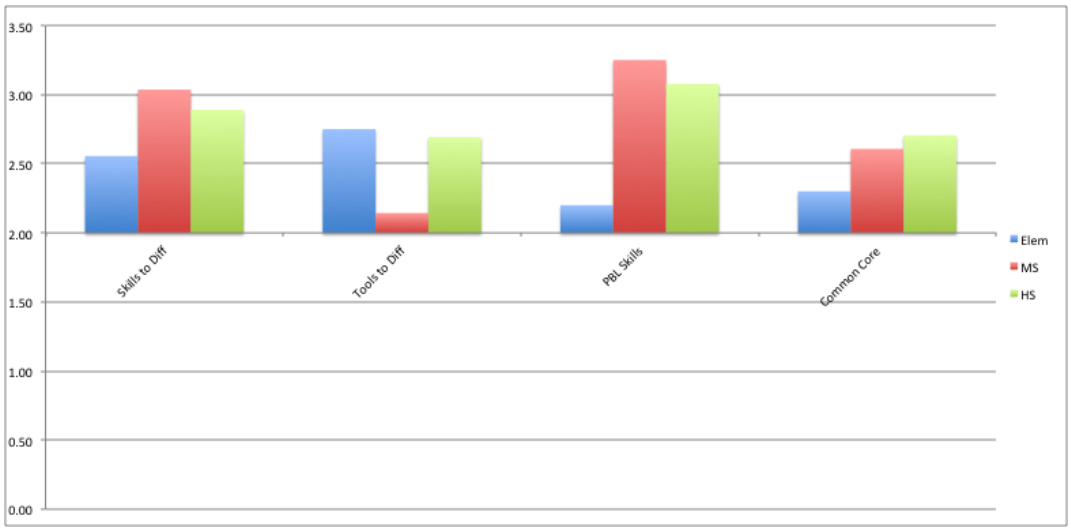


Figure 12 – Teacher opinion on whether they have the technical skills to use technology to support various teaching activities. Question 4 , 0 = Strongly Disagree, 1 = Disagree, 2 = Neutral, 3 = Agree, 4 = Strongly Agree.

Administrators and District Policy

Croton-Harmon's indicator for Administrators and District Policy states:

> *There are clear district-wide expectations and a vision for how teachers will leverage technology as a tool for student learning and teacher professional practice. Teachers are supported in their work by a curriculum map that encourages interdisciplinary, project-based, engaged learning at all grade levels. There are a wide array of professional development opportunities available to teachers and these help teachers meet their professional learning goals with regard to technology integration. District policies related to safe and ethical technology use and teacher-parent communication with technology are well established and clearly understood by all.*

This section of the district's indicators describes how the district – administration particularly – communicates and supports its expectations for how technology is used to support teaching and learning. Therefore, attention is given here to articulation of expectations and teacher professional development.

Expectations for How Teachers Leverage Technology

The topic of how Croton-Harmon teachers use technology to support learning has been covered in detail in the previous sections of this chapter. Croton-Harmon's indicator for Administrators and District policy starts off by stating that there are "clear district wide expectations and a vision" for how teachers will leverage technology, and here the evaluators note that while there is certainly a fairly uniform understanding by teachers and administrators as to how technology should be ideally used, there are in fact few explicit "expectations". In interviews, administrators tend to express the view that "most" teachers simply use the technology that is available to them and that it is not necessary to "force" teachers. The general feeling seems to be that teachers will use anything and whatever is provided. A standard qualification to this opinion is that this is true as long as adequate professional development is provided (this will be discussed below).

Another concept expressed in Croton-Harmon's indicator is that there is a "curriculum map that encourages interdisciplinary, project-based, engaged learning at all grade levels". Here, the evaluators note that (as has also been discussed in the previous section), there are the K-4 "correlations" and some very preliminary mappings of technology resources within the Atlas Curriculum Maps. The evaluators find that neither of these in their present state really constitute a curriculum map that meets the description in the indicator. In the case of the correlations, it is clear that not all K-4 teachers are aware of this resource; and furthermore, the resource is not very detailed or complete. The same is the case with the Atlas maps. The evaluators' review of these maps shows that many of the maps do not reference technology at all, and those that do mostly tend to just list online resources or software as tools to support the learning tasks described in the map.

The evaluators find that the correlations and maps in their present form are a good start toward the type of map described in the indicator, but that further work will be required in order for them to fulfill the function intended by the indicator. This finding is echoed by teachers and parents:

We need a deeper understanding, at the Board level and the school level, of what technology can do from k through 12 to help provide learning skills to students and to enhance college/career readiness. Having a technology roadmap is step one; Having a clear understanding of how to use data for decision making is step 2. Having repeated and dedicated technology investments is step 3; Implementing technology in a systemic manner (from reading tracker to college application tracker) is step 4.

The district could better inform families what the goals and expected uses are for technology, so that parents can be on board with what is expected. Can the school give more guidance on what studies have shown would be an appropriate amount of recreational computer time for children at the different ages?? We as parents grew up without any precedent to base our rules about home computer usage for our children. Learning has to be fun, so games can serve as a way of learning lots of things via technology - but we don't know which games or how much time per week, is recommended. For reading books, there are all kinds of book lists for recommended reading, and there is a standing amount of reading time per day recommended for the various grade levels - what about similar for tech usage?! This would be extremely helpful, as I feel I am much in the dark of what rules/games to impose/allow.

Teacher Professional Development

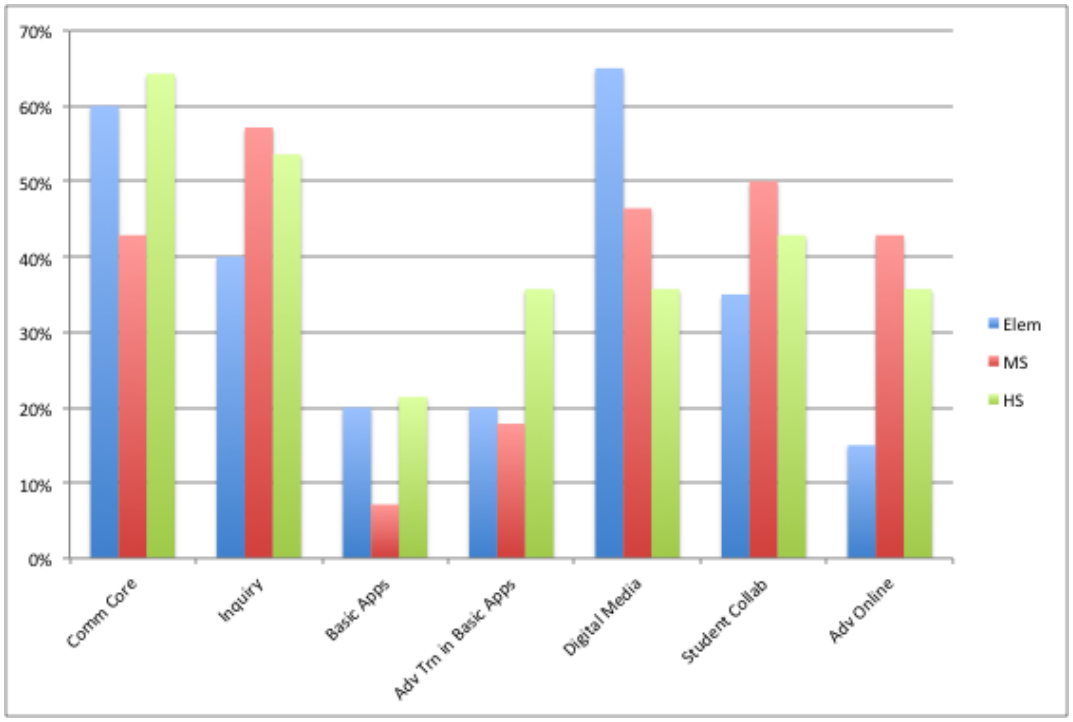


Figure 13 – Percentages of teachers (by level) requesting professional development by topic

As shown in **Figure 13**, Croton-Harmon teachers express interest in attaining further professional development in various instructional applications of technology. Topics such using technology to support the Common Core, and using technology to support inquiry seem to be of significant interest to teachers. Of relatively less interest are various "how to" topics related to basic technology tools. This is in keeping with the evaluators' observations of teacher skills as well as what teachers have said in interviews and focus groups. For example:

> *I don't understand the question linking technology to the Common Core standards--I've been to several conferences about the Common Core, and none of them have stressed the use of technology in English; the focus has always been on the types of texts read, not on technology.*

The evaluators note that the district has structures in-place that support professional learning and sharing. As one administrator noted:

> *We also hold meetings every Wednesday for the district. We have a collaborative Wednesday every month, where faculty can showcase their work or help each other with lessons - one Wednesday is for faculty meetings, and another is curricular meetings. During the collaborative Wednesdays, teachers are able to work with own department or others - and have cross-building so all math teachers can meet – this is built-in structure, so it provides a good time if we need training.*

Nevertheless, it seems that not all teachers have engaged with the cross-building aspects of these days as several teachers (mostly elementary) noted (see above) that they would appreciate having the time to meet with teachers in other buildings to understand what technology skills and activities exist in other buildings. The real issue here may be that it is just not possible for some teachers to accomplish meaningful professional development in scheduled/group times. As teachers described this situation:

> *I would like more practical pd from my peers - no lack of will from the district – but we need to set aside time during the school day to learn what we need*

> *There are many different programs that we have started to require all teachers in the district to use but yet we and rarely given any real training in these programs. Most times we are told to just figure it out on our own after being showed a program, let's say during a faculty meeting. This large group demonstration does not count as training in my book. Actually having time to work within the program while an "expert" is there to help me along is what type of training we need in the future.*

This call for "an expert" to be in the classroom and to offer hands-on support came up repeatedly among teachers in surveys and focus groups. Elementary teachers in particular seem to feel the loss of a full-time instructional technology specialist in their building.

> *Debba used to be here to train the teachers. But she's not anymore. So whatever we're doing is two years old.*

Elementary teachers note that the aide in the lab is very helpful for students, but that he is not really intended to function as a professional development or instructional support to teachers.

Policies Related to Safe and Ethical Use of Technology

The District Policy indicator specifically mentions "safe and ethical" technology use, and the evaluators also note that this is one of the NETS-S (5) and NETS-T (also 5) standards. This means that the promotion of safe and ethical technology practices among students and teachers should also be covered within the Student Skills and Teacher Skills/Pedagogy indicators. In fact, as seen in **Figure 10**, teachers were asked if their students had digital citizenship skills, and most teachers mildly agreed with this statement. This is nearly the same level at which teachers agreed that their students had skills in using technology for inquiry.

The evaluators do not have any direct data on the degree to which Croton-Harmon students practice safe and ethical technology use, but the data is clear on the fact that insuring such use is a significant concern among parents, the School Board, and teachers. The Board noted that a goal for this current school year is to examine existing policies related to Internet safety.

Parent concern about "safe and ethical use" of technology seems to start with the expected concern about children learning about the perils of social media and cyber bullying:

> *School should emphasize the ethical of social networking. School should teach kids how to protect themselves on social networking. School should educate kids about internet bullying.*
>
> *Spend as much time as they do with D.A.R.E on the dangers and downfalls of social media, you tube and the internet. They need to use the technology at a time in their developmental stage where they don't really understand the dangers the same technology holds for them and their future.*

But these comments quickly moves to concerns related to the value of technology within the educational process and the amount of emphasis placed upon technology by teachers. For example:

> *The use of some technology is important in order to support learning in the classroom but it should be used to a minimum whenever possible.*

Elementary parents seem particularly concerned about issues of appropriate use of technology:

> *I think you also have to consider what they're not learning by using tech. All of this software is elegant and gives them choices, but everything is still black and white choices and doesn't foster true creativity, like you can get [by going] outside.*
>
> *I would love to see a teacher who is empowered to reject technology. Not a luddite but to think critically about what they want to teach and have a means for deciding what they want to bring into their classroom. So your 5 year old doesn't need to sit at a screen, they have that at home. School should be for something else.*
>
> *I would like to add that the less tech the better is my opinion. I would like to see more critical learning involved. More creating than consuming. I see that most tech use is consuming.*

The evaluators note that often these parents' concerns were in fact calls for their students' teachers to engage in the very sorts of practices called for in the district's indicators and the NETS standards. For example, several parents, such as the ones quoted below, called for what is essentially collaborative, project-based, differentiated learning.

> *At the youngest ages, I think it is great to expose kids to technology and the benefits of those tools. However, they are very young and formative. I would NOT want computer assisted learning to take the place of experiential learning from teachers and peers. It is still very important to engage socially, and excel at the basics before using technology aids. For example, their handwriting should be great before they are allowed to type papers. If technology is used in the schools, there should be a large emphasis on teaching kids how to filter out the noise and garbage they will ultimately encounter.*

> *They should be fostering social skills at this age, and tech is often so self-directed. People walking around with headphones banging into walls. I think it would be interesting to have tech used as a tool for teachers to differentiate their teaching in the classroom.*

The evaluators' analysis of this data results in several findings. First, it does seem that Croton-Harmon parents are concerned about, and want to be kept aware of, their students' use of technology within the educational environment. Part of this concern is strong skepticism about the role of technology and concern that if not properly monitored it could displace more traditional, human, interactions. Secondly, it appears that many – if not most – parents really have no idea what technology's intended purpose is within Croton-Harmon's schools. Many parents expressed hope that technology would be used for the very same purposes/objectives that the district's *teachers* say they are using it for. These parents do not seem to share the same understanding of technology use as their children's teachers. In other words, parents have little insight into the district's vision for technology. As one parent simply noted:

> *It may be helpful to present the school's vision to the parents for possible discussion.*

The evaluators would concur with this statement. It does appear that many concerns around "safety and ethics" are really proxies for other issues related to communication and sharing of a commonly held (and enacted) vision for technology. As has been noted elsewhere in the findings chapter, there is considerable disparity among teachers and classrooms as to how technology is used. This is reflective of a lack of commonly held vision and a lack of a standard set of expectations for student/teacher technology use.

Home/School Communication

Finally, Croton-Harmon's indicator for District Policy touches upon the need for technology to support parent/home communication to teachers. While it appears – from evaluator review of the district's website - that nearly every teacher has a class page, it is clear that not every teacher maintains his/her page and that not every page has equivalent information. This same observation is made by many parents. For example:

> *[I would like to see] Consistency of teacher web design so that students aren't hunting around for where assignments are located would help. Also - the school website itself is a disaster the*

information and functionality is not intuitive (e.g., the search tool requires you know the page you want to search (hello, if I knew that I wouldn't be searching).

I am pleased that the CHHS teachers post their homework assignments, and much other valuable info on their webpages - the PVC teachers really didn't use their pages.

It is inconsistent between teachers. Middle school teachers feel that just posting homework is all they have to do with technology.

It is clear that teacher websites vary from teacher to teacher in so far as what information the sites contain and the degree to which they are functional parts of the learning experience (versus simply posted syllabi or static class descriptions). This is very much equivalent to the variance the evaluators find, and parents note, around the degree to which individual teachers utilize technology for teaching and learning or even personal productivity. As one parent noted:

One tool that is important for teachers to use is good email. The fact that we're still writing notes and putting them in the folder is not good. Some teachers send too many emails, but other teachers don't at all.

The evaluators find that some parents have high expectations for home-school communications and wish that the class/teacher/school websites be more than just pages for posting assignments. While communicating about homework seems to be a minimum expectation, several parents have discussed using the "portal" to support real learning outside of the classroom.

The major gap I find in the Croton-Harmon Harmon School District technology platform is the lack of transparency around our child's homework lessons and on-going curriculum. The district should enhance the current parent portal to allow teachers to post homework assignments, upcoming lessons, recommended reading, extra-curricular learning exercises across multiple topics, etc. The portal could also be used for teachers to provide real-time commentary on students, e.g., you might want to work on listening, or reading, or math, etc. This will enable parents to be more engaged in their child's development.

This is in-line with other parent comments, collected by the evaluators, for what is essentially "flipping" the classroom. While no parents (in the collected data) actually used that particular term, it was clear that this concept was on the minds of a number of parents who spoke to the desire to have classrooms be the places where projects, discussion, and collaboration could occur while using technology to support out-of-class access to content-rich lectures and other resources. The evaluators found that the district's School Board was much more direct and clear around their desire to see technology used to change the traditional dynamic between school versus what happens "outside" of school.

[My vision is about] … flipping the classroom. The school will become the place where 21st century activities take place, but the learning, the actual lecture, could go on anywhere. Makes learning 24/7. The school becomes the place where you do communication and collaboration. The hub.

Infrastructure

Croton-Harmon's indicator for infrastructure states:

> *The district's technology infrastructure is robust and reliable and is well supported both technically and instructionally. Technology is available throughout the learning environment and supports anywhere-anytime, engaged, student-centered learning.*

Devices and Distribution

The evaluators observe that there are workstations in classrooms throughout the district. Each building has at least one computer lab, and there seem to be laptop carts throughout the district as well. The evaluators have learned that the Middle School just this year had its laptop carts upgraded, and the Elementary School received new laptops for its carts last month (2/2013). The Elementary school also has a set of 30 iPads (distributed in groups of five to six classrooms). iPads exist in small sets or as individual units throughout the district. All devices are connected to the Internet through a wired network or the nearly ubiquitous district WiFi. As has been mentioned, nearly every classroom (with the exception of kindergarten classrooms) has a Smartboard. Peripheral devices such as printers, student response systems, and document cameras seem widely available. Graphing calculators and various data acquisition devices were found largely at the secondary level.

Despite the rather widespread availability of technology devices, the evaluators find that many Croton-Harmon teachers cite a "lack of technology" as a barrier to their further use of technology in the classroom environment. For example:

> *There are so many wonderful programs and sites out there to support teacher and student instruction. This is not feasible unless all students have access to a computer/laptop.*

> *We need more computers in our building, plain and simple. Technology is great, and I know how to use what I have in my classroom and to plan lessons using it, but I need the actual computers in the classrooms in order to support student learning in this area. It is one thing for the teacher to use it and model, but if the students don't then have access to the technology, they can't try it and apply it for themselves.*

> *More computers can help with research and project-based learning.*

> *Ideally technology would function best if every student had access to it in every class.*

The issue here seems to be that many teachers are advocating for a 1:1 student-device environment as this best supports their vision for how students would best use technology. Some parents and quite a few students seem to support this notion as well and advocate for what would essentially be a "BYOT" (bring your own technology) policy for the district.

> *Allow use of tablets devices and or smart phone in school for scheduling assignments and reminders, as it is done in the "real world"*

Every student should get an ipad or be allowed to use our iphones in class to help us learn.

I especially think students should be allowed to bring ipads or laptops to take notes in class to stay more organized and more efficient.

Nevertheless, there are also parents who take issue with what they feel is an impending personal device policy and have concerns about the anticipated increase in technology use this would bring.

I've been concerned at school board meetings to hear talk of the inevitability of smart phones, tablets, etc. in the classroom for educational purposes - without having these purposes defined. I would like to see serious discussion about how to balance the benefits of personal technology in the classroom with the significant downsides (the impossibility of monitoring what 25 students are actually doing on the little screens in their hands). I don't see a compelling case for personal technology in the classroom. As it is there is tons of texting (and some tv watching) going on during class, when it's supposedly against the rules. What's it going to be like when everyone's allowed to have a phone in his or her hand?

The district needs to have a policy on hand held devices. I'm disturbed that students can have their devices and many are so distracted! At the PVC winter concert last night, students had their phone with them on stage (no need for that!). In certain situation - while performing in a group - phones need to prohibited!!! Young children in the audience were playing games on their or their parents phones throughout the concert. We are raising children to only focus on their devices and they no longer have the ability to pay attention to each other. We as a society and the school district need to set some limits to ensure our children will be able to communicate in person and on-line and respect each other. Technology can make many types of learning easier, but it makes other type of learning more difficult.

Systems and Technology-Based Resources

The evaluators observed and found mention of a number of technology-based resources used by teachers and students in Croton-Harmon schools. Among those such resources most frequently encountered are:

- A large collection of Smart Notebook-based lessons and activities available to elementary teachers. These are stored on a server accessible to all CET teachers and seem to be widely used.
- Brainpop, Brainpop Jr., YouTube, and other sources of web-based video
- Grolier's Online and other licensed reference databases
- Sammy's Science House, Millie's Math House, Raz-Kids, XtraMath, and other tutorial programs
- Quizlet for the creation of electronic flashcards (used both in school and at home)
- Edmodo social media for education (at the secondary level)
- Various programs and systems specific to music and foreign language instruction.

Support

Technology support is defined in Croton-Harmon's Infrastructure Indicator as being both technical and instructional. In terms of technical support, the district contracts with a technical support consultant that maintains equipment, administers the network, and provides technical support to the district.

Administrators interviewed by the evaluators noted that technical problems and maintenance are not a particular problem in schools. Teachers generally felt that technical support and maintenance was adequate, with a specific side note that many printers at CET are "broken".

While the district seems to be in good shape in terms of technical support, the same cannot be said for *instructional* support. Teachers – particularly those at CET – note that there is no one really available to provide assistance at the classroom level. Teachers at CET are clearly missing the "computer teacher" they had up until about three years ago, but as has been noted in the Teacher Skills/Pedagogy section above, teachers are truly looking for support and coordination of technology within their curriculum. At present, there appears to be no effective mechanism in place to instructionally support elementary teachers. The same situation exists at the secondary level, but teachers there do not seem to perceive of this as negatively as elementary teachers.[7]

It is clear that the district-wide Instructional Technology Specialist is working hard to provide a instructional support resource to teachers in all three schools. Further, it is clear that this is much appreciated assistance at all three schools. Unfortunately, one person cannot really cover three buildings with very different needs. While there is time to support individual projects, particularly at CET and the middle school, there is not time to provide the sort of on-going, job-embedded professional development necessary for teachers to meet the district's indicators for student and teacher skills and integration. Teachers are keenly aware of this situation, as the data and comments detailed in previous sections of this chapter shows. The evaluators also note that best practice calls for at least two Instructional Technology Support Specialists for a faculty the size of Croton-Harmon's (150).[8]

[7] The evaluators note that this is a typical finding in many school districts. Teacher demand for instructional technology support tends to diminish as a concern when one moves from elementary school to high school. Typically, the high school curriculum is sufficiently rigid so that teachers have identified the relatively few technologies they choose to integrate – e.g., graphing calculators, probeware, or simply word processors – and they then proceed to do it. Further, the department orientation of many high school faculties tends to offer a natural degree of peer support. Elementary, and often middle school, teachers tend to be looking for new strategies and approaches and therefore sense the need for "someone" to help feed these ideas into the classroom/instructional environment.

[8] The School Technology and Readiness (STaR) Chart – a set of benchmarks for schools to reach "advanced" states of technology readiness – calls for a 0.5 FTE Instructional Technology Specialist for every 30 to 60 district staff (teachers). The STaR Chart has been adopted by several states as set of non-binding guidelines for local technology planning. http://etac.tecedge.net/ provides details on Massachusetts' version of the STaR Chart.

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. For the most part, these recommendations represent very basic actions that the district could perform which would have significant ramifications on how the district performs in terms of meeting its indicators for Student Skills as well as Teacher Skills/Pedagogy.

These recommendations have been reviewed and refined with the Croton-Harmon technology evaluation committee in a meeting held on February 25, 2013.

Mapping Technology and Technology Skills to Croton-Harmon's Curriculum

The evaluators recommend that Croton-Harmon should engage teachers, the assistant superintendent, and the Instructional Technology Coordinator in the work of generating a truly comprehensive mapping of suggested student technology experiences onto grade level curriculum with a strong emphasis on truly student-centered -- not necessarily 1-1 -- project-based learning. Specifically, this mapping should be a living document that identifies key NETS-S based, student technology skills, dispositions and activities by grade level and then "maps" those experiences onto the district's academic curriculum. This would be an expanded (i.e., covering all grades and subjects) version of the current "Correlations". It is important that this work be accomplished by individuals (those roles stated above) who have a working knowledge of the district curriculum, state/national standards, NETS, and instructional technology strategies. This work is not about developing a "wish list" of skills or technologies or an idealized notion of how students will work in the future. Rather, the mapping should be a very concrete set of exemplars for how teachers can implement NETS within a solid curriculum-based context.

In addition to the expanded correlations – which is essentially a "scope and sequence" for meeting NETS-S – the district should weave the suggested technology-supported activities from the correlations into the existing and on-going Atlas curriculum-mapping work. In doing this, the emphasis should be on connecting technology-supported project-based learning activities to the various curriculum strands mapped. This is in contrast to how technology is typically reflected in the Atlas maps at present (i.e., as an information tool or resource). As reflected in the NETS standards, technology use should be at the center of curriculum activities, and not an ancillary "add-on" to traditional instructional activities.

Instructional Technology Support as Professional Development

There are a variety of models that support job embedded professional development. One model is the use of Instructional Technology Integration Specialists. Should the district explore this avenue, the evaluators recommend that the district should have an Instructional Technology Integration specialist *at each building*.[9] The function of these positions would be to provide job-embedded professional development (modeling, mentoring, instructional support) to teachers in each building around the

[9] Ideally, there would be three Instructional Technology Integration specialists, as the work of these positions will be different at each school. At minimum, there should be one specialist devoted to CET and another who works between the middle school and the high school.

implementation of the aforementioned curriculum map. The Instructional Technology Integration specialists would help spur the development of the maps, and the implementation of new pedagogies that fully integrate technology in the spirit of the NETS standards. Ideally, these new building-based positions would be in addition to the district-wide technology coordinator position, which could continue to focus on management of district-wide technology initiatives, data management, and overseeing the technical infrastructure. The district currently utilizes Curriculum Coordinators to provide teachers with ongoing instructional support. Given this current structure, the district might also consider using this Curriculum Coordinator model to support technology integration. The district might also consider using other coaching models to help foster the inquiry process with appropriate technology integration.

The evaluators note that the role of Instructional Technology Integration specialists (or whatever staffing model the district pursues) would be to engage staff in non-traditional (i.e., something other than "workshops") professional development that aims to *change the way that Croton-Harmon teachers teach*. This clearly has broader implications than simply helping teachers use more technology. In fact, "using technology" is not really the point of technology integration as articulated by the NETS. Rather, the NETS – and Croton-Harmon's student skills and teacher pedagogy indicators – are about achieving thinking and learning skills necessary for lifelong success. As this is the same overall "goal" as the district itself has, the Instructional Technology Integration specialists can be thought of as embedded, in-building, change agents who work to implement the district's broad professional development program.

Therefore, one of the main points of focus for the Instructional Technology Integration specialists should be in assisting teachers to implement the types of student-centered, project-based learning experiences that emphasize collaboration, critical thinking, creativity and communication (the so-called 4Cs) that are also central to student success in meeting new assessments and the Common Core.[10] This also, and for example, addresses what the evaluators find as one of Croton-Harmon teachers' main barriers to successful implementation of project-based learning and thus technology integration; that is, teachers' difficulty in fitting project based work into a concept of assessment that emphasizes empirical knowledge and individual student work product. Getting past this barrier will require time, modeling, and reflection. This is exactly the sort of support that the district should provide its teachers, and it can be delivered through the Instructional Technology Integration Specialists.

Articulate and Support a Clear and Unified Vision

As detailed in the Findings, the evaluators believe that there is at least the beginnings of a vision for instructional technology in Croton-Harmon schools. The good news is that this vision broadly aligns with the district's commitment to the role of inquiry, student-centered learning, and an orientation to student projects. Nevertheless, the alignment is not perfect, nor is it very deep. For example, as has been discussed, many teachers – and therefore students – still experience technology as an optional "add on" or tool which supports mostly mechanical tasks associated with locating information or presenting work products. Further, the degree to which "projects" figure in the curriculum varies from teacher to teacher, with many teachers channeling student project work down a very narrow, individual, path that produces very teacher-directed products. Some teachers understand projects to be rich, interdisciplinary, activities

[10] The evaluators note that as it becomes increasingly standard for school districts to retain staff who work as Instructional Technology Specialists or coaches, ISTE has developed a set of standards that describe the work of these individuals. This set of standards – the NETS-C (coaches) – is attached in the Appendix of this report.

that build higher order thinking skills. Other teachers seem to have a much more limited understanding of the practice -- one which is rather limited to the production of an individual work product that fits easily within existing assessment formats. The fact that there can be multiple definitions of technology integration or project-based-learning existing among teachers indicates that not everyone is onboard with the same vision.

There are many problems related to the lack of a commonly held, or unified, vision. One of the most basic problems as related to instructional technology is that different teachers will integrate technology to different degrees (and therefore with different results and different student experiences) depending on their own personal take on the vision. Not only does this create an inequitable experience for students, but it also engenders a situation where students do not progress equally in their technology skills. This makes it difficult for teachers to know what their students are capable of in terms of using technology, and therefore dissuades teachers from creating experiences that require the use of technology. Another result of this situation is that teachers tend to focus on "least common denominator" technology skills (often the use of basic applications such as word processors or the use of tutorial software), and this in turn brings parents to the conclusion that their students "do not do much with technology" other than type papers or "play games". In short, the lack of a common vision tends to inspire a downward spiral where less and less is done with technology and parents (and students) become less and less confident that technology plays a worthwhile role in the educational environment.

Clearly, the way out of this situation is to insure that there is a strong vision and that mechanisms are in place to support the vision. Specifically, the district needs a clear framework for technology use (the curriculum maps and correlations), and a professional development effort that supports the implementation of this framework. The existing vision expressed by the district's indicators should be sufficient to drive the development of the necessary supports for promoting widespread adoption of the vision.

IV. Appendices

NETS Standards

NETS - S

1. Creativity and Innovation

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

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

2. Communication and Collaboration

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

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

3. Research and Information Fluency

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

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

4. Critical Thinking, Problem Solving, and Decision Making

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

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

5. Digital Citizenship

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

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

6. Technology Operations and Concepts

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

a. Understand and use technology systems
b. Select and use applications effectively and productively
c. Troubleshoot systems and applications
d. Transfer current knowledge to learning of new technologies

NETS - T

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.

a. Promote, support, and model creative and innovative thinking and inventiveness
b. Engage students in exploring real-world issues and solving authentic problems using digital tools and resources
c. Promote student reflection using collaborative tools to reveal and clarify students' conceptual understanding and thinking, planning, and creative processes
d. Model collaborative knowledge construction by engaging in learning with students, colleagues, and others in 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.

a. Design or adapt relevant learning experiences that incorporate digital tools and resources to promote student learning and creativity
b. Develop technology-enriched learning environments that enable all students to pursue their individual curiosities and become active participants in setting their own educational goals, managing their own learning, and assessing their own progress
c. Customize and personalize learning activities to address students' diverse learning styles, working strategies, and abilities using digital tools and resources
d. Provide students with multiple and varied formative and summative assessments aligned with content and technology standards and use resulting data to inform learning and teaching

3. Model Digital Age Work and Learning

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

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

4. Promote and Model Digital Citizenship and Responsibility

Teachers understand and global societal issues and responsibilities in an evolving digital culture and exhibit legal and ethical behavior in their professional practices.

a. Advocate, model, and teach safe, legal, and ethical use of digital information and technology, including respect for copyright, intellectual property, and the appropriate documentation of sources
b. Address the diverse needs of all learners by using learner-centered strategies providing equitable access to appropriate digital tools and resources
c. Promote and model digital etiquette and responsible social interactions related to the use of technology and information
d. Develop and model cultural understanding and global awareness by engaging with colleagues and students of other cultures using digital age communication and collaboration tools

5. Engage in Professional Growth and Leadership

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

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

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

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

ISTE NETS Essential Conditions

Necessary conditions to effectively leverage technology for learning.

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

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)

District NETS-S/Elementary Curriculum Correlation

Kindergarten

1. Illustrate and communicate original ideas and stories using digital tools and media-rich resources. (1,2)	• Create number stories (addition and subtraction) in Kidpix and Smart Notebook • Create picture webs using Kidspiration, Inspiration and Smart Notebook • Create and illustrate project report covers, diagrams and journal pages using Kidpix and Smart Notebook • Identify and create patterns using Investigations Shapes
2. Identify, research, and collect data on an environmental issue using digital resources and propose a developmentally appropriate solution. (1, 3, 4)	• Think like a Scientist: Sort, classify and use the five senses to investigate the Hudson River. • Use of interactive activities in Smart Notebook • Create living/nonliving bookmark in Inspiration • Research in Sammy's Science House • Use a digital camera to collect data on the life cycle of a chicken. • Online jigsaw puzzles www.jigzone.com • www.pebblego.com • www.brainpopjr.com • www.pnwboces.org/science21
3. Engage in learning activities with learners from multiple cultures through email and other electronic means. (2,6)	• N/A (District does not have video conferencing and does not use email in K)
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)	• Use document camera (Elmo) to display student work • Use software such as Smart Notebook, PhotoStory, Inspiration, Kidspiration, Brainpop. • Use digital photo prompts for writing exercises. • Group Slideshows, reading buddies
5. Find and evaluate information related to a current or historical person or event using digital resources. (3)	• Use of www.brainpopjr.com for topics such as Martin Luther King Jr., Flag Day, Labor Day, Earth day, President's Day. • www.google.com

	• www.pnwboces.org/ssela • Digital photos to interview community members
6. Use simulations and graphic organizers to explore and depict patterns of growth such as the life cycles of plants and animals. (1,3,4)	• Kidspiration • Chick video • www.pebblego.com • www.brainpopjr.com • www.pnwboces.org/science21 • www.pnwboces.org/ssela
7. Demonstrate safe and cooperative use of technology. (5)	• Computer lab procedures • Identify computer parts • Appropriate behaviors within the lab • Cyber citizenship • www.netsmarts.org, • www.ikeepsafe.org/iksc_kids/ • www.brainpopjr.com Parts of a computer and internet safety • www.headsprout.com (Mousing around) • REACH acronym in relationship to technology
8. Independently apply digital tools and resources to address a variety of tasks and problems. (4,6)	• Use a variety of software including but not limited to: Millie's Math House, Mighty Math Carnival Countdown, Investigations, www.onemorestory.com, www.starfall.com, Tenth Planet Literacy series • School eChalk class page resources • Trouble shooting of navigation skills.
9. Communicate about technology using developmentally appropriate and accurate terminology. (6)	• Review District Acceptable Use Policy (AUP) • Login procedures • Opening and closing programs • Differentiate between installed programs and online resources • Use peripheries (headsets, microphones) • www.headsprout.com (Mousing around) • Online alphabet activities • Navigate online resources • Navigate installed programs • Introduction to KidKeys 2
10. Demonstrate the ability to navigate in	• www.onemorestory.com

virtual environments such as electronic books, simulation software, and websites. (6)	• www.starfall.com • Use a variety of software including but not limited to: Millie's Math House, Mighty Math Carnival Countdown, Investigations, Tenth Planet Literacy series • Echalk class page resources

1st Grade

1. Illustrate and communicate original ideas and stories using digital tools and media-rich resources. (1,2)	• Create number stories (addition and subtraction) in Kidpix and Smart Notebook • Create picture webs using Kidspiration, Inspiration and Smart Notebook • Create Slideshow stories in Kidpix based on Family Traditions/ holidays • Create and illustrate project report covers, diagrams and report/journal pages using Kidpix and Smart Notebook • Identify and create patterns using Investigations Shapes
2. Identify, research, and collect data on an environmental issue using digital resources and propose a developmentally appropriate solution. (1, 3, 4)	• Enter and analyze data on Graph Club • Solve a mystery and identify coordinates and compass directions in Neighborhood Map machine and Zap Around Town • Investigate the Hudson River: Think like a scientist: sort, classify and organize living and non-living things. Use activities in Smart Notebook and/or Word, and Inspiration and/or Kidspiration • Use a digital camera and/or photos to identify and collect data during, but not limited to the following: Hudson River trips, Teatown Maple Sugaring trip, CET nature trail • Bald eagle webcam/essential habitat • Bald eagle diagram activity • Research on the web using the following websites: • www.pebblego.com • www.brainpopjr.com • www.pnwboces.org/science21 • www.pnwboces.org/ssela

3. Engage in learning activities with learners from multiple cultures through email and other electronic means. (2,6)	• Students create Family Traditions illustrations in Kidpix representing their cultures/traditions and share them. • (District does not use video conferencing or email in 1st grade.)
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)	• Use document cameras (Elmo) to display student work. • Create a poster, magazine, journal, report cover or other print material using software such as Smart Notebook, Photo Story, Inspiration, Kidspiration, Brainpopjr • Use digital photo prompts for writing exercises • Group Slideshows, Reading buddies
5. Find and evaluate information related to a current or historical person or event using digital resources. (3)	• www.brainpopjr.com videos and quizzes/assessments for topics such as Christopher Columbus, Martin Luther King Jr., George Washington, Flag Day, Labor Day, Earth day, President's Day • www.google.com • www.enchantedlearning.com • www.pnwboces.org/ssela • Digital Photos/Flip Videos to interview community members
6. Use simulations and graphic organizers to explore and depict patterns of growth such as the life cycles of plants and animals. (1,3,4)	• www.kidspiration.com • www.pebblego.com • www.brainpopjr.com • www.pnwboces.org/science21 • www.enchantedlearning.com • Hermit Crab Video • Bald Eagle Webcam and videos • Use Venn diagrams and graphic organizers for a variety of topics including but not limited to character studies, story element webs and needs and wants.
7. Demonstrate safe and cooperative use of technology. (5)	• Computer lab procedures • Identify computer parts • Appropriate behaviors within the lab • Cyber citizenship • www.netsmarts.org, • www.ikeepsafe.org/iksc_kids/ • www.brainpopjr.com : Parts of a computer

	and Internet safety • www.headsprout.com ("Mousing Around" as needed) • REACH acronym in relationship to technology
8. Independently apply digital tools and resources to address a variety of tasks and problems. (4,6)	• Use a variety of software including but not limited to: Millie's Math House, Mighty Math Carnival Countdown, Investigations, Neighborhood Map machine, Zap Around Town, Kidpix, Kidspriation, www.onemorestory.com, www.starfall.com, Tenth Planet Literacy series, Memory Fun and Sequencing Fun. • School echalk class page resources • KidKeys 2 • Orchard Math Assessment
9. Communicate about technology using developmentally appropriate and accurate terminology. (6)	• Review district acceptable use policy (AUP) • Login procedures • Differentiating between installed programs and online resources. • Review using peripheries (headsets, microphones) • Navigating online resources • Navigating installed programs • Practice KidKeys 2
10. Demonstrate the ability to navigate in virtual environments such as electronic books, simulation software, and websites. (6)	• Use a variety of software including but not limited to: Millie's Math House, Mighty Math Carnival Countdown, Investigations, Tenth Planet Literacy series, www.onemorestory.com, www.starfall.com • School echalk class page resources

2nd Grade

1. Illustrate and communicate original ideas and stories using digital tools and media-rich resources. (1,2)	• Fractured Fairy Tales documented with photographs or PhotoStory 3. • Create picture webs using Kidspiration, Inspiration and/or Smart Notebook. • Create and illustrate project report covers, diagrams and report/journal pages using MS Word or Publisher (i.e. Frog unit).

	• Digital Yearbook using PhotoStory 3
2. Identify, research, and collect data on an environmental issue using digital resources and propose a developmentally appropriate solution. (1, 3, 4)	• Research on the web: Communities: Identify and evaluate characteristics of urban, suburban and rural communities using Google earth, Smart Notebook and web resources. Create maps in Neighborhood Map Machine. • Use a digital camera and/or photos to identify and collect data • Enter and analyze data on Graph Club • Research on the web: frog life cycle, US symbols, government, wants and needs, goods and services, biographies • www.pebblego.com • www.brainpopjr.com • www.pnwboces.org/science21 • www.pnwboces.org/ssela
3. Engage in learning activities with learners from multiple cultures through email and other electronic means. (2,6)	• Students explore, identify, compare and contrast lifestyles across rural, urban and suburban cultures using web resources. • www.brainpopjr.com • www.google.com • (District does not use video conferencing or email in 2nd grade.)
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)	• Use document cameras (Elmo) to display student work. • Create a poster, magazine, journal, report cover or other print material using software such as MS Word, MS Publisher, PhotoStory 3, Inspiration, Kidspiration. • Use digital photo prompts for writing exercises. • Group slideshows, reading buddies • Use of flip videos to film student collaboration and problem solving
5. Find and evaluate information related to a current or historical person or event using digital resources. (3)	• www.brainpopjr.com for topics such as Christopher Columbus, Martin Luther King Jr., George Washington, Flag Day, Labor Day, Earth day, President's Day. • www.google.com • www.enchantedlearning.com • www.pnwboces.org/ssela • Digital photos/Flip videos to interview

	community members
6. Use simulations and graphic organizers to explore and depict patterns of growth such as the life cycles of plants and animals. (1,3,4)	• Document the life cycle of plants and frogs • Use Venn diagrams and graphic organizers for a variety of topics including but not limited to math and ELA. • www.kidspiration.com • www.pebblego.com • www.brainpopjr.com • www.pnwboces.org/science21 • www.enchantedlearning.com
7. Demonstrate safe and cooperative use of technology. (5)	• Computer lab procedures • Appropriate behaviors within the lab • Cyber citizenship • www.netsmarts.org, • www.ikeepsafe.org/iksc_kids/ • www.brainpopjr.com Videos: parts of a computer and Internet safety • REACH acronym in relationship to technology
8. Independently apply digital tools and resources to address a variety of tasks and problems. (4,6)	• Use a variety of software including but not limited to: Key Skills, Kid Keys 2, Investigations, Neighborhood Map machine, Zap Around Town, Kidpix, Kidspiration, Smart Notebook, MS Word and MS Publisher, Graph Club 2 • School echalk class page resources • www.google.com • www.pebblego.com • Orchard Math Assessment
9. Communicate about technology using developmentally appropriate and accurate terminology. (6)	• Review district acceptable use policy (AUP) • Login procedures • Differentiate between installed programs and online resources • Review using peripheries (microphones) • Navigate online resources using key words • Navigate installed programs • Practice appropriate usage of keyboarding programs • Learn appropriate usage of Digital cameras and Flip Videos
10. Demonstrate the ability to navigate in	• Use district installed software as well as a

virtual environments such as electronic books, simulation software, and websites. (6)	variety of web resources such as google.com, scholastic.com, Ask.com and yahoo.com • School echalk class page resources • Differentiate between Google web search and Google image search

3rd Grade

1. Creativity and Innovation Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology. Students: a. Apply existing knowledge to generate new ideas, products, or processes b. Create original works as a means of personal or group expression c. Use models and simulations to explore complex systems and issues d. Identify trends and forecast possibilities	• Create a project written in Word, such as poetry journals, and import to Publisher. Clip art and Google images will also be imported. • Use of various SmartBoard activities specific to curriculum topics • Use of various websites specific to curriculum topics • Utilize PhotoStory 3 and cameras to create a digital story; for example a science experiment, making igloos, etc. • Utilize Microsoft Paint to create Halloween masks • Create graphs using www.CreateaGraph.com using multiple sets of data
2. Communication and Collaboration Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others. Students: a. Interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media b. Communicate information and ideas effectively to multiple audiences using a variety of media and formats c. Develop cultural understanding and global awareness by engaging with learners of other cultures d. Contribute to project teams to produce original works or solve problems	• Create a project written in Word, such as poetry journals, and import to Publisher. Clip art and Google Images will be imported. • Utilize Photo Story 3 and cameras to create a digital story for example a science experiment, making igloos, etc. • Use of various SmartBoard activities specific to curriculum topics • Use of various websites specific to curriculum topics • REACH acronym in relationship to technology

3. Research and Information Fluency Students apply digital tools to gather, evaluate, and use information. Students: a. Plan strategies to guide inquiry b. Locate, organize, analyze evaluate, synthesize, and ethically use information from a variety of sources and media c. Evaluate and select information sources and digital tools based on the appropriateness to specific tasks **d.** Process data and report results	• Create a project written in Word, such as poetry journals, and import to Publisher. Clip art and Google images will be imported. • Utilize Photo Story 3 and cameras to create a digital story for example a science experiment, making igloos, etc. • Research land forms on the internet, type in Word, and import to Publisher or PowerPoint. • http://streaming.discoveryeducation.com • www.brainpop.com • www.pnwbocws.org/ssela • www.pnwboces.org/science • www.googleearth.com • www.Type2Learn.com • Create graphs using www.CreateaGraph.com • Use of various Smart Board activities specific to curriculum topics • Use of various websites specific to curriculum topics
4. **Critical Thinking, Problem Solving, and Decision Making** Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources. Students: a. Identify and define authentic problems and significant questions for investigation b. Plan and manage activities to develop a solution or complete a project c. Collect and analyze data to identify solutions and or make informed decisions d. Use multiple processes and diverse perspectives to explore alternative solutions	• Create a project written in Word, such as poetry journals, and import to Publisher. Clip art and Google images will be imported. • Utilize Photo Story 3 and cameras to create a digital story ; for example a science experiment, making igloos, etc. • Create graphs using www.Create aGraph.com • www.RAZkids.org • www.pearsonsuccessnet.com • http://streaming.discoveryeducation.com • www.brainpop.com • www.keyskills.com • Orchard math assessment • Use of various Smart Board activities specific to curriculum topics • Use of various websites specific to curriculum topics
5. **Digital Citizenship** Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior. Students: a. Advocate and practice safe, legal, and responsible use of information	• Review and discussion of the AUP • Lessons reviewing the definitions of copyright and plagiarism • Lessons identifying legitimate websites and verifying information • REACH acronym in relationship to technology

and technology b. Exhibit a positive attitude toward using technology that supports collaboration, learning, and productivity c. Demonstrate personal responsibility for lifelong learning d. Exhibit leadership for digital citizenship	
6. **Technology Operations and Concepts** Students demonstrate a sound understanding of technology concepts, systems, and operations. Students: a. Understand and use technology systems b. Select and use applications effectively and productively c. Troubleshoot systems and applications d. Transfer current knowledge to learning of new technologies	• Create a project written in Word, such as poetry journals, and import to Publisher. Clip art and Google images will be imported. • Utilize Photo Story 3 and cameras to create a digital story ; for example a science experiment, making igloos, etc. • www.RAZ kids.com • Use of various Smartboard activities specific to curriculum topics • Use of various websites specific to curriculum topics • Create graphs using www.CreateaGraph.com

4th Grade

1. Creativity and Innovation Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology. Students: e. Apply existing knowledge to generate new ideas, products, or processes f. Create original works as a means of personal or group expression g. Use models and simulations to explore complex systems and issues h. Identify trends and forecast possibilities	• Create a Native American bookmark in Word and import into Publisher which tells a story with pictures • Create a non-fiction newspaper article written in Word, and import into Publisher. Clip art and Google Images will be imported • Use of various SmartBoard activities specific to curriculum topics • Use of various websites specific to curriculum topics • Create poems and cards using Word and import graphics, clip art and Google images • www.wordle.net • Create a Memory Book page in Word, import into Publisher, and import photos

2. Communication and Collaboration Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others. Students: e. Interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media f. Communicate information and ideas effectively to multiple audiences using a variety of media and formats g. Develop cultural understanding and global awareness by engaging with learners of other cultures h. Contribute to project teams to produce original works or solve problems	• Create "character cards" and "bio cubes" using Read, Write, Think.org • Create a Native American bookmark using a Word document import into Publisher • Create vocabulary books (based either on social studies or word work curriculum). These projects will be created in Word, and then imported to PowerPoint using animation, clip art, Google Images and voice overs. • Use of various SmartBoard activities specific to curriculum topics • Use of various websites specific to curriculum topics • Create a Memory Book page in Word, import into Publisher, and import photos • REACH acronym in relationship to technology
3. Research and Information Fluency Students apply digital tools to gather, evaluate, and use information. Students: e. Plan strategies to guide inquiry f. Locate, organize, analyze evaluate, synthesize, and ethically use information from a variety of sources and media g. Evaluate and select information sources and digital tools based on the appropriateness to specific tasks h. Process data and report results	• Create a non-fiction newspaper article written in Word, and import to Publisher. Clip art and Google Images will be also imported. • Create vocabulary books (based either on social studies or word work curriculum). These projects will be created in Word, then imported to PowerPoint using animation, clip art, Google images and voice overs • http://streaming.discoveryeducation.com • www.brainpop.com • www.pnwbocws.org/ssela • www.pnwboces.org/science • www.Type2 Learn.com • Use of various SmartBoard activities specific to curriculum topics • Use of various websites specific to curriculum topics • Use of graphic organizers to outline information • Create Excel spreadsheets and then create graphs based on that information

	• Research and take notes on a specific topic to determine the important facts and formulate a paragraph with a topic sentence.
4. **Critical Thinking, Problem Solving, and Decision Making** Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources. Students: e. Identify and define authentic problems and significant questions for investigation f. Plan and manage activities to develop a solution or complete a project g. Collect and analyze data to identify solutions and or make informed decisions h. Use multiple processes and diverse perspectives to explore alternative solutions	• Create a non-fiction newspaper article written in Word, and import to Publisher. Clip art and Google images will also be imported. • Create vocabulary books (based either on social studies or word work curriculum). These projects will be created in Word, imported to PowerPoint using animation, clip art, Google images and voice overs. • www.RAZkids.org • www.pearsonsuccessnet.com • http://streaming.discoveryeducation.com • www.brainpop.com • Orchard math assessment • Use of various SmartBoard activities specific to curriculum topics • Use of various websites specific to curriculum topics • Use of keywords in search engines • Use of graphic organizers to outline information • Create Excel spreadsheets and then create graphs based on that information • Research and take notes on a specific topic to determine the important facts and formulate a paragraph with a topic sentence.
5. **Digital Citizenship** Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior. Students: e. Advocate and practice safe, legal, and responsible use of information and technology f. Exhibit a positive attitude toward using technology that supports collaboration, learning, and productivity g. Demonstrate personal responsibility for lifelong learning h. Exhibit leadership for digital citizenship	• Review and discussion of the AUP • Lessons reviewing the definitions of copyright and plagiarism • Lessons identifying legitimate websites and verifying information • REACH acronym in relationship to technology

6. **Technology Operations and Concepts** Students demonstrate a sound understanding of technology concepts, systems, and operations. Students: e. Understand and use technology systems f. Select and use applications effectively and productively g. Troubleshoot systems and applications h. Transfer current knowledge to learning of new technologies	• Create a non-fiction newspaper article written in Word, and import to Publisher. Clip art and Google images will also be imported. • Create vocabulary books (based either on social studies or word work curriculum). These projects will be created in Word, imported to PowerPoint using animation, Clip Art, Google Images and voice overs. • www.RAZkids.com • Use of various SmartBoard activities specific to curriculum topics • Use of various websites specific to curriculum topics • Create a Memory Book page in Word, import into Publisher, and import photos • Create Excel spreadsheets and create graphs based on that information

Data Collection Instruments

Surveys

Teacher Survey - http://www.sun-associates.com/croton/chufsdteacher.html
Parent Survey - http://www.sun-associates.com/croton/chufsdparent.html
Student Survey - http://www.sun-associates.com/croton/chufsdstudent.html

Principal Questions

(opening text) This interview is part of Croton's evaluation of how instructional technology is used to support teaching and learning in the district. Sun Associates has been tasked with conducting this evaluation. In addition to this focus group, we have conducted an online survey and will be visiting all classrooms in the school. We are also conducting teacher and parent focus groups. Ultimately, this evaluation will be reported to the district by the end of this school year

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 is does what you feel is a exemplary job of integrating technology as an aid in student learning?

2. How typical is this for the teachers in the school?

3. What's your vision for the role of technology in the school?

4. To what extent do you feel that your teachers have the skills to use technology in the way that you envision?

5. What barriers exist to realizing this environment/vision? (probe for PD, resources, policies, skills/knowledge, etc.)

6. What sorts of policies have you – and/or the district – put into place to support the integration of technology?

7. Anything else you want to tell us about your work, resources, or other factors impacting the use of technology in teaching and learning?

Teacher Focus Group Questions

(opening text) This focus group is part of Croton's evaluation of how instructional technology is used to support teaching and learning in the district. Sun Associates has been tasked with conducting this evaluation. In addition to this focus group, we have conducted an online survey and will be visiting all classrooms in the school. We are also interviewing principals. Ultimately, this evaluation will be reported to the district by the end of this school year

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. 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. Please describe an actual lesson or activity from your classroom that incorporates technology.

2. What value does technology bring to the learning in this activity?

3. Can you describe your vision for how technology can ideally support learning?

4. Can you identify any elements of the environment in Croton-Harmon schools (thinking about your school specifically as well as generally in the district) that you feel specifically support or detract from your ability as a teacher to integrate technology within your instructional environment?

5. To what extent do you feel that your students have the skills (attitudes, dispositions, ???) necessary for using technology in a meaningful way in the classroom? (prompt for info literacy)

6. Anything else you want to tell us about your work, resources, or other factors impacting the use of technology in teaching and learning?

Parent Focus Group Questions

(opening text) This focus group is part of Croton's evaluation of how instructional technology is used to support teaching and learning. Sun Associates has been tasked with conducting this evaluation. In addition to this focus group, we have conducted an online survey of parents and teachers and have visited all classrooms in the school. Ultimately, this evaluation will be reported to the district this spring.

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. 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. As a way of getting started, could you give me an example of something that you can recall your student doing this year that you feel did an exemplary job of integrating technology as an aid in student learning?

(ask them to be specific about the value that technology brings to the learning process)

2. In general, what sorts of student learning skills *do you believe* are fostered by the use of technology?

3. What do you believe is the best way for students to utilize technology within the context of learning?

(Find out how well – or not – the district has supported this vision)

4. What barriers are you aware of that might exist to realizing this environment/vision?

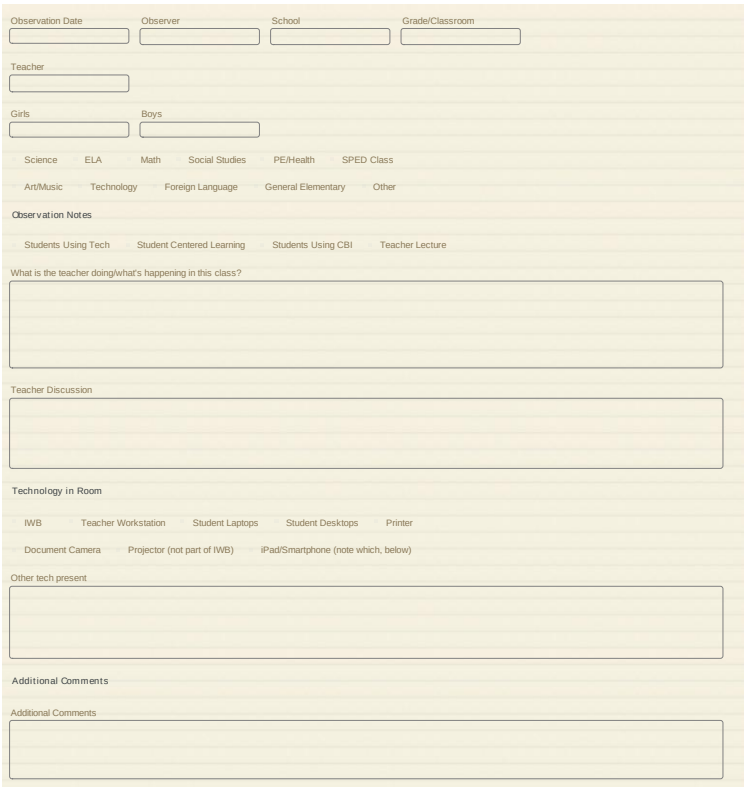
(probe for teacher skills, resources, etc.)

5. To what extent to you feel that teachers here have the skills (technology and otherwise) to create types of learning environments feel need to be created?

6. Thinking about your child's experience in Croton-Harmon schools, do you feel that his/her exposure to technology-supported learning has been more or less consistent throughout the years? Why or why not?

7. Anything else you want to tell us about your child's experience around technology integration or the use of technology in school?

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

Students Using Tech | Student Centered Learning | Students Using CBI | Teacher Lecture

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