Ipswich Public Schools: Educational Technology Plan (2014-2019)

June 1, 2014

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Acknowledgements

Special thanks to the following educators for their help in developing this plan:

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Students

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Technology Committee

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Ipswich Technology Plan 2014-2019

Section I: Overview

Ipswich Public Schools' Technology Plan outlines the district's vision and goals for the use of technology to engage students and teachers in powerful learning for the period of 2014-2019. This plan serves several purposes:

- It documents the steps the District has taken to meet its goals and vision for teaching and learning supported by technology
- It outlines key areas, such as professional development, that are necessary for successful use of technology to help students become, not simply consumers of information, but producers of knowledge
- It offers a set of recommendations to maximize the benefits of technology to enhance teaching and learning in Ipswich schools.
- It focus on key teaching and learning competencies supported by technology in all curricular areas and encourages the development of behaviors and competencies that will increase student success in today's global society. **Note:** *This plan does not have. Will need to be developed.*

A.   About Ipswich

The town of Ipswich, incorporated in 1634, is located in Essex County in northeastern Massachusetts. It was founded by John Winthrop the Younger, son of John Winthrop, one of the founders of the Massachusetts Bay Colony and its first governor. Its approximately 13, 175 residents[1] live on 32 square miles. Ipswich is drained by the Ipswich River and Plum Island Sound, which join and empty through a narrow but navigable channel at the foot of Castle Hill around Sandy Point into Ipswich

Figure 1: Ipswich, Massachusetts

Bay adjoining the Atlantic Ocean. The town may be most well-known for Crane Beach, considered one of the most beautiful beaches on the East Coast of the United States, and a critical breeding ground for the endangered piping plover. Ipswich has an Open Town Meeting form of government with an appointed Town Manager.

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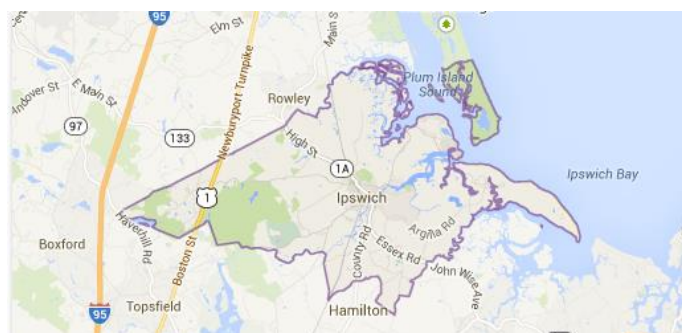
[1] Based on the 2010 Census.

B. School District Profile

Ipswich Public Schools is comprised of four schools—two elementary (Paul F. Doyon Memorial School and Winthrop Elementary School), a middle school and a high school. Thumbnail images of each school are seen in the image below. There are approximately 2013 students, 176 teachers, and 205 additional school staff in the district (Carleton, 2014).

The Central Office includes a Superintendent, Director of Finance and Operations, and a Director of Pupil Personnel Services. The curriculum is managed by Subject Area Committees chaired by teachers. Classroom teachers serve on curriculum teams thereby having an integral impact on curriculum and instruction. The district superintendent is Dr. William Hart.

C.   Instructional Philosophy

The goal of Ipswich Public Schools is to equip students to compete for jobs in the 21st century while also developing in each student an appreciation for life and a motivation to reach a level of excellence in each task undertaken. Teachers, administrators and staff work together to cultivate the intellectual, social, and physical growth of all students, as well as to instill life-long habits of inquiry and thinking so that each may constructively participate in our ever-changing world.

With parent and community support, the Ipswich Schools are working to afford students the opportunity to pursue their individual aspirations by providing them with the knowledge, skills and motivation to successfully compete for jobs in the 21st century and, at the same time, assuring students retain an appreciation for the environment with which they are entrusted.

Ipswich Schools offer advanced placement courses at the high school and enrichment programs for academically gifted students at the elementary and middle schools. Ipswich students at all levels have been among the most recognized in the state in music, art, and drama competitions. At the same time, 88% of Ipswich high school graduates go on to higher education.

In the Ipswich 21st century classroom, from kindergarten to 12th grade, classroom technology is combined with student-centered instruction to promote problem solving and critical thinking, rather than simple fact-based memorization.

D. District Technology Teams

Technology issues and recommendations are derived from two groups within the school district.

Technology Committee: The Technology Committee is comprised of teachers, principals, parents and members of the IT staff. Its mission is to support the implementation of the District Technology Plan by bringing together teachers, principals and IT staff to review, modify, create, and support District policies and procedures around technology. The Technology Committee does the following:

1. It meets regularly to provide the informational and instructional departments an opportunity to collaborate on determining the technology needs of the District.
2. It communicate policies and procedures to staff and parents via departmental representatives
3. It advises the superintendent on decisions around technology.
4. It examines and addresses technology-related policies and procedures on a continual basis to address instructional needs.

Technology Advisory Group: The Technology Advisory Group (TAG) is an *ad hoc* committee comprised of residents of Ipswich with professional experience in the technology industry. The TAG provides guidance and recommendations on school technology decisions including policies, acquisition and implementation. The TAG meets twice monthly with the school Director IT and Superintendent.

Section II: Technology for Teaching and Learning

A. "Technology" Defined

"Educational technology" or "technology," involves far more than computers or the Internet. It may include such diverse technologies as videoconferencing, digital television, interactive whiteboards, and gaming. Increasingly "technology" includes small, portable devices such as tablets, MP3 players, gaming devices, Smart- and cell phones, probes and graphing calculators. What all have in common is that they are tools that allow users to gather information, analyze, display, communicate and collaborate around that information.

B. Technology's Effectiveness

Technology is indispensable in the world of higher education and work. As such, Ipswich schools must prepare students to master the digital tools they will be expected to use as part of their continuing education and professional careers.

However, as indispensable as technology is, it is important to recognize that there is no longitudinal, irrefutable body of evidence that states that technology *alone* improves learning. Many highly-touted applications and software show no "measurable impact" on or "no significant difference" in student learning. Indeed, some research demonstrates *negative* impacts of technology on student learning. Such a statement should not be interpreted as an argument against investing in instructional technology. Rather the statement should be interpreted as a cautionary one: technology is not a "silver bullet" of educational or instructional reform. The hard work of school improvement still rests with human beings. As a tool, each type of technology offers its share of benefits and drawbacks; therefore, the use of technology must always be matched to specific and appropriate student learning outcomes.

> *Most of us enjoy technology. We get more involved with learning through technology. It is more exciting; easier to type than write; easier to see and hear; easier to understand, versus the teacher explaining. I can read my typing. I don't lose stuff. You can share easier. I can present things to more people. It makes everything more personal. If I don't understand I can go back to it and look at it later or again and again. When teachers explain, they talk but they don't spend a lot of time on one thing. With technology everything is much more organized.*
>
> Middle-school student

Despite the lack of conclusive research on technology's overall effectiveness, research points to several benefits of technology as a teaching and learning tool. These are noted here since they guide the formation of this technology plan.

First, technology can, *under the right set of conditions*, enhance teaching. Visualization tools, like Interactive Whiteboards, make visible and concrete complex and abstract data (Marzano, 2009). Digitally archived historical information and photographs can augment and invigorate the print-based information of textbooks. The Internet can connect students and teachers with online courses, classrooms and colleagues across the globe.

Technology can also, under the right conditions, positively benefit multiple dimensions of the student learning experience—enhancing students' communicative, social, analytical and creative capacities. Word-processing, for instance, if part of the writing process (drafting, revising and rewriting), can help students improve composition skills (Russell, 2004). Text-to-speech applications make available otherwise inaccessible content to visually impaired students. Simulation software allows students to partake in experiences that would otherwise be physically impossible or financially prohibitive. Online assessment systems allow teachers to check for student understanding in order to immediately apply corrective action such as re-teaching, peer instruction or individualized tutoring. These are but a few of the benefits of technology when targeted toward specific learning outcomes and tasks.

Second, there is no one "right" type of technology for use in teaching and learning. Indeed, teachers' objectives for students' computer use often vary by the subjects they teach (Becker, *et al.* 1999) and by their instructional objectives. Social studies and teachers of mixed academic subjects may be more interested in students researching ideas while language teachers may more likely to be interested in students expressing themselves in writing. In contrast, science and math teachers may be more focused on "mastery" of skills and thus more likely to select games, Computer Aided Instruction, or particular "Office" applications (databases and spreadsheets) to help students master such skills. Teachers who have more than one instructional objective may use a greater variety of applications. For example, those interested in having students research ideas and information and express new understanding based on such information may not only have students use online reference applications and Internet search engines—two applications naturally associated with information retrieval (Becker, *et al.* 1999)—but social media tools, publishing software, or video.

Third, there is also no "right" age at which to begin using technology. Research (Wenglinsky, 2005) concludes that technology is beneficial when it is developmentally appropriate for the students who use it. The optimal role of technology for high school students is different from its optimal role with younger students. High school students benefit from using generic technology-driven processes across subject areas, rather than the subject-specific applications needed at the primary and junior secondary levels. Young learners benefit from multimedia and visually-based technologies far more than they do from text-based applications.

Fourth, there are trade-offs when deciding whether students should use technology collaboratively or individually. Students who work in groups at the computer have been found to interact more with their peers, use more appropriate learning strategies, and

persevere more on instructional tasks. Students who work individually at the computer have been found to spend more time actually engaged with the software and complete their assignments more quickly, but require more help from the teacher (Sivin-Kachala & Bialo, 2000).

Finally, and most critically, technology provides learning benefits when its use is coupled with what research has identified as best practices in instruction and assessment—learner-centered; inquiry-based or problem-based instruction; deep questioning techniques; peer instruction; diagnostic assessments that measure what children know and that help teachers tailor instruction to begin at their same "starting point;" differentiating instruction and learning tools based on students' level of understanding; using formative assessment to take the measure of student understanding and revising instruction based on this; checking for student understanding; and developing students' expressive, reflective, analytic and creative capacities through discussion and open-ended writing.

The fundamental rationale for placing technology in schools rests on a belief that it is an instrument of reform—that technology can qualitatively enhance the teaching and learning process. Decades of false starts, hits and misses and lessons learned about technology reveal a more fundamental truth: Improvements in student learning only occur as a consequence of improvements in the level of content, teachers' content knowledge and instructional skills and levels of student engagement. This relationship of the teacher and student in the presence of content is what City & Elmore (2010:23) call "the instructional core." Any innovation that aims to improve "schooling" must fundamentally improve and alter this instructional core.

C. Summary

The dominant theme that emerges from the research on technology in education is that content, instruction, assessment and sound policies, practices and support matter far more than the kind of device, the software suite, or the teacher's technology skills. As research and experience inform us, technology "works" when it supports student learning outcomes and when it is used to deepen content knowledge, instruction and assessment. Successful use of technology—helping students learn in ways are measurably better or that would otherwise be impossible—still depends, not on boxes, bandwidth and wires, but on that most fundamental classroom transaction—good instruction.

Section III: Technology, Teaching and Learning in Ipswich Public Schools

A.   A Vision for Teaching and Learning

Ipswich School's vision of teaching and learning focuses on two sets of student competencies.

The first is essential knowledge. In this arena, Ipswich Public Schools will develop in students mastery in the academic content and skills that are grounded in academic disciplines.

> *I want to see kids producing—versus what they are doing right now which is consuming information that other people have created. Right now teachers teach and students consume. By producing I mean research, develop existing information, and create an argument for change. Take raw material of information and turn it into a finished product infused with their own analysis, synthesis of multiple sources of info, and their own creativity and point of view.*
>
> Principal

The **second** set focuses on cultivating students' successful "habits of mind." These behaviors and dispositions "cut across" academic disciplines and include:

- **Collaboration:** Students will be able to work together toward a common goal; demonstrate mutual respect; listen actively; seek to understand perspectives different from their own; demonstrate flexibility in decision-making; and share responsibility for group success.
- **Communication:** Students will be able to read and listen for understanding; express themselves in various modes with precision and clarity (writing, speaking, artistic and non-verbal communication); make clear and logical arguments; respond to the various demands of an audience; and communicate interpersonally in synchronous and asynchronous modes.
- **Creativity:** Students will be able to use flexible thinking; imagine possibilities; engage in exploratory behavior; make use of, adapt or challenge existing structures; develop novel ways of thinking and expression.
- **Critical thinking:** Students will be able to incorporate problem solving; reason abstractly and quantitatively; use prior knowledge and integrate new information; use logic to develop strategies and make judgments and decisions; analyze and evaluate other points of views; and use appropriate tools strategically.
- **Self-management:** Students will be able to self-assess accurately; set personal goals; monitor personal progress; exhibit self-control; manage time and materials; demonstrate organizational skills; and set priorities

- **Perseverance:** Students will be able to persist in completing a task; develop and maintain stamina; overcome challenges and obstacles; manage pressure and setbacks; maintain an optimistic outlook when facing lengthy or uncomfortable challenges; and take responsible risks.

Throughout the student's career in Ipswich Public Schools, we will see constant interplay between these two sets of competencies. Foundational essential knowledge competencies must be met early on in students' tenure at the school, whereas other essential knowledge requirements, such as writing, research projects, or physical fitness, are embedded throughout the curriculum. Other competencies can be mastered earlier or later in a students' individual path depending on individual aptitudes and interests.

The role of teachers: Within such a learning environment, *teachers* do most of their work and thinking *prior* to entering the classroom. While in the classroom they combine some elements of explicit instruction around these habits of mind. They create learning experiences in which students are engaged in differentiated learning experiences, use performance-based assessments to redirect instruction and learning for students; and engage students in project-based learning activities that solve real-world challenges.

The role of students: Within such a learning environment, *students* are clear on what the learning objectives are; clear on the standards for content and habits of mind acquisition; know where they are in the continuum of growth; and work individually and in small groups with the teacher probing and supplying resources as needed.

The role of technology: Within such a learning environment, *technology* plays a diverse and multi-faceted role. It deepens and extends the above habits of mind. It is used to find, enrich, and furnish content and serves as a research, writing, problem-solving and creativity tool. It functions as a medium for communicating and collaborating with classmates in the same district, across the state, or across the globe. It serves as a tool by which students can gather, analyze, synthesize and organize data in order to solve a real-world problem. It serves as a tool to formatively and summatively assess student learning; and as a vehicle for gathering, managing, and disseminating information that help to improve the overall efficiency of teaching and learning.
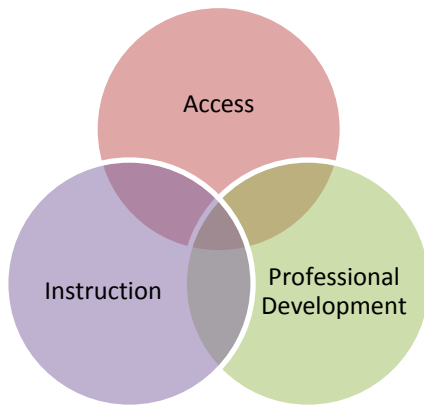
B. Technology Goals

The District's technology goals focus using technology that supports the above habits of mind and powerful learning. To do this, access (to technology), modes of technology-based instruction, and professional development must be integrated, as shown in the diagram below, and as explained by the following three goals.

Goal 1: *Powerful learning experiences supported by technology:* All Ipswich students will participate in learning that is engaging, empowering and rigorous and technology will deepen and extend this learning.

Goal 2: *Ready technology access:* Every Ipswich teacher and student will have access to a comprehensive and functioning infrastructure for learning when and where they need it.

Goal 3: *Ongoing professional learning:* Every teacher will participate in ongoing, personalized professional development that helps them use and integrate technology and broaden and deepen student learning through technology.

C. Attaining Our Vision and Goals: Current Activities

To attain both the above vision and goals, Ipswich Public Schools has embarked on several steps, which are outlined here.

In 2014, the District embarked upon a three-phased approach to upgrading its overall technology ecosystem. Each phase is briefly displayed below and will be discussed in greater detail in this section.

Kids surprise you. (Sometimes) they can't express an idea verbally or with a pen but can express it on a computer.

Middle school teacher

[16]
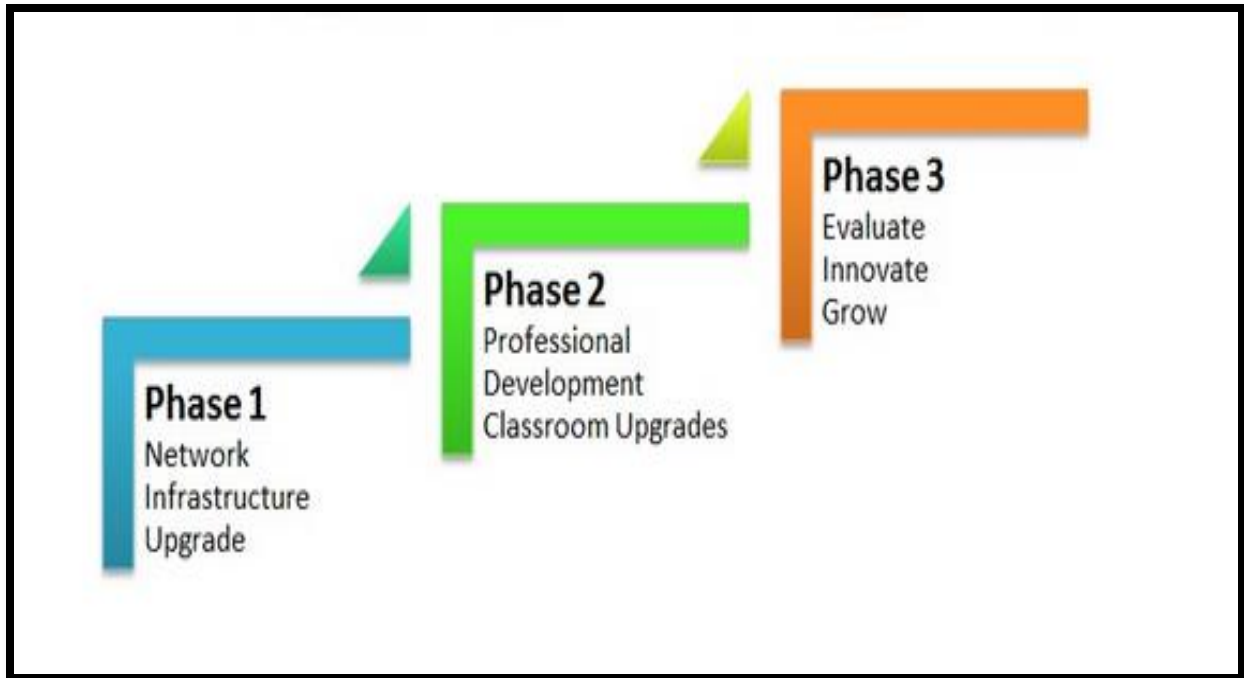
Activity 1: Network Infrastructure Upgrade

To ensure that teachers, students and staff have access to the Internet and access to servers and shared drives for file sharing, backups, scheduling, email, and web publishing, the District has embarked on a significant and ambitious upgrade of its whole technology infrastructure. This includes installing Aerohive AP370 802.11ac Wireless Access Points (WAPs) in all classrooms which will be centrally managed. This system is configured to provide a secure connection to the school network for school wireless devices as well as a secure Internet connection for staff and students who are participating in the "Bring Your Own Device" (BYOD) program. Because of such upgrades, wired and wireless LANs at each individual school will be able to handle larger amounts of bandwidth. Similarly, boosting wireless access points will support greater infusion of equipment through expanded BYOD and through the purchasing of new equipment. School owned laptops, tablets, wireless desktops and wireless printers will be connected directly to the school wireless network.

These upgrades will also ensure that District will provide connectivity of 1 Gbps per 1,000 students/staff to the Internet for all computers in 100% classrooms in the District. The average Internet download speed available will be in the range of 50 - 300 Mbps

Phase I began in March 2014 and includes the following activities:
- Connecting all schools and the central office via a new fiber network
- Replacing all network cabling in the two elementary schools
- Upgrading all network switches, routers and firewalls
- Installing a new secure wireless system in all schools

[17]

- Installing new servers for all school networked applications
- Installing infrastructure for virtual desktops
- Establishing a faster and more robust Internet connection
- Installing a centralized Antivirus program
- Creating a new Active Directory (AD) domain with central accounts for all staff and students (Grades 3 – 12) and synchronizing these accounts with Google Apps
- Implementing an online *Technology Help* request system for more efficient technical support response and the ability to track technology issues
- Consolidating the library catalog system for all schools
- Installing a new parent and staff notification system
- Upgrading and centralizing the school lunch program
- Replacing the Student Information System (SIS) with a comprehensive program integrated with the AD domain
- Upgrading the district website to an easy to maintain web hosted solution integrated with the SIS and AD

The timeline for the Phase I upgrading is shown below:
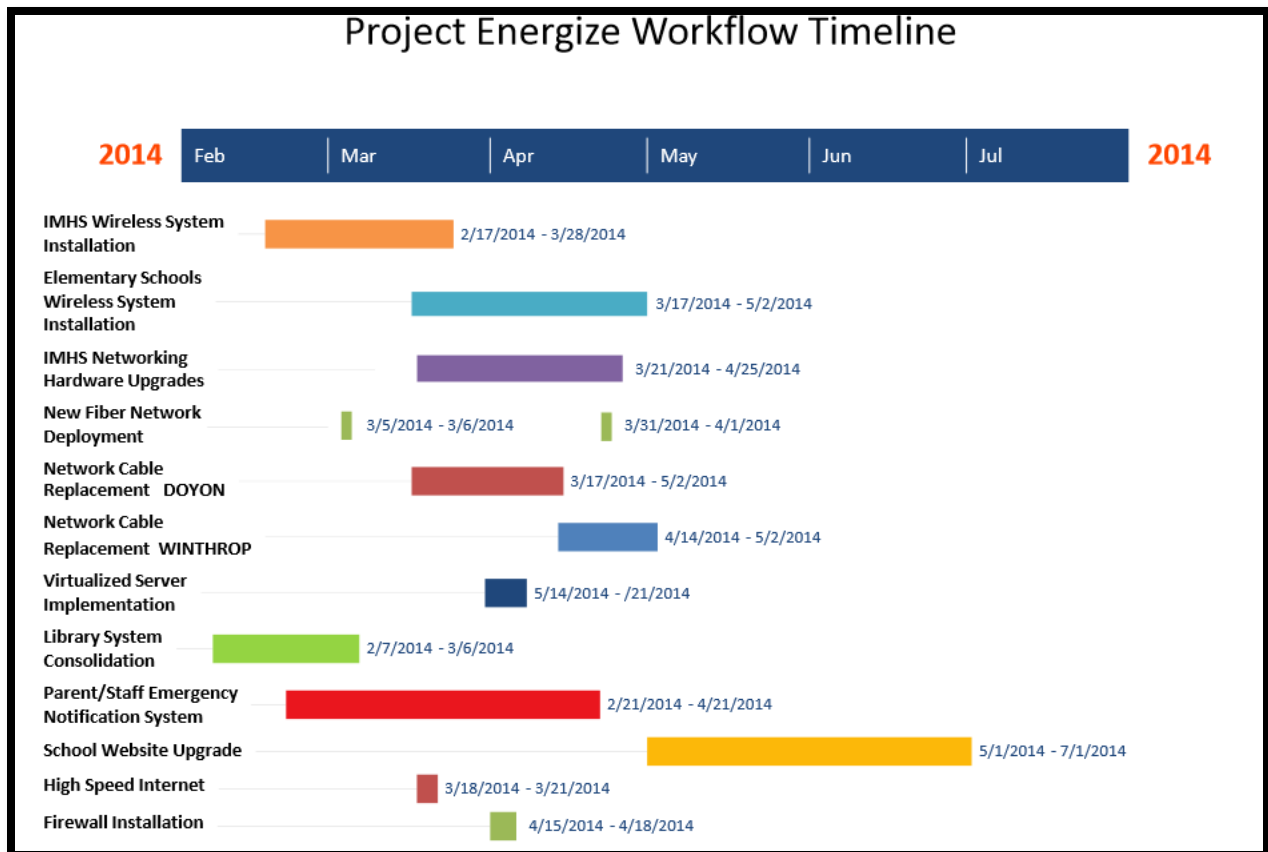
Additionally, all Internet traffic on the school network will continue to be filtered per CIPA regulations. Critical data will continue to be stored off-site on a separate backup system.

Activity 2: Upgrade Classroom Equipment

The District has and will continue to provide students with technologies that are appropriate to their grade level. These technologies maximize access to the general education curriculum for all students, including students with disabilities, using universal design principles and assistive technology devices. Classrooms have access to devices such as digital projectors, electronic whiteboards, and personal computing devices.

The next phase of this upgrading process will provide teachers and students with modern and well-functioning hardware and software that, together with improved network infrastructure, and the learning opportunities such technologies allow, will help to facilitate the District's vision of harnessing the power of 21st century tools to provide students with a 21st century education. Beginning in the 2014-2015 school year, the District will have a ratio of approximately 1.14 computer to student, thereby exceeding the State of Massachusetts' recommended ratio of one device per five students.

The table on page 23 of this document breaks down the items to be purchased and their total cost. As it will show, and the embedded table here shows, technology will be focused on a combination of tablets (for lower grades), Chrome books (for upper elementary and middle-school grades) and laptops and Chrome books for high school.

Estimated Inventory After Phase 2	
116	projectors
232	tablets
856	laptops
295	chromebooks
420	desktops
225	printers
175	thin clients
1978	Total

The District appears to be aiming to become a Google District, thereby taking advantage of many of the free services offered through Google Apps for Education. All staff and students from grades 3 – 12 will have a Google Apps account supported by the district.[2]

A complete list of all infrastructure and hardware/software upgrades can be found in Appendix 3.

Activity 3: Updating District Technology Plan

To ensure that technology and networking upgrades are in the service of an overarching educational vision, the District is developing a new five-year strategic plan for technology. Overseen by the Technology Committee (comprised of teacher representatives, School Committee members, administrators, technology specialists, community members, and a technology consultant), the District has developed a vision for using technology, interviewed teachers and students about the most optimal technologies for teaching and learning, conducted classroom observations, and visited "exemplar" districts in Massachusetts and Maine.

Activity 4: Ongoing, Job-Embedded Professional Development

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[2] Whether or not to become a Google district is still under discussion.

The ultimate measure of success of any initiative is student learning. To attain this, teachers must know how to use technology for their own productivity and personal learning; more critically, they must know how to use technology in ways that measurably and qualitatively deepen and extend student learning.

Thus, student performance will be influenced by high-quality by professional development opportunities for teachers. Studies of professional development have found that teachers who participate in sustained curriculum-based professional development report changes in practice that in turn are associated with significantly higher student achievement scores on state assessments (Cohen & Hill, 1997, in Von Frank, 2008).

To make Ipswich's technology vision a reality, the District will embark on new models of professional development. In addition to offering continued summer courses (See Appendix 4), the Ipswich school community will, beginning in the 2014-2015 school year, use PLC's as a vehicle for meaningful collaboration with engaged, active, committed participants in order to strengthen student learning.

The District is exploring other models of professional development and these will be discussed further in the Recommendations section of this plan.

Activity 5: Updating All Technology Policies and Procedures

In the 2014-2015 school year, the District will update all technology policies and procedures, including updating its Acceptable Use Policy to include other types of technology besides computers, to include social media, to include roles and responsibilities of teachers, students and parents. The District will involve students in this upgrading. Part of their task would be to do outreach to other students soliciting their ideas for an AUP and sharing outcomes of updated AUP. The District will also develop a social media policy.

The District will also look at either adding or updating a mobile device management (MDM) policy to allow for enrollment/authentication, app provisioning and managing updates, security and enforcement of security policies, remote management access, and compliance with Children's Internet Protection Act (CIPA)[3], monitor compliance with school policies.

Note: *You will need a timeline of activities here.*

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[3] See http://www.fcc.gov/guides/childrens-internet-protection-act

Section IV: Budget

The District recognizes that technology plays a critical role in achieving its goals. Like many school districts in challenging financial times, the District is attempting to maximize budget resources in order to ensure the implementation of its long-range technology plan. This is a particularly challenging task for the District since it does not have a dedicated technology budget.

Hardware, software and infrastructure: The District has sought funding for technology programs from federal, state, and private resources. The networked infrastructure upgrading e-rate covers 40% of the Verizon internet service and 40% of the Edline web hosting service.

The primary source of funding for new devices and upgrading existing equipment comes to the District via Payne Grants. The table below outlines the cost of Phase 1 upgrades (totaling $912,975.00) for the 2013-2014 school year.[4]

Item	Description	Quantity	Cost Each	Sub Total	Item Total
Hardware Upgrades					
Switch/Router Upgrade	Upgrade all network switches and routers	1	$179,350	$179,350	
Virtual Server Solution	Virtual server install, rack, UPS, 5-yr maint	1	$107,167	$107,167	
Backup Solution	Backup server with offsite option	1	$10,334	$10,334	
Wiring/Cabling	Replace network cabling with Cat 6	1	$134,111	$134,111	
Fiber rework (IMHS as hub)	10 G fiber connection for all schools	1	$22,902	$22,902	
Wireless Solution	High capacity wireless AP with 5-yr maint	150	$665	$99,700	
Firewall	10 G high perf. firewall with web filter	1	$20,723	$20,723	
UPS's in all closets (9)	1500 W UPS's for switch closets	9	$409	$3,685	
ISP upgrade	300/75 Mbps Verizon FIOS (E-rate)	1	$0	$0	
Closet Ventilation	HVAC in server room and IMHS IDF's	1	$13,400	$13,400	
Electrical circuits for server room	Circuits on the emergency generator	2	$540	$1,080	
Student Info Database Server	SQL database server for Aspen	1	$8,500	$8,500	

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[4] Note that this budget is still being finalized as of May 29, 2014

Lunch Program mgnt computers	Food Service management computers	4	$794	$3,175	
Virtualized Desktop system	Replaces desktops with thin clients	1	$52,745	$52,745	
Tech Management Tools	Workstations, network analyzer, tools	1	$8,916	$8,916	
Misc cable repairs and room config	Kitchens, Central Office, Library, MS Office	1	$2,000	$4,500	**$670,288**
Software Upgrades					
Destiny library system	Consolidated Library System in all schools	1	$7,847	$7,847	
Blackboard ConnectEd System	Parent/Staff phone and email messaging	1	$3,506	$3,506	
Aspen Student Information System	Replaces MMS (and later ESPED, Atlas)	1	$99,865	$99,865	
NutriKids Lunch Point of Sale	Centralize lunch program in all schools	1	$23,875	$23,875	
Edline website hosting	Website Hosting for all schools and district	1	$3,543	$3,543	
Sophos Endpoint Solution	Centralized antivirus system (5-yr maint)	1	$11,295	$11,295	
Google Archiving (Email and Drive)	Staff email and drive archiving	1	$4,560	$4,560	
Microsoft Licensing	Server licensing, SQL server and CAL's	1	$6,536	$6,536	
Active Directory Installation	Install centralized Active Directory	1	$0	$0	
Work Order Management System	Tech work order system with online forms	1	$0	$0	
Wireless Security Configuration	Security with radius authentication BYOD	1	$0	$0	**$161,027**
Total Infrastructure					**$831,315**
Consultant				$70,000	
Contingency				$11,660	
Total Project Budget					**$912,975**

The type of hardware and cost for Phase II of upgrading (that is, equipment purchases) is noted in the following table and totals $599,928:

Item	Description	Quantity	Cost Each	Sub Total	Item Total
Projector installations					
Doyon Classrooms	Wall mounted short throw interactive	5	$2,453	$12,265	
Doyon Library	Ceiling mounted projector with Cat6,	1	$1,600	$1,600	
Winthrop Classrooms	Wall mounted short throw interactive	15	$2,453	$36,795	
Winthrop Library	Flat panel monitor on cart with conne	1	$6,635	$6,635	
Middle Classrooms	Wall mounted short throw interactive	24	$2,453	$58,872	
High Classrooms	Wall mounted short throw interactive	24	$2,453	$58,872	
IMHS Library	Flat panel monitor on cart with conne	1	$6,635	$6,635	
IMHS Auditorium	Long throw projector with HDMI and	1	$9,000	$9,000	
IMHS Pods	Upgrade projectors in 4 Pods	4	$3,755	$15,020	
					$205,694
Presentation Stations					
DO Teacher Laptops	Upgrade very old laptops	19	$587	$11,153	
WI Teacher Laptops	Upgrade very old laptops	25	$587	$14,675	
MS Teacher Laptops	Upgrade very old laptops	16	$587	$9,392	
HS Teacher Laptops	Upgrade very old laptops	16	$587	$9,392	
					$44,612
Tablets					
Doyon tablet Cart (Grades K-2)	25 tablets with charging cart	2	$6,925	$13,850	
Winthrop tablet/iPad Cart (Grades K-2)	25 iPads with charging cart	1	$15,200	$15,200	
					$29,050
Computer Labs, Mobile Labs					
MS Laptop Carts (1 per grade)	25 laptops with charging cart	2	$15,723	$31,446	
HS English Classroom laptop carts	25 laptops with charging cart	4	$15,723	$62,892	
DO Laptop Carts (1 per school)	25 laptops with charging cart	1	$15,723	$15,723	
WI Laptop Carts (1 per school)	25 laptops with charging cart	1	$15,723	$15,723	
DO Chromebook Carts (Grade 3-5)	25 Chromebooks with charging cart	3	$8,348	$25,044	
WI Chromebook Carts (Grade 3-5)	25 Chromebooks with charging cart	1	$8,348	$8,348	
MS Chromebook Carts (1 per grade)	25 Chromebooks with charging cart	3	$8,348	$25,044	
HS Chromebook Carts (3 core subjects)	25 Chromebooks with charging cart	3	$8,348	$25,044	
IMHS Library Chromebook Cart	25 Chromebooks with charging cart	1	$8,348	$8,348	
					$217,612
Desktop Replacements					
DO Desktops district wide special need	Standard desktops	5	$581	$2,905	
WI Desktops district wide special need	Standard desktops	5	$581	$2,905	
MS Desktops district wide special need	Standard desktops	5	$581	$2,905	
HS Desktops district wide special need	Standard desktops	5	$581	$2,905	
HS CAD Lab	Solidstate drive PC's w/ 20" monitor	25	$1,199	$29,975	
MS Music Lab	iMac's w/ ss drive, mics, speakers, oth	15	$2,385	$35,775	
IMHS Art iMacs	iMac's w/ ss drive	5	$2,058	$10,290	
					$87,660
Printers					
DO Shared Printers strategically located	Black and white production Laser prin	2	$500	$1,000	
WI Shared Printers strategically located	Black and white production Laser prin	2	$500	$1,000	
MS Shared Printers (1 per Pod)	Black and white production Laser prin	3	$500	$1,500	
HS Shared Printers (1 per Pod)	Black and white production Laser prin	3	$500	$1,500	
					$5,000
Software Site License					
Adobe Design Suite site license		1	$6,500	$6,500	
Solidworks 3D CAD program	Educational version (26)	1	$3,800	$3,800	
					$10,300
Total					$599,928

The equipment purchases spread over a three-year leasing period. This leasing option provides an annual equipment refresh cycle works that works in the following manner:

[23]

Year 1: The District finances an equipment purchase with a three-year lease. The amount of equipment purchased is a percentage of the total district equipment inventory. This equipment is paid for in annual payments for 3 years.

Year 2: The District finances another equipment purchase with another three -year lease. The amount of equipment purchased is a similar percentage of the total district equipment inventory. This equipment is also paid for in annual payments for three years. This year the total budget will need to include two annual lease payments.

Year 3: The District finances another equipment purchase with another three -year lease. The amount of equipment purchased is a similar percentage of the total district equipment inventory. This equipment is also paid for in annual payments for three years. This year the total budget will need to include three annual lease payments.

Year 4 and every year afterwards, the District finances another equipment purchase with another three -year lease. The amount of equipment purchased will be a similar percentage of the total district equipment inventory. This equipment will also be paid for in annual payments for three years. This year and every year after, the total budget will need to include three annual lease payments because the first year lease has been paid off and a new lease has been established. The annual payment on a three-year lease at 5% interest to replace 10% of inventory will be $31,150. The cost to replace approximately 15% of inventory every year with the same or lower cost alternative will be $89,000. Note that the percentage of the total district inventory that gets replaced each year establishes the average equipment refresh cycle. For example, if 10% of the equipment is replaced each year, the refresh cycle is 10 years.[5]

Total Annual Budget required to support a 10 year equipment refresh cycle					
	Year 1	Year 2	Year 3	Year 4	Year 5
Lease 1	$31,150.00	$31,150.00	$31,150.00		
Lease 2		$31,150.00	$31,150.00	$31,150.00	
Lease 3			$31,150.00	$31,150.00	$31,150.00
Lease 4				$31,150.00	$31,150.00
Lease 5					$31,150.00
Total Annual Budget	$31,150.00	$62,300.00	$93,450.00	$93,450.00	$93,450.00

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[5] Though a 10 year equipment refresh cycle may seem too long, per Massachusetts guidelines (which recommends a refresh cycle of five years), the actual refresh rate will vary depending on the life of the equipment and the amount of additional funding received through other funding sources such as donations. Laptops and tablets will need to be replaced sooner while projectors, desktops and printers will last much longer.

Aiming for Cost Efficiencies: The District is undertaking many measures to maximize cost efficiencies. Below are a few examples of such measures:

- To leverage technology purchases, the District also has a BYOD program in the high school and will expand this BYOD program to the middle school in the 2014-2015 school year.
- By combining servers into a single centralized network using Ethernet technology, the District can update the server and apply security patches from a central location, thus reducing costs while improving overall security.
- The District will reduce the number of printers available to each school. Printers are often notoriously unstable and need constant maintenance and upkeep (paper, toner, ink). The District will promote kiosque-type (versus individual classroom) printing and push for more cloud-based storage and digital products. This should reduce both the need to purchase more printers and reduce costs associated with maintaining them.
- The District is exploring mechanisms to pay for breakage. This includes robust warranty systems and revenue-generation schemes to pay for the cost of breakage, such as a student insurance fee and/or technology fee.
- By becoming a *Google for Education* district, the District will scale back purchasing on desktop application software by using free, cloud-based applications. It will also save money by replacing the legacy staff email system with Gmail accounts, and by giving students access to 30 GB of cloud-based storage.

The district is also exploring ways that technology can reduce costs and create efficiencies in other areas of the district budget.

Professional Development

Note: *Needs to be information here on where funding for professional development will come from.*

Support and Contracted Services

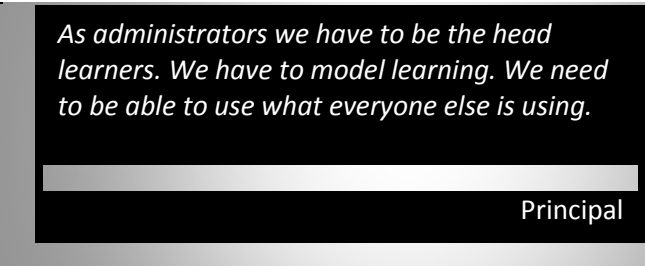**Note:** *Needs to be information here on this.*

Section V: Recommended Actions

This section outlines a series of recommendations (ranked by order of importance by the Technology Committee) for actions and activities that Ipswich School District should examine and/or implement in the next year. Note that these recommendations are often overlapping and highly interconnected.

Recommendation 1: Build strong distributed technology leadership

To ensure that (1) new technology investments improve instruction and learning (2) present and future technology needs meet curricular, instructional, assessment, professional learning and school operations goals; and (3) the District does not end up in the same state as the last few years, the District will need strong technology leadership—by the superintendent, principals, an IT director, the technology integration specialist, teachers, students and parents.

Technology leadership broadly involves improving all District-related technology activities by creating, using, and managing appropriate technological processes and resources. Some research (Anderson & Dexter, 2005) suggests that technology leadership is a stronger predictor of successful technology outcomes as compared to expenditure and infrastructure.

> *As administrators we have to be the head learners. We have to model learning. We need to be able to use what everyone else is using.*
>
> Principal

What does technology leadership involve?

Technology leadership essentially involves communicating the District's vision and goals for technology through all levels of the school system, among all stakeholders, and in all dimensions of instructional technology. It means that at each level—district, building and classroom—there is sufficient attention, resources, support, advocacy and management so that technology is used efficiently and effectively.

Technology leadership is multidimensional. It involves an *administrative* aspect—a voice that communicates the district's vision for how technology can and should be used to support, add value, and transform student learning. It has an obvious *technical* component—a dedicated, full-time technology director and sufficient technology support staff who oversees technology operations within the district. It has an *instructional* component—someone who is responsible for developing and/or disseminating models of instructional practices using technology. And there is a *professional development component* that focuses not just on technology training but on using technology to promote Habits of Mind, like collaboration, creativity and problem solving. These higher-level skills are the hardest for teachers to inculcate and there often the hardest skills to develop in teachers themselves.

Formal technology leadership is probably best institutionalized among a revamped Technology Committee (possibly merged with the Technology Advisory Group) which is given greater responsibility and authority for technology-related decisions. This leadership team could work with teachers to set goals; develop activities that meet these goals; make sure that people, policies, procedures and supports are in place so that technology is an enabler of learning, not an impediment to it; revisit, update and create policies and procedures around acquisition, use, support, repair and purchasing of devices; provide teachers with intensive, ongoing professional development around technology (to be discussed later); and constantly assess how technology is or is not supporting District goals and student learning.

Aside from the Technology Committee, technology leadership can come from *district, school administrators and teachers* who model leadership by their use of technology—for communication, collaboration, instruction, assessment, data analysis, and dissemination of information in the following ways:

Technology leadership begins at the building level and here principals are critical in modelling technology leadership by:

- Ensuring that the District's educational vision and goals are supported by technology at the building level
- Advocating for effective and quality use of technology by teachers as part of instruction and assessment
- Modeling the use of technology in his/her interactions with teachers, parents and students and in his/her daily work routines
- Understanding what models of good technology-based instruction look like in practice
- Advocating for teachers to receive ongoing instructional and technical support
- Engaging in professional development activities that focus on technology and integration of technology in student learning activities.
- Providing professional development opportunities for teachers and staff that emphasize use of technology and that facilitate integration of technology into student learning.
- Securing resources to support technology use and integration in the school.
- Allowing teachers the time and space to experiment, and to fail and learn from failure, with technology
- Being knowledgeable and supportive of state and CCSS technology standards and promote attainment of the standards in the school.
- Communicating the uses and importance of technology in enhancing student learning experiences to the school's stakeholders (Grady, 2011: 7-8)

The District and administrators can leverage PLCs to build technology leadership *among teachers* by:

- Using PLC time to allow grade-level and subject-area teams to identify learning outcomes, and collaboratively and systematically plan, design, practice and co-teach technology-based instructional activities
- Creating a culture of shared teaching, learning, and student success, and creating opportunities for peer feedback and discussions
- Encouraging experimentation to determine and disseminate best practices in technology-based teaching and learning activities
- Using formative and summative assessment data to identify areas where students need help and designing activities (with and without technology) to target instruction and support to these areas
- Building the capacity of teachers to use technology as part of curriculum design and planning, instruction, assessment, communication and collaboration through professional development, ongoing support and collaboration with colleagues, all of which are aligned with the larger District vision and goals for technology
- Creating a shared vision, strategies, goals, and benchmarks for teaching and learning with technology among PLCs

Students also play a role in technology leadership. For many students this first mean teaching them how to use certain technologies. For all students, it will involve cultivating their awareness of their responsibilities as "digital citizens." It means giving students choices in how they us technology to complete school work, a voice in technology decisions (since they often know more about technology than adults) and developing formal technology leadership teams (who may for example, help to design student-related technology policies), technology squads (for technical support), and allowing students to serve on the Technology Committee.

Recommendation 2: Ensure adequate technology support

Ipswich School District is purchasing a very large technology inventory. One rule of thumb is that districts should not make hardware purchases that exceed their capacity to provide technical support for this inventory. A second rule of thumb is to always plan for breakage.

> As an example of student technical support, see MOUSE Corps, a career-readiness program for high schoolers that gives those students experience providing IT support for their schools, professional internships, mentoring, and skills-building workshops at http://www.mouse.org/

There is no ideal ratio of the number of tech support staff to machines, equipment or students. The ratio the District needs will depend on the skills of staff. And though it *should* reduce the amount of maintenance and repair needed, there is no ironclad guarantee that purchasing new equipment or moving to a more virtualized set of devices or an upgraded system will automatically reduce issues. There's a maxim in educational technology that "It's about education, not technology—until it breaks. Then it's all about the technology."

Therefore, the second recommendation is that the District ensure adequate technical support at least until *all of the following* are accomplished:

- Successful completion of Phase 1 (network upgrading) and Phase 2 (equipping and provisioning new devices) in order to make sure that the District is not left shorthanded by unanticipated events. With new devices coming on line, new policies, configuring software, addressing software conflicts, provisioning, and phasing out/moving/selling existing equipment, the District will need more, not less technical support staff in the short term. The general rule is to prepare for breakage. Even with new devices, which have warranties, there are always issues, especially around break-fix. Simply having a warranty will do little if there is not sufficient staff to get the broken device to the vendor and/or to make sure the vendor fixes it in a timely fashion.

- Successful completion of the first iteration of PARCC. The shift to online testing with PARCC will demand readiness and support across the system—making sure there are enough devices and peripherals for students, ensuring that all devices work with PARCC, that there is sufficient bandwidth during the testing window, etc. The first "real" application of PARCC will be the true test of how well online testing works and the true amount of support needed for online testing.

- Successful development of a comprehensive technology system—developing procedures (such as a work-order system), training and overseeing technology squads, inventorying and setting up and imaging new equipment, providing basic training on equipment, helping to design technology literacy classes for students, updating and designing Acceptable Use Policies (for all stakeholders), a social media policy, a Mobile Device Management system, procedures for requesting technology support, a central inventory of all equipment, etc.

> *We need whatever will last longest and require fewer repairs and be cheaper and what we can live with. Considering that everything has to be updated and there is all this new equipment, this will cost a lot of money .*
> Student
>
> *We need the whole gamut of support—from integration support to technical support.*
> Principal

- Development of a maintenance plan (and budget), whether that is a student insurance system, contracting with external vendors, a student-insurance scheme, etc. Many school districts are downsizing, or in some cases, radically scaling back their technology support staff, but many of these districts have 1:1 programs where either students/families pay for device maintenance and breakage or where parents pay the cost of external device repair.

One common vehicle that districts have used to leverage technology support is the use of student technology support squads. Student tech squads have been used successfully across districts in the US and across the globe. Essentially these are groups of students (predominantly middle and high school students) who offer basic troubleshooting and break-fix support. These students could be trained in a number of ways—through *YouTube* videos, through training by technology staff. They wouldn't touch the network but could at least deal with basic technology issues and basic training on technology, thus freeing up formal technology staff for more high-level support. While student technology squads can reduce the amount of dedicated technical support staff needed, that reduction would not be immediate. Setting up and making sure such tech squads are "worth it" involves establishing procedures, protocols and training—by a dedicated technology support staff.

To be effective and supportive, versus problematic, the student tech squads should go through a serious vetting and application process, similar to admission to National Honor Society. Important qualifications are obviously attention to detail, seriousness of purpose, and being highly responsible, but the most important qualification shared with the consultant is that these students be "trustworthy."

Additionally, for student tech squads to work well, there needs to be (1) a formal and centralized reporting system through which students work—they can't run off and start fixing equipment on their own; (2) a set of rules and guidelines that is known to them, to teachers, to administrators and to parents about what they are and are not authorized to do and how (3) consequences and immediate accountability for behavior that jeopardizes the District's technology assets (for example, sharing passwords or downloading unauthorized software); (4) training by existing tech support staff; and (5) academic credit, or some equivalent thereof (such as a certificate) that makes this arrangement a more formal and serious endeavor and makes it possible for dismissal if student tech squad members are not performing well.

The goal, after a few years, is that the District build up enough student technology support capacity that students can begin training and supervising one another.

Recommendation 3: Standardize, centralize and streamline technology operations and procedures

The third recommendation focuses on the need to standardize, centralize and streamline technology operations and procedures.

Standardization (of equipment purchases) has several benefits. First, it means that technicians need only focus on one operating system versus two and on supporting 1-2 types of hardware versus several. Second, this means that teachers and students need only learn one platform. Third, it will allow the District to purchase in volume, thus enabling it to negotiate better pieces with vendors. Finally, it conforms to teacher wishes. The need for

standardization emerged as an important, and unanticipated, theme in teacher interviews. (Note that standardization can be achieved on a cohort basis—Android tablets for K-3, Chrome books for Grades 4-9; more laptops (with resident specialized software for Grades 10-12. Or academic departments may standardize equipment purchases, as is currently the case.)

This standardization also suggests that Ipswich should investigate the benefits and challenges of becoming a *Google* district. (One of the main questions is how well doing so will support PARCC). The IT department wants this. Teachers want this. Students want this. There are numerous advantages in becoming a Google District—Chrome books are cheaper to purchase and maintain and they have faster start up times than laptops. They are virtualized, thus making learning anytime-anyplace (as long as there is an Internet connection), making upgrading and support easier and making collaboration easier. *Google Apps* offers a fairly powerful suite of applications. *Google* is an open system and updates its operating system more frequently than Apple. (Boston Public Schools has just become a Google District, so it would be beneficial to talk with someone there.)

> *We need consistency and compatibility in terms of technology.*
> Teacher
>
> *It doesn't matter what we have. We just all need to be using the same thing.*
> Teacher

Centralization means that technology is managed, not at a school level, but at a district level (Since Ipswich has four schools, this should not result in inordinate bureaucracy) through an IT director, and that there is a central plan to manage devices and infrastructure. Centralization would impact most on the area of technical support. For instance, because Ipswich is such a small district, technical requests are personal versus procedural. Rather than having tech support respond directly to a personal request, support requests would come through online system or an app that assigns a ticket to a technician based on his/her area of expertise. This provides the IT department with a holistic view of the entire district's computers, so it can more easily keep track of inventory, identify patterns of problems, and plan for hardware and software upgrades, and makes technology "accounting" and recordkeeping easier. Having a master list of what's wrong with each unit will help the IT team, as well as any external company performing repairs, provide a better picture of what the costs will be to repair these units beforehand and limit unwanted surprises on the back end. This should serve to reduce technical support costs.

Based on teacher interviews, it appears that several technology-related procedures need to be *streamlined*. (Streamlining and centralizing are not necessarily mutually exclusive.)For instance, downloading apps involves several steps (including a trip to Central Office). This could be simplified through the use of iTunes gift cards. Since the goal is to get teachers using technology on a regular basis, technology-related procedures should be simplified.

Recommendation 4: Plan for intensive professional development

For too long schools have neglected to invest in technology as a tool versus as an exploratory toy. Principals, teachers and students don't have enough training to effectively integrate. Businesses invest in training, not stuff. Schools invest in stuff, not training, and their training is haphazard. My dream is that technology be integrated seamlessly in day-to-day activities with instruction and assessment, with every-day learning (Teacher)

Teachers are the gatekeepers and the implementers of Ipswich School District's vision and goals for technology, thus to make this vision and these goals a reality, Ipswich's teachers will need professional development. The visual below demonstrates how (and how much) this professional development should be layered or tiered and suggest that it involve: (1) technology skills training (2) technology integration, and (3) curriculum planning and design, and (4) ongoing support.
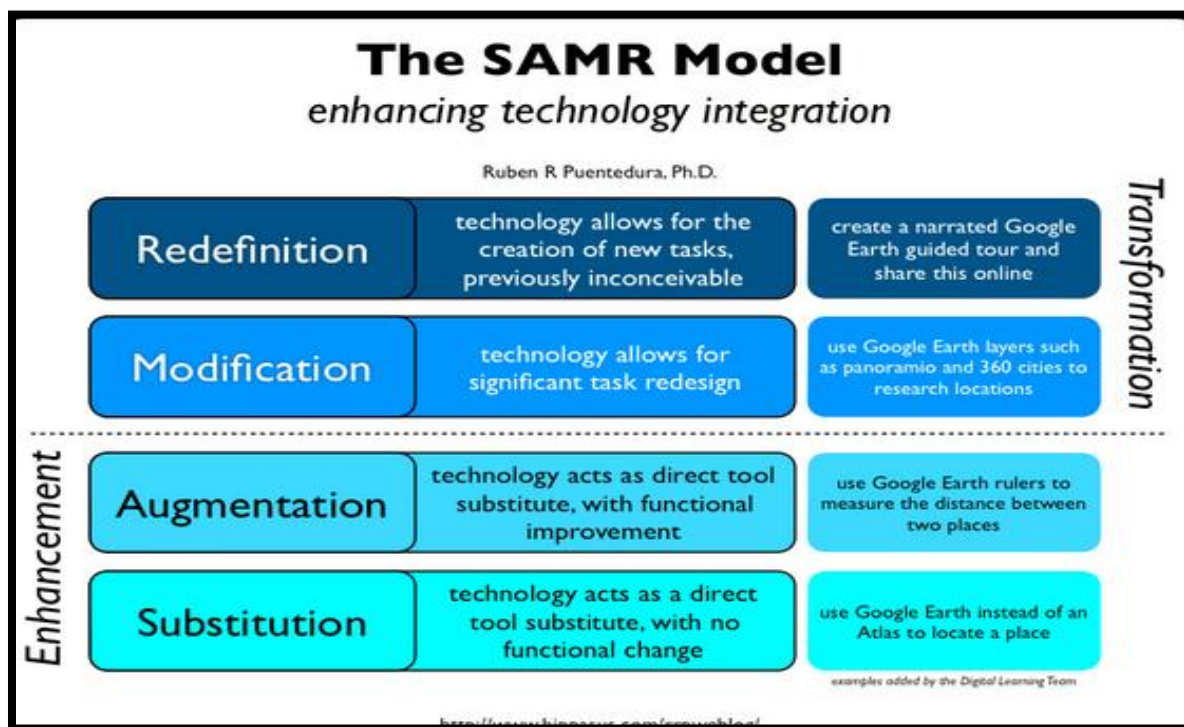
Technology
skills training

Technology
integration

Curriculum planning and
design

Ongoing support
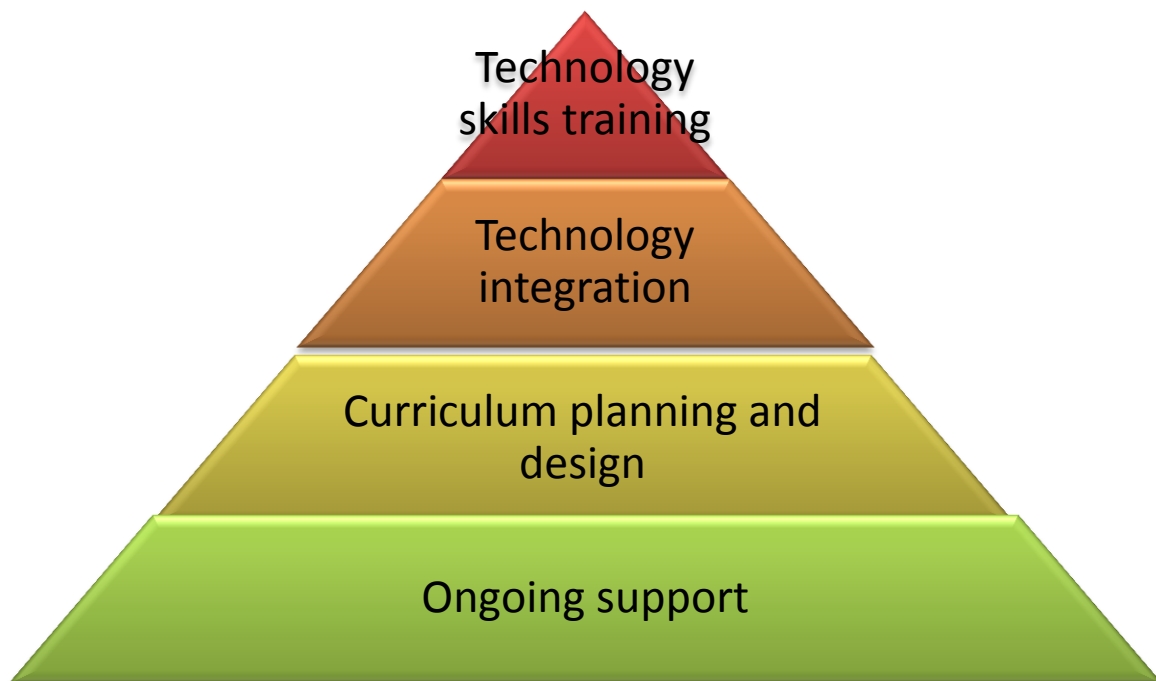
1. **Technology-skills training:** First, because the technology has been so problematic for so long, many teachers are back to square 1 (or feel themselves to be—and perception is self-fulfilling in many cases). While this skills training is necessary to build teacher confidence, it should be brief and not consume a large proportion of professional development time or budget. It is in using technology as part of their own work, versus a class, where they will learn how to use it well. This technology training could be carried out by IT support staff or students.

One alternative to using official Ipswich PD time for technology skills training is to give teachers time to learn technology online via *YouTube* or to set up paid school accounts on *Lynda.com* so teachers can access these technology tutorials.

2. **Technology integration:** As the graphic above illustrates, more formal professional time should be spent on should technology integration within specific content areas (for upper school teachers) and grade levels (for lower school). Teachers will learn the technology skills within the context of integration.

People often speak of "integration," but are not sure of what it involves exactly, therefore this plan offers two potential models. The first is SAMR (Substitute-Augment-Modify-Redefine) — an integration model in which technology is integrated into learning in such a way that it either *substitutes, augments, modifies* or *redefines* both the learning activity. The goal is for teachers to design activities in which technology modifies, and more critically, redefines learning.

The SAMR Model
enhancing technology integration

Ruben R Puentedura, Ph.D.

Redefinition	technology allows for the creation of new tasks, previously inconceivable	create a narrated Google Earth guided tour and share this online
Modification	technology allows for significant task redesign	use Google Earth layers such as panoramio and 360 cities to research locations
Augmentation	technology acts as direct tool substitute, with functional improvement	use Google Earth rulers to measure the distance between two places
Substitution	technology acts as a direct tool substitute, with no functional change	use Google Earth instead of an Atlas to locate a place

Transformation

Enhancement

examples added by the Digital Learning Team

The second way of thinking about technology integration is to (1) disaggregate the concept of "integration" into a number of key components and (2) see integration not as a monolith but as a continuum of practices. The table below (developed by the consultant for a 2007 publication) provides a framework that could potentially be used as part of professional development focusing on integration.

# Dimensions and Levels of Technology Integration

Level of Integration/ Examples	Emerging	Intermediate	High
Learning Objective: What should students know and be able to do?	Learn about technology, such as learning how to word process, do research, or communicate with technology.	Substitute a technology tool for a conventional tool, such as using a spreadsheet for population forecasting.	Use technology with embedded knowledge, such as using SimCity to learn about community development.
Appropriateness: Is this the most appropriate tool to attain stated learning outcomes?	Software stimulates relatively passive involvement on the part of the student and focuses on cultivating basic skills: memorization, identification, and recall of information.	Software is more active and cultivates advanced levels of learning: comprehension and application of information.	Software stimulates active intellectual involvement on the part of the user.
Use: How are students using computer applications and digital content?	• Test preparation, remediation, and improved basic skills. • Enrichment or reward for completing work, such as games or online sites geared to teens. • Basic research and presenting information.	• Access data via the Internet or CD-ROMs. • Some degree of data manipulation, such as creating graphs, and data presentation, such as electronic presentation or publishing and word-processing software.	• Access, manage, integrate, and evaluate information. • Solve problems; analyze, synthesize, and evaluate information. • Present and communicate this information in a clear, effective, and multimodal manner.
Type of Instruction: How is the teacher teaching with technology?	Primarily teacher-centered instruction.	Mixture of teacher-centered and learner-centered instruction, such as collaborative and project-based learning.	Primarily learner-centered instruction, including problem-based, project-based, case-based, inquiry-based, and collaborative learning.
Fungibility: Can the same learning objective occur without using technology?	Students and teachers can perform the same tasks without technology: using Word instead of a pen, PowerPoint instead of an overhead projector, or skill-and-drill software instead of flash cards.	Students and teachers can perform the same tasks without technology, but technology deepens and enriches student experiences and learning: using interactive Web-based mapping tools.	Supports content instruction that makes possible experiences and learning that would otherwise be impossible: using ask-an-expert sites for hard-to-reach expertise; using simulation software that allows students to have otherwise unavailable learning experiences, such as dissections or building a city.
Learning/Literacy: What levels of learning and types of literacy are students attaining?	• Functional literacy: phonemic, verbal, and numeric. • Possibly some degree of technical literacy, such as learning how to use spreadsheets.	• Functional literacy: technical literacy. • Information literacy, or knowing how and where to find information online.	21st-century literacies, such as visual, spatial, and media.
Access/Location: Where is the technology located? Can teachers get to it when they need it?	Computers are mainly found in computer lab or some centralized location.	Pods of computers (in groups of 2–5) are located in classrooms.	1:1 laptop programs.
Hardware: What types of hardware are being used?	Computer-based; primarily or exclusively desktops.	Computer-based desktops or laptops, supplemented by portable technologies, such as digital and video cameras.	Portable technologies (GPS, cell phones, video cameras, digital cameras, MP3 players), as well as computer-based desktops and laptops.
Computer Applications/ Digital Content: What applications are students using?	Digital content (Internet, content-specific software, and integrated-learning packages) used to enhance textbook information and help students access data.	Blended resources: text-based and digital resources, including Internet, CD-ROMs, online learning objects and tools, and content-based multimedia software.	Mainly digital content: digital learning resources and Internet-based interactive applications and simulations.

One of the shortcomings of technology-related PD is that we often lead with the technology—how to use application **A** to result in action **B**. In fact, we might want to "flip" this practice, by focusing first on the *conceptual thinking* behind the application (e.g., the writing process first, then using Word to support this; graphing first then *GraphIt!* to support mathematical thinking) then technology use to support this thinking. A quick example with concept mapping software: This is a technology application with a rich body of research on its effectiveness. To use it "well," we first have to understand how to organize, analyze and synthesize information; how to think relationally; and know which types of concept map to use for what purpose (e.g., cause-and-effect maps vs. Venn

Diagrams, etc.) and how to effectively help students build these skills. Once these two areas are covered, we can begin to teach how to use the tool.

- **Curriculum planning and design.** The greatest focus on both PD and PD time should be on team-based curriculum planning and design (especially with the new Common Core curriculum and PARCC[6]) to take advantage of the potential of technology to create, connect, and collaborate that technology affords students. This is where most Ipswich teachers seem to want to focus their efforts.

Since many of Ipswich's teachers want content-specific technology-based professional development, with opportunities for planning and practice, the District may want to focus on the TPACK— Technological Pedagogical Content Knowledge—framework for both design of learning activities and professional development (outlined in the graphic below).
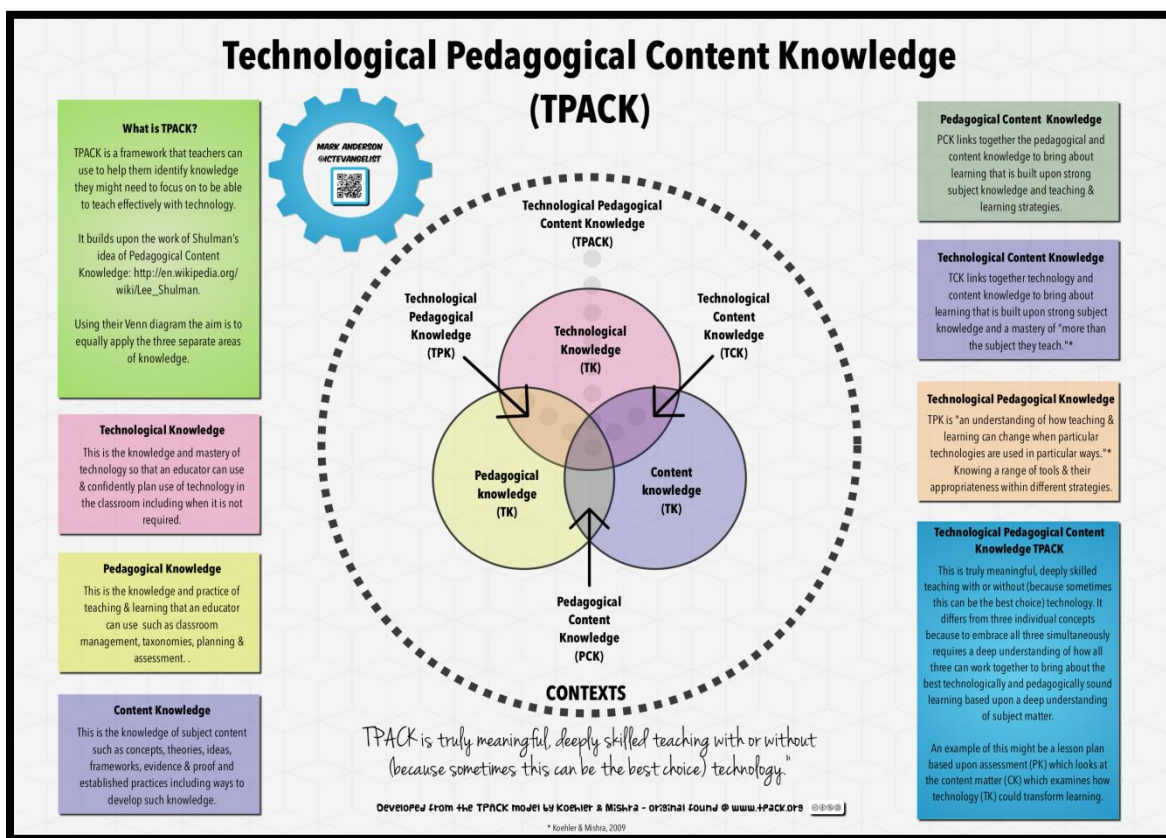
- **Ongoing support:** At the foundation of the "professional development pyramid" in the previous page, teachers need ongoing support, in the form of school-based coaching, mentoring and follow-up. This ongoing support should be the foundation

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[6] For more information on PARCC, see http://www.parcconline.org/.

of all professional development. Research on implementation and transfer of learning demonstrates that while some professional development is better than none; even small amounts of coaching are more impactful on teachers than a lot of training (Fixsen, *et al.* 2005).

Characteristics of Professional Development

Interviews with Ipswich teachers (and survey results) suggest that teachers want professional development that is ongoing, collaborative and personalized. They need actual models of the practices they are supposed to embody. They want opportunities to go to other teachers' classrooms (noted as "open classrooms" in the table below), in their schools, in other schools, and in other districts. They also want help using technology in ways that deepen students' critical-thinking skills (one way to address this is to focus on the conceptual thinking before plunging into technology tools) and address students' learning styles. All of teachers' responses about professional development can be found on the District's *Survey Monkey* site, but the table below enumerates their greatest wishes in terms of the types of technology-related professional development they want to receive.
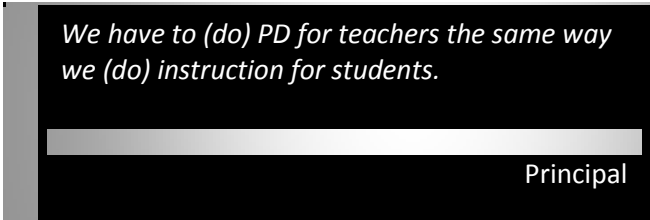
[I need/I really need…]	% responses (as of May 26, 2014)
1. Mechanism to keep me up to date on technology	64%
2. More opportunities to collaborate with colleagues	62%
3. Common planning time with grade-level team/department to design technology-based activities	62%
4. Ongoing, school-based PD	61%
5. Help using technology to really engage my students and speak to their learning styles	58%
6. Help using technology to deepen students' critical thinking skills	53%
7. Observe teachers who use tech successfully	52%

A few final suggestions in terms of professional development:

1.   **Invest professional development money in providing time, structures and supports for teachers to work together** in department teams or grade-level teams and PLCs. The District should guard against spending precious PD resources on external experts who cannot provide the kind of intensive, scaffolded, school-based professional development teachers need—unless they provide highly specialized instruction (for example, in TPACK, that you might not be able to find locally). Teachers are aware of the fact that there is good practice with technology across the district and they want the time

to see these people in action. The money spent on one speaker could allow several teachers to attend a conference and return and hold PD sessions for their colleagues.

2. **Leverage professional development opportunities for teachers:** Since budgets are tight, think of leveraging opportunities for PD. For instance, each faculty meeting could dedicate 15 minutes for "Technology Tip of the Week" in which tech support staff demonstrates something that has been determined a key "behavior" or the technology integration specialist shows a new literacy app. Another is to require all teachers who attend conferences to come back to their schools and share what they've learned. With mini-grants, rather than writing reports, teachers could create videos or do mini-professional development sessions for colleagues demonstrating how they are using equipment. "Tech Tuesdays," Edcamp models, early release on Thursday afternoons are all ways to leverage professional learning opportunities. Finally, look outside the District to districst with more resources—Burlington, Hamilton, Lynnfield—and explore whether Ipswich teachers can participate in after-school PD there; and explore the free online courses, online communities, MOOCs and unconferences in which teachers can participate (either individually or with groups) at no cost.

> *We have to (do) PD for teachers the same way we (do) instruction for students.*
>
> Principal

3. **Extend professional development through technology:** All of the above should be recorded and the District either create a YouTube Channel or iTunes channel or using some free wiki or web space (*Edmodo*) to create "Ipswich Online University" where videos are placed along with any archives that accompany videos so teachers can have access to just-in-time PD. The critical piece though is to make sure that the above is not about using the tool, but using the tool to deepen and extend student learning in a particular content area.

4. **Build a professional development system:** Professional development takes time to plan and set up, and similar to IT, it also needs to be systematic—a PD team need to be assembled, trained, professional development activities designed, and a system of school-based support established. The District may need to devote the next year to this. In the meantime, as teachers are getting used to their new technology, it can adopt a framework such as Miami-Dade County (FL) schools uses—an "Explore, Play, Fail, Experiment"[7] model. This is part of its three-year technology plan. In the first year, teachers explore, play, fail, and experiment. In the second year they have a minimum requirement for usage. By the third year it's a mandatory experiment. Play/learn is critical for teacher—teachers play and experiment with low risk scenarios. In year 2,

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[7] See http://superintendent.dadeschools.net/index.php?news=221

[37]

they begin participating in formal ongoing PD. In Year 3, they are mandated to use the technology fully and with expertise.

5. **Implement a PD evaluation system**: It's clear what teachers like but it's not clear what works and since budgets are tight it's important to figure out which professional development formats give the District the greatest return on investment. It is therefore important to attempt to link the mode of professional development with what is deemed to be effective and with new information and then revise and fine tune PD accordingly. One way to get low-cost evaluation is to reach out to local universities and colleges (for example, Salem State) to see if a faculty member in the College of Education (who is interested in publishing as part of tenure) might take on a professional development evaluation for a modest fee.

Recommendation 5: Dedicate sufficient budget to cover all recurring technology-related expenditures

Like many districts across the US, Ipswich Public Schools is dealing with a constrained budget environment. There is no dedicated technology budget and funds for maintenance and repair have been traditionally found at the building level, primarily by "robbing Peter to pay Paul"—taking funds from another budget (like textbooks) to pay for technology. Money for maintenance, professional development, refresh (if not covered through the leasing scheme), and for other contracted services.

Recommendation 5 is a critical one: When there is not enough money, organizations do one of two things: they cut expenses or they try to add revenue. The District must do one or the other, or find money somewhere, so that there is a sufficient budget to cover all recurrent costs associated with technology.

A real concern is that the technology inventory, even with new devices, will continue to suffer from the "tragedy of the commons." Because the technology is a common, versus individual, asset, students don't see the need to take care of it (as evidenced by what seems to be middle schoolers' predilection for ripping out laptop keys). 1:1 programs get around this, and a number of responsibility issues, because students (and their families) see the devices as belonging to the student, not the school.

This section explores some options for generating revenue to cover the cost of maintenance, teacher professional development, replacement, and other technology-related contractual services. These are presented as options and involve far more research and exploration that the summary data provided here.

1. **Severely scale back all technology expenditures by implementing a full BYOD program:** Many districts use BYOD programs to forego the cost associated with

[38]

equipment purchases and maintenance. While equipment purchases for the 2014-2015 school year appear well underway, the District could begin planning to move toward a full BYOD at the end of the lifecycle of the equipment it is now purchasing or at the end of its five-year technology plan. As the cost of laptops continues to decline, the District could begin "preparing" parents for this inevitability and begin specifying (as many districts do) the kinds of laptops that parents will need to provide for students.

In the short-term, BYOD could be used to minimize maintenance and repair costs for those parents who do not wish to pay a technology maintenance fee (see below), their child can bring his/her own device to school but the family assumes all responsibility for repair and breakage.

2. **Charge a technology maintenance fee to each student:** For students who use the school's computers, charge a $25 annual technology maintenance fee. So many districts across the US—Manchester, CT; Union City, NC; Yarmouth, ME are but three—do this that it has almost become almost standard practice (Indeed, many districts charge more—a $50 fee to cover major breakage like damaging the laptop screen). If parents object to or cannot pay the maintenance fee, they are free to move to a BYOD solution. With 2000 students and $25, the District could raise $50,000 in maintenance funds.

There are a number of issues associated with such a suggestion. First, every student would need to be assigned the same computer (at least in each class). Next, it would require inspecting and inventorying all devices at the start and finish of the school year and recording their status. Third, the District really would need to start outreach to parents and the community, explaining in detail the current financial situation and why such funds are needed. Finally, there is the question of what to do with unspent funds. Some districts (like Yarmouth, ME) return the money to families; others, like Union City, NC, keep the money and put into a general technology fund.

4. **Student insurance:** A variation of the above is a student insurance system where every family must purchase insurance through the District to cover the cost of breakage, for example, $30 annually with a $100 deductible. (One way to avoid logistics of gathering and returning money is to simply push the cost of potential repair onto parents). In such a scheme, parents would be responsible for insurance of the devices their children use, with the proviso that money could be returned at the end of the school year. This would mean that students need to be assigned a particular device in each class or across all classes. Such an arrangement, like a technology fee, could reduce damage since responsibility for equipment would be pushed onto, and traced back, to students.

An insurance scheme would allow savings in two areas. First, it could potentially free the District from expensive warranties with Original Equipment Manufacturers (OEMs). Next, it makes parents and students responsible for maintenance costs of equipment. However, as it stands right now, it is insurance on the device (versus providing money

to fix software or network issues) and like insurance it can be complex and warrants further examination.

5. **Rental laptop program:** A fourth option to generate funds for break-fix is to institute a rent-to-own laptop program, where the District "gives" a student a new Chrome book which they keep and on which they pay a monthly installment (perhaps for less than the cost of a Chrome book). At the end of a certain period, they buy or at least have the option to buy. Similarly, at the end of the life cycle of technology, if there is no budget for repairs and the District does not anticipate any will be available within the next six months, the District might consider selling equipment "as is" to parents and the community to unlock the most value from equipment before they become obsolete.

6. **Cases:** All laptops and tablets, regardless of whether kept in carts or not, should have some sort of case. Cases significantly reduce the most costly repairs (cosmetic case and display damage) and will unlock more value when you sell or trade in your equipment. For example, a $30 case can net back $100 more on a Mac laptop trade in, for example. Additionally, computers and tablets should be audited yearly by the IT department to make decisions on whether to keep, repair or sell that device.

7. **Rigorous AUPs and digital citizenship:** Students and parents need to understand that having a school-issued device is a privilege, not a right, and that with this comes responsibility for caring for an expensive digital tool. This sentiment is best operationalized within a rigorous Acceptable Use Policy (for students, and increasingly in many districts, for their parents) and strong digital citizenship classes. If AUPs are made more rigorous—assigning financial penalties for breakage; loss of using a school computer for severe violations of acceptable and ethical use—and if the District, particularly through advocacy of parents and peers, really emphasizes equipment care, proper use, and responsibility as part of acceptable use in Ipswich Public Schools, there should be some increase in more responsible technology use and care with a commensurate decrease in breakage and expenditures on maintenance. Such a suggestion can help lower maintenance and repair costs, but needs to be coupled with at least one of the options above to see significant savings.

8. **Buy refurbished equipment for younger grades:** Though this does not cover recurrent costs, it does cover capital costs (with the possibility that money saved on equipment could be rolled over into a general maintenance fund). K-3 students will do far less technology intensive work than older students, so do they really need expensive iPads to do so? One way of saving money is to use refurbished tablets and desktops for younger ages. The District could save approximately 30% from moving to a refurnished iPad versus a new iPad program. Similarly the District could use refurbished desktops

in common areas and for certain tasks (video editing), this saving money and investing that into more devices.

Recommendation 6: Help students truly become digitally literate

Technology literacy is not a one-dimesional skill involving the mechanics of using a computer. Rather it is a taxonomy of skills and dispositions around technology use. It involves knowing how to use a tool, use it wisely and ethically, and understand the benefits and challenges and consequences of such tool use. These are interrelated but distinct issues, and each is discussed here as *basic technical literacy, digital citizenship,* and *information literacy*.

Basic technical literacy
According to some teachers, many Ipswich students appear to have received no formal instruction in keyboarding or basic technology operations with the result, as one teacher noted, "their skills are all over the place." Teachers report having to take time to t each students how to keyboard or save files, thus intruding on valuable instructional time. More critically, beginning in the 2014-2015 school year, students will need to take PARCC assessments online and keyboarding skills will be a major factor in determine not just their success on state-level assessments, but the district's.

Beginning this school year, numerous school districts across the US are formally enrolling students in keyboarding and computer skills as early as kindergarten to prepare for both the tests and the increased use of technology.

A quick scan of Common Core State Standards[8] shows that students will need, at a minimum, the following technology skills to comply with and meet Common Core State Standards, and more critically, to successfully participate in the *Partnership for Assessment of Readiness for College and Careers* (PARCC) assessment, beginning in the 2014-2015 academic year.

- **Fundamental computer skills:** Introductory computer vocabulary; computer hardware devices; mouse basics; using the computer desktop; windows and menus of common software programs; and basic browsing skills in order to take the online test.
- **Keyboarding and word processing:** Keyboarding and word processing basics; how to format text; use proofing tools; and edit and revise text in order to express answers in written form.
- **Creating and analyzing charts and graphs:** Create and format spreadsheets and graphs; collect data; and express data visually.

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[8] For a complete list of CCSS Technology Standards, see
http://www.lbschools.net/Main_Offices/Curriculum/Areas/Technology/docs/Common_Core/CCSS%20K-12%20Technology%20Scope%20and%20Sequence.pdf

- **Communicating and presenting information using digital tools:** Evaluate information for presentation; organize and compose slides; utilize design and effects; and include external hyperlinks in slides in order to create cohesive visual aids for presentation.

On the PARCC assessment, students will need to be proficient with basic navigation and computer tools such as drag-and-drop; multiple select; highlighting; word processing; and any accessibility features for students with special needs. Note that both CCSS technology skills and PARCC technology-skills requirements are quite laptop (versus tablet) focused.

> On August 11, 2011, the Federal Communications Commission (FCC) released and later amended a Report and Order regarding E-rate funds which required that, "Beginning July 1, 2012, schools' Internet safety policies must provide for educating minors about appropriate online behavior, including interacting with other individuals on social networking websites and in chat rooms and cyberbullying awareness and response."

Thus, it is important that the District, working with parents, ensure that students have attained some degree of digital literacy by grade 3. This technology training can certainly be accomplished as part of formal instruction in which teachers (in departments and grade levels) develop a set of skills students need to know (perhaps modified from CCSS standards) and focus on integrating these skills in their classes (for example, using word processing tools and key skills could be part of ELA class; spreadsheet use part of math).
These technology skills could be part of the overall learning goals teachers regularly establish for their classes. Or technology training could be carried out by the team of teachers working with the technology integration specialist.

The District might also look at typing and keyboarding classes to be held after school, perhaps with parent or older student volunteers, with existing or free online keyboarding programs[9] or keyboarding apps.

If neither of the above work, the District could ask that parents ensure that children have a certain set of technology skills (particularly in order to complete PARCC successfully). For those children without home access, schools could send students home with a laptop in order to practice.

Digital Citizenship
Digital citizenship includes a whole range of norms around technology use—behavior, acceptable use, cybersecurity, knowing how to deal with social media (That *Facebook* post can come back to haunt you!), caring for equipment, netiquette, Internet safety, cyberbullying, copyright, intellectual property, etc.

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[9] See http://www.nchsoftware.com/typingtutor/ or http://www.typingweb.com/

Presently, it appears that digital citizenship is taught as part of the health curriculum, but it may be more logical to move this responsibility to the library media specialist. If the District does not have a digital citizenship curriculum, it could start with:

- **Common Sense Media** (CSM): http://www.commonsensemedia.org/educators/curriculum
- **Digital Driver's License:** https://otis.coe.uky.edu/DDL/launch.php
- **Isafe**: http://isafe.org/wp/

The District could register with a free resource like CSM or DDL and use their no-cost curricula with students, perhaps during the first week of school. After this, students might have to take some sort of a quick test to demonstrate that they've learned big ideas and sign an Acceptable Use Policy, which if they violate, involves some sort of consequence or loss of technology privileges.

The District might also look at granting *Computing Drivers Licenses*. Before students get their laptops, they have to earn their "driver's license," which proves they've passed a test on proper computer care and usage, including how to navigate, how to stay safe on the Internet, how to turn the wireless on and off, how to connect the computer to the network, how to charge, etc. Many districts have instituted such policies.

One of the best ways to keep devices in good condition is by creating a sense of value around devices. Students need to understand what a privilege it is to have a classroom laptop, Chrome book or tablets, and that if devices are abused, they may not be available. Many districts instill this sense of value by having student technology leaders conduct a technology orientation with fellow students and using "Student Technology Monitors" to monitor and report on students' technology use. The District might also want to enlist a team of students (Technology Leaders) to set consequences for violation of AUPs or inappropriate/unethical activities with technology or device abuse. This would put students in charge of making each other accountable for appropriate use. It is also the consultant's experience that students are often much more demanding of and rigorous with one another than adults area.

> *We need a class on how to better use technology, like a computer class on what to do and what not to do, like you can't eat over them, and what are appropriate uses. Right now lots of kids don't know how to use certain programs because they only use technology at home for entertainment and they don't know how to behave with technology—they rip pff keys. We need DARE for computers.*
>
> Student

Information Literacy

[43]

Because it is part of wise use, because it is required by CCSS, because they dovetail with and complement the District's Habits of Mind, and because true digital "literacy" demands that students must be critical consumers and producers of information, it is imperative to improve students' information literacy skills. The American Association of School Librarians (AASL) has a number of online resources to assist districts and media specialists in this endeavor.[10] The State of Massachusetts also outlines information literacy standards by grade level for Massachusetts students[11] (below).

> **Students should be able to do online research and evaluation:** *Conduct keyword searches on major search engines; identify ethical sources of information; and examine and evaluate information for validity in order to find and use online information in their test answers.*
>
> Common Core State Standards

The Recommended PreK – Grade 12 Information Literacy Skills Standards fall under eight broad categories:

Standard 1. Define an Information Task
Students will be able to define problems competently and identify information needs.

Standard 2. Develop Information Seeking Strategies
Students will be able to develop strategies to find information relevant to their question or personal need.

Standard 3. Locate and Access Information
Students will be able to access and gather information efficiently and effectively.

Standard 4. Use Information
Students will be able to evaluate resources for their appropriateness, select the best and extract the most relevant information.

Standard 5. Synthesize Information
Students will organize new information from multiple sources to construct a product that communicates the results of their research

Standard 6. Participate in Collaborative Activities
Students will participate effectively in groups to pursue and generate information.

Standard 7. Evaluate the Process and the Product
Students will evaluate both the research process and the final product. This may include both self and peer evaluation.

Standard 8. Appreciate Literature
Students will gain an increased enjoyment of literature and grow in their abilities to locate and select appropriate reading materials independently.

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[10] See http://www.csulb.edu/~lfarmer/infolitwebstyle.htm#Overview
[11] For more information on Massachusetts' Information Literacy standards, see http://maschoollibraries.org/dmdocuments/MSLAStandards2.pdf

Though this has been repeated in other recommendations, a key component of effective digital citizenship is to make sure that the District update its Acceptable Use Policy to include, for example, other types of technology besides computers; to develop a social media policy; to develop student technology leaders as part of distributed technology leadership (Recommendation 1); and to involve students and parents in the updating and development of existing and new policies. As part of the latter, students and parents could do outreach to other students and parents soliciting their ideas for an AUP and sharing outcomes of updated AUP. This could help to develop a common vision of how technology should be used; greater awareness of the shared responsibilities of schools, parents and students; and greater buy in and awareness of appropriate technology behaviors and uses at home and in school.

> *A lot of kids are distracted by technology. They don't know how to determine what is good information and what isn't.*
>
> Parent

Recommendation 7: Make teaching and learning with technology the main District priority for the next two to three years

School districts often suffer from "initiative creep"—numerous initiatives that, though all working toward the same broad set of goals (improved student learning) are often presented, talked about, implemented and evaluated independently of one another, with the resulting perception that they are all distinct, and yet all of equal priority. This lack of articulation and coherence often results in a sense of confusion about priorities, implementation overload, some degree of cynicism and resistance about change, anxiety, and initiative/innovation fatigue by those in char ge of implementing such initiatives—principals, assistant principals, and teachers.

> *If technology is going to be the focus, then it has to be THE focus. It will be hard to get staff on board unless it is main focus.*
>
> Teacher

Therefore, the 7th recommendation in this report is that the District, because of its significant human and financial investment in technology, focus its energies and efforts in the next two to three years on using technology to improve the efficiency and quality of teaching and learning and to support the cultivation of Habits of Mind.

Why two to three years?
Much, or most, of year 1 will be about getting the human and institutional system "up to speed" to match technology investments—technology training and professional development on technology integration for teachers; online assessment with PARCC; building students' technology skills so they can successfully complete a high-stakes online assessment; revising technology-related procedures; ironing out the inevitable implementation glitches and conflicts that occur with new hardware, software, firmware

and a network; developing new technology-related policies; developing a centralized, managed technology network and system with policies, procedures and plans; and helping all District stakeholders learn how to operate within this new system.

Change is a long process (research estimates 5-7 years for changes to take hold and be institutionalized), thus teachers will need time (and ongoing professional development and support) to see what functioning technology can do and to use technology to deepen and extend critical concepts in their subject areas. Once (and as) teachers develop confidence that the technology works well, confidence in their own skills around technology, and gathered new ideas from colleagues, they can begin to develop appropriate and new pedagogies around this new technology—project- and problem- and inquiry-based learning; true collaborative approaches; flipped learning approaches; exploration of blended learning approaches. Thus, years 2 and 3 could focus on developing these "signature" pedagogies supported by technology. By managing and pacing the change initiative that is technology, there is a much greater chance that it will develop roots and take hold.

How can the District make teaching and learning with technology its main focus?

First, make time to continue discussing, in depth, the recommendations within this report and do so with greater numbers of teachers, students and parents to get greater voice and input and buy-in.

Second, focus all district efforts toward promoting technology integration across all subject areas and grade levels by integrating those initiatives (such as Google Schools, differentiated instruction, Habits of Mind, PLCs) that would appear to be a natural fit with technology and subordinating or setting aside for now those initiatives that are not a natural fit with technology.

Third, build the capacity of administrators and teachers to understand how to use technology to differentiate instruction, use project- and problem-based approaches, diagnose and formatively assess student learning, etc. Administrators have noted the need for greater professional development around technology and the need to "understand what's out there." They will be critical drivers of effective technology integration at their schools. The District can set up regularly scheduled visits to schools and staff meetings by the technology integration specialist, library media specialist and IT staff to share best practices in other schools and check in with teachers to see what they need in order to follow up with teachers in their classrooms.

Fourth, use PLC time for technology professional development and planning, as has been mentioned in Recommendation 4. For example, teachers' professional learning communities could focus on technology integration, exploring different instructional models (various blended learning approaches, flipped instruction, etc.), developing common assessments, interdisciplinary activities, content-based activities that use technology, technology-based formative assessment, and so forth.

Fifth, after teachers have had time and professional development, make effective technology integration a component of the teacher evaluation system, if it is not already.

Sixth, disseminate good practice with technology so that all Ipswich community members—in and outside of the formal educational system—see that it is a priority and that good practice is noted and rewarded. This can occur via constant updates to the website and through social media tools (Twitter, Instagram, Tumblr, YouTube, Pinterest); by contacting local television and newspaper; by conference presentations (ISTE, Mass CUE) and writing (*T.H.E Journal* or *Learning and Leading with Technology*); through external incentives and gifts to teachers and classes who do an interesting/valuable/powerful learning or community-service activity using technology (perhaps even having local community members and businesses donate gifts and preside on a team of judges who assess these projects).

Finally, evaluate what works and what does not work, so it can be fixed, or expanded or abandoned. There should be some empirical evidence—to inform the District about what technology-related practices are working—and qualitative data to inform the District why they are or are not working.

Recommendation 8: Involve parents and the community more formally in these new technology initiatives

Finally, as the District moves forward with technology, it is important to reach out to and involve parents and the community at large. The parents with whom the consultant spoke (an admittedly small sample size) are presumably quite involved in schools and yet seemed unaware of how problematic the District's technology woes were. It is critical to reach out to parents beginning in the 2014-2015 school year when new technology is in place. This can be done through open houses, school visits, and by constantly updating the District website so that parents see it as a dynamic resource.

As noted above, the consultant did not interview enough parents to say this with 100% confidence, but my sense from those interviews is that parents see teachers as the primary custodians, gatekeepers and instructors of their children's technology use—and I sense a strong fear and reluctance among Ipswich School District staff to require anything of parents.

However, parents should also understand that they too have a formal responsibility in terms of their children's proper use of new technology. Most do—they just need to be reminded or made aware or invited into a partnership around this. Therefore, on Back to School Night or some parent gathering at the very beginning of the school year, it is important to talk with parents about responsible use of technology in school and at home, or their responsibilities as custodians of children's technology use, and to go through newly updated Acceptable Use Policies. It's also important to make parents and students aware that the use of technology in Ipswich School District is a privilege, not a right, and with this,

comes shared responsibility. Technology controls in school (filters, etc.) can technically "parent" children and teens about acceptable technology use, but as in other areas, this is much better done by parents and teachers working together to instill in Ipswich students an appreciation of both the real benefits and the drawbacks and dangers of technology use.

It will be important to inform parents of instructional changes that will occur as a result of greater technology integration (especially if more teachers employ blended learning or flipped learning approaches). Like students, it will be important to meet parents where they are so they can support district technology initiatives and become advocates for the District.

It will be important also to educate community members at large about technology. Older community members may think of technology as something that is frivolous or for entertainment purposes. They may look on it with suspicion or not understand that the ability to use technology successfully to complete a particular set of tasks is a foundational literacy, like reading, writing or numeracy. The District and schools should think of ways to bring community members to schools so they can see the value of technology. Additionally, learning activities (with and without technology) can be community based and service based. This greater integration between schools and the community can hopefully promote greater understanding about the changing needs of schools and more good will between the two.

Section VI: Appendices

Appendix 1: Data Analysis

The majority of data in this report was gathered from interviews with the data sources listed in Appendix 2. Interviews were transcribed and sent to interviewees for fact-checking and verification (except in the case of students and parents). Therefore, almost all interviewees have exact manuscripts of what they reported to the consultant.

Interview transcripts were imported into the qualitative analysis software, *NVivo*, and inductively coded (because of the short duration of the consultancy, the consultant did not have sufficient time to do the iterative coding that should be the standard). This allowed the consultant to check her own broader perceptions against actual data and warded against bias on the part of the consultant. Coding also allowed for more rigorous and more fine-grained analysis, revealing patterns that might not be evident without the coding process (One example was the emergence of standardization of technology as a key theme through). Codes were aggregated to identify themes (reported throughout this plan) and dominant themes were generated as frequency tables and, where appropriate, presented to the Technology Committee as part of discussions around this technology plan.

The following table outlines these codes, the number of references for each, and the percent of total responses of each

Name	References	% Total Responses
Access	85	18%
Coherence	18	4%
Current tech use	35	8%
Current tech use-Data collection	1	0%
Current tech use-Differentiated instruction	1	0%
Digital citizenship	5	1%
Effective use of technology	2	0%
Frustrations with tech	70	15%
PD-as needed	2	0%
PD-ongoing	8	2%
PD- effective use of tech	4	1%
PD-coaching	4	1%
PD-curriculum design	2	0%
PD-differentiated	1	0%
PD-funding	1	0%
PD-linked to content	2	0%

PD-More	3	1%
PD-open classrooms	4	1%
PD-personalized	5	1%
PD-PLCs or collaboration	5	1%
PD-self-paced	3	1%
PD-skills training	6	1%
Prioritize tech	4	1%
Real-time assessment	10	2%
Reliable tech	40	9%
Rich content	1	0%
Seamless tech	0	0%
Space issues	5	1%
Standardization	14	3%
Tech integration	10	2%
Tech leadership	1	0%
Tech support	6	1%
Tech-benefits of	40	9%
Tech-benefits-assessment	1	0%
Tech-benefits-Internet	1	0%
Tech-benefits-IWB	14	3%
Tech-benefits-videos	1	0%
Tech-desired use	36	8%
Tech-ease of use	1	0%
Tech-equity issues	1	0%
Types of tech	1	0%
Types of tech activities	1	0%
Ubiquitous computing	4	1%
Vision for tech	6	1%
Total number of mentions	465	

Appendix 2: Data Sources

The information represented in this report was gathered from a variety of written resources and interviews with Ipswich School District stakeholders (superintendent, school principals, teachers, students, IT department, library/media specialist, and parents) all of whom, except for students, are identified by name below.

A. Interviews

Dr. William Hart
Superintendent of Schools

Chris Burke
Technology Integration Specialist

Jeannie Frash
Director of Technology

Bill Ford
Technology Specialist

Derek Deacon
Technology Specialist

Alison Connelly
Library/Media Specialist

Schools

Paul M. Doyon Memorial Elementary School

Ipswich Middle School

Sheila Conley
Principal

Dave Fabrizio
Principal

Betsy Castonguay
Teacher

Kathy McMahon
Assistant Principal

Amy Gregory
Teacher

Amie Morrison
Teacher

Susan Merrill
Teacher

Lauren Peck
Teacher

Susan Speak
Teacher

Kim Chalifour
Teacher

Andrea Welch
Teacher

Joanne Ryan
Teacher

Grade 4-5 five students

Jake Patterson
Teacher

Erin Smith
Teacher

Glen Foster
Teacher

Lauren Yeannakakis
Teacher

Chris Senechal
Teacher

Grade 6-8 students

Ipswich High School

Winthrop Elementary School

Becky Bascom
Teacher

Jamie Archung
Teacher

Suzanne Bediz
Teacher

Melissa Diodati
Teacher

Jeff Carovillano
Assistant Principal

KrisAnn Dooley
Teacher

Dave Dalton
Principal

Lauren Gouzie
Teacher

Bill Gallant
Teacher

Lauren Grogan
Teacher

Mary Manos
Teacher

Molly Lacolla
Teacher

Gail Pepe
Teacher

Katy Norris
Teacher

Andy Sargent
Teacher

Robbyn Wile
Teacher

Tim Sidmore
Teacher

Molly Smith
Teacher

Colleen Werner
Teacher

Students

Parents

Kelli Bovio   Jess Murphy

                                           Tina Pezza
Mike Dolaher

Bob Hickey   Erika Turner

Edward Kloman   Ian Waters

Toni Mooradd

B. Survey

Seventy-four percent (131 of 176 teachers) also completed an online survey of 17 categories (68 items) which served as a needs assessment and asked about current and desired technology practices. Those data have also been integrated into this plan. All survey results may be found on the District's *Survey Monkey* site.

Appendix 3: Recommended Improvements

		Current State	Recommendations	TL
Infrastructure	Fiber WAN	• Single fiber from each school to the Town Hall • Used for Munis access only	• 10G single mode fiber connecting 4 school buildings (HS/MS, DOY, WIN, Central) • Use existing Gould transceivers connected to 10G SM GBICs in layer 2 switch at Town Hall. Router, Firewall and Servers located at HS/MS	1
	Firewall	• Untangle on old computer (free web filter)	• FortiNet 600C or better	1
	Routers	• None, using multiple NICs in computers	• (4) Layer 3 switches, one at each building or (1) core router at HS/MS	1
	Switches	• Mixed types of switches, most unmanaged,	• Managed, Layer 2, stacked, fiber connected between closets	1
	ISP	• MS/HS-Comcast Business (50/10), Elem-Comcast Free (25/5)	• Verizon FIOS (150/65) and Comcast Business (25/5) failover – evaluate dedicated line in 3 years	1
	Wireless Access Points	• Aerohive 330 (HS/MS), Miscellaneous home wireless routers (Elementary)	• Expand Aerohive solution (HS/MS), Extend Aerohive solution (Elementary) • Implement secure wireless networks (SSIDs) for school devices, BYOD devices and guest access	1
	Servers	• Different OS on the main File/Print servers in HS/MS • Old version of OS on servers in elementary schools • Servers are not all on the same domain	• Windows 2008 or better servers centrally located providing the following services: One Active Directory domain, one AD integrated DNS, one Firewall/Web Filter, DHCP, file access, print access, central backup service, antivirus and software update services, inventory and software tracking	1
	Racks, UPS, Closets	• Racks are used for switches not servers • UPS's none in wiring closets • Some closets are not properly	• Install servers on racks • Calculate size and install UPS's • Provide air conditioning for some wiring closets • Provide enclosed sound proofing racks for tech office/wiring closets	1

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		• ventilated • Some closets also double as tech office	
Wiring	• Cat-5 in Elem, Cat-5e in MS/HS	• Replace wiring in Elem with Cat-6, run additional drops to ceiling in HS/MS for wireless	1
Backup System, Antivirus PA system	• Files backed up to servers and ext. • HDs using CrashPlan • Free version of MS Security Essentials AV • IED 8000 in HS/MS • Phone integrated system in WIN and switch system in DOY	• Centralized enterprise backup solution with offsite option • Centralized antivirus solution for updating, tracking and reporting	
Phones	• Different phone systems in schools	• Central VOIP system on fiber network	3
Surveillance	• 4 surveillance cameras – HS/MS	• Extend Surveillance system to Elem	3

		Current State	Recommendations	TL
Accounts, Data and Information Services	Network Accounts	• Ldap accounts (HS/MS), Windows AD accounts, 2 domains, generic student accts (elementary) • Google accounts not synced with AD	• One Windows Active Directory Domain account for all students (Grades 3 – 12) and all staff • Google Apps account synchronized with Active Directory accounts	1
	Network File and Print access	• Ldap access to file shares (HS/MS), Windows home folders (elementary) • Google Drive folders for all students (Grades 3 – 12) and all staff No print servers (HS/MS)	• Networked home folders and shared folders available on local servers for in-school access and local applications • Print service setup by location with authentication for student access on strategically located printers in all schools • Google Drive folders for all students (Grades 3 – 12) and all staff	2
	Email	• MecNet mostly converted over to Gmail – not archived	• All users switched to Gmail only Archived using Gaggle	1
	Student Info, Health, Grades	• MMS used for all schools student info and health info • MMS used for grades by HS/MS, no gradebook for elementary	• Activate online registration in MMS, implement SIF • Extend MMS grading system to elementary schools or switch to Edline equivalent • (Switch to Aspen when data has been consolidated)	2
	Employee Info	• Munis contains all employee info	• Synchronize MMS course scheduling with Munis for EPIMS and SCS Integrate Munis and MMS accounts with Active Directory accts	2
	Special Education	• ESPED not synced with MMS	• Synchronize SPED info with MMS (or switch to Aspen)	2
	Lunch POS	• Lunchbox not synced with MMS	• Implement new centralized lunch POS system and synchronize with MMS	2
	Media Checkout	• Destiny in MS/HS not synchronized with MMS • Library World systems in elementary schools	• Centralize Destiny system for all schools • Synchronize Destiny accounts with MMS	2
	Curriculum, Grades	• Examview, Moodle, Atlas used by some	• Web-based grades assessment program, Web-based curriculum mapping system synchronized with Active Directory accts	2

		Current State	Recommendations	TL
	assessment			
	Online Payments	• Online payments system is not connected to the lunchbox program	• Integrate online payment system with centralized lunch POS system Enable online payment system for all other fee collections	2
	Notifications, Parent Communications	• Parents subscribe to the listservs on MecNet • Website on MecNet maintained via FTP • Google Sites/Moodle/MMS portal for assignments and projects	• Implement school messaging and emergency phone calling system synchronized with MMS and Munis for student, parent and staff notifications • Edline equivalent synchronized with MMS for assignments and grades publishing	2

		Current State	Recommendations	TL
User Equipment and Applications	Desktops, Laptops, iPads/Tablets, BYOD	• Outdated computers – some not in use • Laptops need upgraded image • Unmanaged tablets of various make and models • BYOD unregistered devices	• Upgrade desktops older than 6 years or replace with virtual desktops Upgrade laptops older than 4 years – replace with tablets or Chrome books • Organize tablets for synchronizing apps and managing updates • Register BYOD devices	2
	Printers	• Old printers in classrooms – some not used	• Replace all printers with a few good production models strategically located throughout the schools	2
	Projectors. Interactive Whiteboards	• Promethean boards (DOY), Eno boards (WIN), Promethean boards (MS), Interactive projectors (HS/MS)	• Install at least a wall or ceiling projector in every classroom and lab • Interactive projectors in HS/MS classrooms • Standardize the interactive whiteboard model for additional purchases	2
	Document Cameras, Handheld Devices	• Some in use in some classrooms	• Standardize the model of document camera and provide in classrooms where requested	2
	Sound Systems	• None	• Install ceiling sound systems in every classroom and lab	2
	Word processing,	• Google Docs	• Use Chrome as standard browser, Google Docs as standard office	2

spreadsheets, presentations	• MS Office (Outlook, Word, Excel)	suite • MS Office for specific applications (Offices, Physics computers, other computers as required)	
Email client	• MecNet and Gmail	• Gmail only	1
Art Programs	• Old version Adobe Suite	•	2
Music Programs	• Using old computers not compatible with new music software	• Upgrade computers – select a standard music application (ie: Garageband on iMac)	2
Math/Science/ELA	• Old version SolidWorks (CAD) LabQuest, Logger Pro Many versions of math programs	• Update Solidworks to network version Update LoggerPro and evaluate new science and math apps for tablets or chromebooks	2
Test Generation	• Examview, TestWiz	• Use program integrated with AD or synchronized with Google Apps Would be helpful to integrate with a gradebook also (Edline?)	2
Elementary Apps	• Kidpix version 4, free typing program	• Implement district typing program with synchronized accounts	2
Special Education	• Old versions of Kurzweil and Lexia Proloque2go and other apps on tablets	• Update required SPED applications • Evaluate new available apps	2
Web Apps, Apple Apps	• Various apps used in all schools	• Establish a system for managing apps, purchasing apps, updating apps and sharing information on recommendations and use of apps	
e-textbooks	• Miscellaneous free resources	• Select a system for e-textbooks (example: net-texts.com)	2

		Current State	Recommendations	TL
Support	Work Order System	• none	• Centrally managed work order system integrated with the inventory database Online web-based form with authentication for submitting tech work requests Work order solutions documented and easily queried	1
	Inventory	• Incomplete • Excel spreadsheet (HS/MS), SpiceWorks (Elementary)	• Central tech inventory database easily assessable by all tech staff Must contain warranty information, purchase date, school location information All equipment tagged with inventory sticker	1
	FAQ access	• none	• Published FAQ website with updated procedures for common requests	2
	Help Desk	• Email, phone or stop in hallway	• Organized student "Help Desk" course directed by the technology staff to provide additional first tier support	2
	Staff	• Three Tech Specialists, Instructional Technology Coordinator	• Three Tech Specialists, Instructional Technology Coordinator, IT Director	1
	Computer imaging service	• Acronis	• Enterprise version of Aronis available in all schools	2

Appendix 4: Proposed Summer Professional Development Plan

Professional Development Opportunities
Summer 2014

The Professional Development Committee is pleased to offer several new exciting programs to match your PD needs this summer. Note that there are changes to how the experiences are scheduled. Please read this carefully and see one of the PD Committee representatives if you have questions.

Opportunity #1 – **Curriculum Writing Course** – The Center for Collaborative Education (CCE) will facilitate this three day course designed to equip you with tools and strategies for creating and planning effective curriculum. The 3-day course will run June 25, 26, 27 with 2 optional days of June 30 and July 1 for writing curriculum. There are two options for taking this course:

> Option A: I would like 3 Ipswich University Credits – You must be present at the course all 5 days: June 25, 26, 27, 30 and July 1st and complete all course work and hours.

> Option B: I don't need Ipswich University Credits. Instead of Ipswich University Credits, you may receive compensation of $150/day to take the 3-day course, plus Professional Development Points.

Opportunity #2 – Curriculum Writing – There are funds available at each school building for teachers to receive compensation of $150/day to work on curriculum writing with grade level/department partners or teams. Involvement in the Compass Training or the summer Curriculum Writing Course is a pre-requisite for this opportunity. You must consult your building principal. Building principals have final discretion for this opportunity.

Opportunity #3 – Summer Learning Seminar – August 4-8, 2014 has been scheduled for a week of innovation and renewal. Instead of a one-topic course, a week's worth of 2-3 hour workshops on a variety of topics will be offered by outside presenters and our own professional staff. You can attend for the entire week or choose the topics that most interest you. PDPs will be awarded for each hour of attendance. Here is a sneak peek at a few of the topics that might be presented:

*Using apps in your classroom	*The Flipped Classroom
*Differentiated Instruction	*CPI – restraint training

*Google in the classroom	*CPR
*Aligning the Common Core	*Using Skype with students
*Next Generation Science Standards	*Aspen

Opportunity #4 – Presenter at Summer Learning Seminar - Do you have a topic that you are passionate about and would be valuable to your colleagues? We are seeking presenters for the Summer Learning Seminar! Compensation is available on an hourly basis.

**Professional Development Opportunities
Summer 2014**

If you are interested in participating in the summer PD opportunities, please complete this registration form and return it to Kathy McMahon at the Middle School by Friday, May 9th. This will help the PD committee gauge interest and begin planning.

Opportunity #1 – Curriculum Writing Course

___ I am interested in this course

___ Option A: I would like 3 Ipswich University Credits

___ Option B: I would like compensation of $150/day

Opportunity #2 – Curriculum Writing

___ I am interested in participating in summer curriculum writing days. I understand that participation in Compass Training or the Curriculum Writing Course is a pre-requisite.

Opportunity #3 – Summer Learning Seminar

___ I am interested in the workshops offered during this week. I would like more information as it becomes available.

Opportunity #4 – Presenter at Summer Learning Seminar

___ I am interested in presenting at the Summer Learning Seminar and would like an application sent to me.

Name_____ **School**_____

Email Address_____

Appendix 5: References

Anderson, R., & Dexter, S. (2005). School Technology Leadership: An Empirical Investigation of Prevalence and Effect. *Educational Administration Quarterly*, *41*(1), 49–82. doi:10.1177/0013161X04269517

Becker, H.J., Ravitz, J.L. & Wong, Y.T. (1999). *Teacher and teacher-directed student use of computers and software.* Center for Research on Information Technology & Organizations, University of California, Irvine and University of Minnesota. Retrieved May 10, 2014 from http://www.crito.uci.edu/TLC/FINDINGS/COMPUTERUSE/REPORT_3_PDF_REV.PDF

Burns, M. (2007, September). A means to an end: Technology integration. *Threshold: Cable in the Classroom.*

Carleton, K. (2014, April 30). Email communication.

City, E.A., Ellmore, R.F., Fiarman, S.E. & Teitel, L. (2010). Instructional rounds in education: A network approach to improving teaching and learning. Cambridge, MA: Harvard University Press.

Cohen, D. & Hill, H. (1997, March). *Policy, practice and learning*. Paper presented for the American Educational Research Association Annual Meeting, Chicago, IL.

Fixsen, D. L., Naoom, S. F., Blase, K. A. & Friedman, R. F. (2005). *Implementation research: A synthesis of the literature.* Retrieved from http://tinyurl.com/bn6w5k8

Grady, M.L. (2011). Leading the technology powered school. Lincoln, NE: University of Nebraska Press.

Ipswich Public Schools. (n.d.). Retrieved from http://www.ipswichschools.org/

Ipswich Public Schools. (2008). *Technology plan 2008-2011.*

Marzano, R.J. (2009, November 10). Teaching with interactive whiteboards. *Educational Leadership* (67), 3, 80-82. Alexandria, VA: Association for Supervision and Curriculum Development

Russell, M. & Abrams, L. (2004). Instructional uses of computers for writing: How some teachers alter instructional practices in response to state testing. *Teachers College Record*, *106,* (6): 1332-1357.

Sivin-Kachala, J. & Bialo, E.R. (2000). *2000 research report on the effectiveness of technology in schools.* Washington, DC: Software Information Industry Association.

Von Frank, V. (Ed.) (2008). Finding time for professional learning. Oxford, OH: National Staff Development Council

Wenglinsky, H. (2005). Technology and achievement: The bottom line. *Educational Leadership,* 63(4): 29-32.

Wikipedia. Retrieved from http://en.wikipedia.org/wiki/Ipswich,_Massachusetts