COMMUNITYREVIEW

SMALLab at Elizabeth Forward Middle School / Photo: James Knox, Pittsburgh Tribune-Review

2012 - 2013 Community Review of Technology and Learning Environments Wilmette District 39

COMMUNITY REVIEW COMMITTEE
Key Recommendations

This report was approved by general consent of the 2012-2013 Community Review Committee at the May 6th, 2013 regular meeting . Each recommendation was separately balloted with the results shown in the table below (similar recommendations by separate sub committees have been grouped together):

Recommendation	Voting Results	Full Text
Pursue 1:1 Device Availability in the District	**Approved 16:2**	page 17, #1
District 39 should pursue a 1:1 learning environment	**Approved 16:2**	page 36, #1
Establish a District 39 Incubator for Technology Enabled Learning Environments	**Approved 18:1**	page 17, #2
Establish a Technology Enabled Learning Environments Traveling Committee	**Approved 19:0**	page 18, #3
Develop an exploratory committee and travel to local and national sites	**Approved 18:1**	page 25, #1
Maintain Focus on Technology Enabled Learning Environments Training for Educators	**Approved 18:1**	page 18, #4
Pursue the Development of New 21st Century Learning Spaces in the District	**Approved 19:0**	page 18, #5
Create a new 21st century learning space in each school in the District	**Approved 19:0**	page 26, #2
Develop Technology Training and Support Systems for Parents and Students	**Approved 19:0**	page 19, #6
Establish a Technology Enabled Learning Environment Communication Plan	**Approved 18:1**	page 19, #7
Engage Parents and Students as Stakeholders in the Process of Adopting New Technology	**Approved 19:0**	page 19, #8
Open up District 39 technology resources, spaces and learning opportunities to the broader Wilmette Community.	**Approved 15:1**	page 19, #9
Include Youth in the planning and design of new learning spaces	**Approved 19:0**	page 26, #3
Explore possible partnerships for funding and curriculum support	**Approved 19:0**	page 26, #4
The district should develop a formal staff development plan for 1:1 learning environments	**Approved 16:2**	page 36, #2
Prepare the network infrastructure where necessary to support a pilot program	**Approved 16:2**	page 36, #3
Identify electronic curriculum content and other resources for 1:1 learning devices	**Approved 17:1**	page 36, #4

CRC Voting Members Present During Voting:	Mary Condon; Adam Denenberg; Lisa Fabes; Jill Forti; Allison Gavin; Amy Hague; Melanie Horowitz; Craig Howard; Sue Kick; Lauren Kolod; Kate Lindberg; Ann Meyer; Heather Oliver; Joyce Pollack; Jim Reddinger; Venetia Vaselopulos; Barbara Weiner; Denise Welter; and Leslie Weyhrich
CRC Voting Members Absent During Voting:	Karen Bryant; Elise Crawford; Kirsten Engel; Amy Hague; Anne King; and Steve Rivkin
Other:	Steve Rivkin stated "I respectfully dissent from the findings and recommendations of the CRC Report entitled '2012-2013 Community Review of Technology and Learning Environments'"

COMMUNITY REVIEW COMMITTEE
2012-2013 Membership

Executive Board

President - Keith Fishe
Vice President and Secretary - Kate Lindberg
Past President - Julie Arment
Superintendent - Ray Lechner

CRC Members: PTA and PTO Representatives

Keith Fishe - Central School
Kate Lindberg - Central School
Kirsten Engel - Harper School
Steve Rivkin - Harper School
Elise Crawford - McKenzie School
Joyce Pollack - Romona School
Barbara Weiner - Romona School
Mary Condon - Highcrest Middle School
Ann Meyer - Wilmette Jr. High School
Leslie Weyhrich - Wilmette Jr. High School

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Julie Arment - At Large Member
Lisa Fabes - At Large Member
Amy Hague - At Large Member
Craig Howard - At Large Member
Anne King - At Large Member
Heather Oliver - At Large Member
Jim Reddinger - At Large Member

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Ray Lechner - Superintendent
Melanie Horowitz - Administrator for Curriculum and Instruction

Lauren Kolod - Central School, Technology Teacher
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Sue Kick - Harper School, Principal
Denise Welter - McKenzie School, Principal
Emily Moore - Romona School, Second Grade Teacher
Venetia Vaselopulos - Highcrest Middle School, Technology Teacher
Jill Forti - Wilmette Jr. High School, Technology Teacher
Allison Gavin - Wilmette Jr. High School, Differentiation Teacher

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By Keith Fishe and Kate Lindberg

This year, the Community Review Committee (CRC), undertook a timely and important issue that is relevant to all District 39 schools and students. The CRC choose to study Technology and Learning Environments, investigating the practices used within the district as well as exploring methodologies in use by other school systems. The CRC was organized into five working groups: (1) District Strategy; (2) Learning Spaces; (3) Instructional Approaches; (4) Overview and Current Practices within District 39; and (5) Project Management and Quality Control. Related sub-topics were also researched such as adopting 1:1 technology, flipped learning, game-based curriculum, tech-focused learning commons, and problem or project based learning.

Education models are changing at all levels, mostly as a result of technology innovations. At post-secondary levels, there has been a surge of MOOC, Massive Open Online Courses, provided by institutions like Stanford, Wharton, MIT, Carnegie Mellon and Johns Hopkins just to name a few. Even at the K-12 levels, open online resources for core topics like math, science, reading comprehension and others are

becoming ubiquitous. In a survey conducted by the CRC, dozens of parents expressed their enthusiasm for Khan Academy, an open online website supported by the Bill and Melinda Gates Foundation. These courses are free and available to anyone, of any age, with time and interest to pursue. While public and private universities, with substantial investments in physical campuses, work to differentiate their on-campus educational experiences from on-line courseware, K-12 schools will have the opportunity to learn from their choices, enriching the in-person experiences while augmenting education through on-line modalities.

The committee has researched, conducted site visits and surveyed teachers and parents on various technology related topics, including 1:1 technology plans. Technology enabled curriculum is more than just having children use laptops or tablets. Our committee has looked at technology-rich learning environments that allow students to build all manner of ideas, from robots to automatic pet feeders. We looked at environments that fostered creativity in music, film and other arts. We found school systems that have created partnerships

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with Universities to design and build flexible learning environments, equipped with tools and components to allow kids to explore STEM (Science, Technology, Engineering and Math) and STEAM (STEM plus Arts) activities within and outside of the curriculum. These environments are often created from existing school facilities and sometimes have expanded hours of operation.

Trends in higher education point to less and less use of physical textbooks and greater use of electronic formats. Textbook obsolescence might occur faster than we think. We should ask ourselves what the implications of this would be. At what point will physical textbooks be less common than electronic versions? At what age do children need to learn to read and use e-books to achieve equivalent fluency and comprehension compared to traditional books or printed materials?

Dependency on electronics can create new impediments for students that will need to be addressed. While glitches are infrequent, they do occur and can certainly affect student performance. Consistent but tolerant policies need to be developed to maintain fairness for all students. While 1:1 initiatives often mean devices are assigned to students for use at school and home, it can also mean that a device is available for each student but the device remains at school. Such a limitation would be appropriate for younger students.
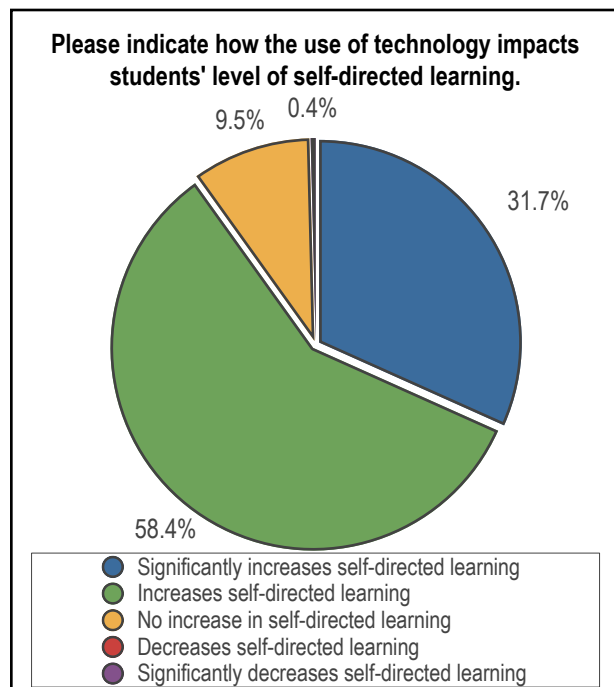
Over 60% of the teachers that were surveyed believed that technology increased their direct interaction with students. Just as important, over 90% of teachers indicated that technology increased self-directed learning.   These results align with new teaching methods like Flipped Learning, where direct instruction is provided as homework via video or other mediums and typical homework problems are completed in the classroom with increased teacher-student interaction. Flipped Learning has been shown to increase student teacher instruction time – providing important moments of low student to teacher ratio contact. The district should consider the age at which flipped classrooms are most effective in increasing differentiation and 1:1 teacher to student opportunities?

Over 54% of parents in District 39 view technology used as a learning tool as "extremely important" and an additional 37% view it as "important." While there is overwhelmingly strong support for the use of technology enabled learning, the parent survey participants (770 respondents) shared diverse views in the comment sections of the survey ranging from "more is better" to "less is much more." It is important that the District's School Board and Administration recognize all stakeholders (including teachers, students, and parents) in the development of the District's strategy vision for technology in order to allow for collaborative use of technology enabled learning in District 39 schools.

Please indicate how the use of technology impacts students' level of self-directed learning.

- 0.4%
- 9.5%
- 31.7%
- 58.4%

- Significantly increases self-directed learning
- Increases self-directed learning
- No increase in self-directed learning
- Decreases self-directed learning
- Significantly decreases self-directed learning

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Students at the
STEAM
Showcase /
Photo: John
Altdorfer

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How New Technology and Learning Environments Can Improve 21st Century Learning Outcomes in District 39

The proliferation of new information and communications technology over the past decade has fundamentally altered our lives. Technology gives us access to unlimited information and resources, enables us to create content and share it anytime, and connects us to social networks where we can collaborate globally. The opportunities are limitless, borderless, and instantaneous.

As a result, the learning outcomes required for our children to succeed in the 21st Century are changing rapidly. In a world "of instant and infinite information, it becomes less important for students to know, memorize, and recall information and more important to be able to find, sort, analyze, share, discuss, critique, and create information. They need to move from knowledgeable to knowledge-able." [1] Our children need to be dynamic thinkers who possess the digital literacy needed to identify,

research, and solve complex problems using the information technologies available to them. Also, they must be able to communicate and collaborate across multiple traditional and electronic realms. Our students will not be adequately prepared for their future academic and professional careers without these skills.

These trends are forcing educators to rethink how learning takes place. Fundamental to these changes is a reexamination of the classic classroom-based learning model. [2] In its 2009 report "Tomorrow Is Now: Preparing Our Students for the 21st Century," the CRC recommended that District 39 make 21st Century learning a priority. New technologies and their impact on technology enabled learning environments were among the key themes examined in that report. New technologies are used to augment and sometimes fundamentally change

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the educational process. Learning environments are no longer limited to direct instruction in physical classrooms with rows of desks that face a professor who lectures to a live audience. Empowered by new technologies, successful learning experiences now occur when students collaborate online. These technology enabled learning environments are no longer restricted by time and place. They can occur over the weekend as much as they happen during the normal school day. These changes have precipitated a discussion about not just the use of technology, but about how to use it to create the circumstances for effective learning. [3]

> "If we teach today's students as we taught yesterday's, we rob them of tomorrow."   John Dewey

District 39 already devotes significant time and resources to technology integration. At a basic level this includes teaching students how to use technology in computer labs. However, technology also is being infused into the classroom to supplement, and sometimes fundamentally change, the ways in which teaching and learning take place (See Table 1). Many teachers use technology in their lesson plans. For instance, various electronic devices (i.e. Smartboards, laptops, and iPads) are utilized widely in classrooms. Additionally, outside of school, many students use online learning "apps" to practice their core reading and math skills. Some teachers have made even larger pedagogical shifts and fully integrated technology enabled learning into their daily lesson plans.

Many school districts have found technology harder to manage than other educational tools for two reasons. First, the rate of change in technology is dramatically faster than current school planning cycles are designed to accommodate. The normal curriculum review cycle, where new learning tools and techniques are traditionally installed, is 6 years and sometimes up to 15 years. However, new technologies and technology enabled learning environments emerge daily and require a shorter review and implementation schedule. Second, the propensity of student and other community stakeholders to adopt new technologies is forcing the evolution of teaching strategies at a greater rate than other time in history. They use new technologies to study, research, create content, and communicate, and they expect that their schools will keep up with them. Our schools are not designed to deal with this kind of push from students and the community and have found it difficult to manage. As the pace of technology change accelerates, it is critical that District 39 have the processes and systems to deal with it appropriately. Change, particularly rapid change, has the potential to create conflict between early adopters and those that see the value of doing things the 'old

way', which was reflected the range of feedback received in the Parent Survey.

Another major challenge for schools is how to implement new technology enabled learning environments in schools that don't have the architectural design or pedagogical foundations to accommodate them. How can physical spaces and discrete class periods be changed to fit new learning environments that may not require walls or class bells? How can we revise our budgets to accommodate new investments in the hardware, software, training, and support needed to stay current with new technologies?

This report examines how new technology enabled learning can be implemented to improve 21st Century educational outcomes in District 39. While great teachers remain the bedrock of District 39's strong educational accomplishments, we need to support teachers by helping to identify, test, and implement the best new technology enabled learning tools and environments. Given the current state of technology sophistication in District 39, we believe that this report will make evolutionary (not revolutionary) recommendations for how to better implement technology enabled learning environments in our schools.

BACKGROUND

In the midst of the America's transition from an agricultural-based economy to an industrial-based economy last century, educator John Dewey argued that schools needed to update their curricula and foster individual learning skills in response to evolving social and employment requirements. Dewey stated "If we teach today's students as we taught yesterday's, we rob them of tomorrow." [4] The resulting changes in policy and practice laid the educational foundation that fueled the intellectual and economic growth our country enjoyed throughout the past century.

The ongoing transition from a national industrial-based economy to a global information-based economy makes Dewey's call to action relevant in the 21st Century. To keep pace with rapidly evolving social, academic, and professional requirements, schools must constantly re-invent themselves to engage students and train them in skills that are relevant for success. These "21st Century Learning Skills" consist of subjects and themes that revolve around three core skill sets : [5]

(1) Life and Career Skills: Flexibility and adaptability, initiative and self-direction, social and cross cultural skills, productivity and accountability, leadership and responsibility;

TABLE 1: Summary of Existing Curriculum and Resources

The table summarizes the existing technology curriculum, technology support and environment resources available in the district. Technology is viewed as a tool that is a means for delivering curriculum. The District supports an integrative approach to technology education such that students learn to use technology as it is infused within the curriculum "Infusion Model". Concepts and topics are integrated with the teaching of technology in all grade levels in the district. In grades 6-8 there is no technology class as the teachers are dedicated full time to the technology infusion model. The technology teachers collaborate with all teachers on research and technology-supported projects that enrich the students' learning.

Key for Table 1:
TT	Technology Teacher
TA	Technology Assistant
LT	Librarian Teacher
LA	Librarian Assistant
SH1	Shared Technician 1 (Romona, McKenzie, Highcrest)
SH2	Shared Technician 2 (Harper, Central, WJHS)

Grade	K-4	5	6	7 to 8
Teachers and Support Staff	Per School: 1 TT 1 TA 1 LT 1 LA	2 TT 1 TA 1 LT	Shared resources with 5th grade	2 TT 1 TA 1 LT
Technical Staff	SH1 or SH2	SH1	SH1	SH2
Classroom Time	K - Sign up Only 1st & 2nd - 30 min 1x/week 3rd & 4th - 30 min 1x/week + option for 1 hr flex block	7-week section Part of related arts	Infusion Model	Infusion Model
Library Curriculum	Understand library organization & how to access, evaluate and use information Understand importance of information literacy to become a lifelong learner Understand responsibilities as a user of information	Understand importance of password protection Conduct research online and retrieve information and images to be included in student's work	Evaluate websites for credibility, accuracy, relevance, date, scope and purpose Cite print and online resources using bibliographic citations Create original digital movie projects and songs using media production software	Understand benefits of using online resources and databases Identify location of online databases Understand how to access each both at school and at home Understand merits of using metasearch engines, directories and online encyclopedias
Technology Curriculum	Understand how technology makes life easier Understand basic operations to use technology more efficiently Understand responsibilities as a user of technology Understand using technology as a tool to present and communicate	Design presentations Produce podcasts Develop scripts with audio and video cues Create websites	Understand the research and design process Combine media to present a topic/point Apply technological concepts to learning	Understand the research and design process Combine media to present a topic/point Apply technological concepts to learning
Cyber Safety Curriculum	Understand responsibilities as a user of technology Practice safe and ethical behaviors in personal electronic communication and interaction	Understand internet safety including cyberbullying and digital disrespect Understand copyright laws Understand tenets of good digital citizenship	Understand internet safety including cyberbullying and digital disrespect Understand copyright laws Understand tenets of good digital citizenship	Understand internet safety including cyberbullying and digital disrespect Understand copyright laws Understand tenets of good digital citizenship
Technology Tools	1 iMacTech lab 1 Library Lab 3-4 mobile carts 1 iPad Cart	1 iMacTech lab 1 Library Lab 3-4 mobile carts 1 iPad Cart	Shared resources with 5th grade	4 iMac labs 4-5 mobile carts 1 iPad Cart

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(2) <u>Learning and Innovation Skills:</u> Creativity and innovation, critical thinking and problem solving, communication and collaboration; and

(3) <u>Technology and Information Media Skills:</u> Information literacy, media literacy, information, communication and technology (ICT) literacy.

District 39's strategic vision is to provide a world class 21st Century educational experience for all students where the whole child is nurtured and developed. The District and the Community Review Committee have invested significant time and resources to identify both (a) the 21st Century Learning Skills that are most relevant to our students, and (b) the ways that these skills will be delivered to our students though the curriculum. Eight broad themes have been identified as being essential to preparing our students to meet the challenges and opportunities of the 21st Century:

(1) <u>Global Awareness:</u> Including global perspectives in our history, social studies and language curriculum;

(2) <u>Value-Added Skills:</u> Teaching creativity, flexibility, risk taking, persistence, problem solving, empathy, and enthusiasm for learning;

(3) <u>Communication:</u> Articulating thoughts and ideas through speaking, writing, and other technology enabled media;

(4) <u>Collaboration:</u> Working in groups to improve outcomes;

(5) <u>Social Responsibility:</u> Respect and ethical behavior;

(6) <u>Teaching Style & Learning Process:</u> Adapting teacher behaviors to accommodate new teaching resources and desired educational outcomes;

(7) <u>Technology:</u> Enhancing use of technology within and beyond the curriculum; and

(8) <u>Learning Environment:</u> Aligning the place, time, and tools with the desired educational outcomes.

Recognizing that these themes are interconnected with each other and the core curriculum, District 39 developed the CONNECTED Learning strategy to articulate its vision for delivering 21st Century Learning Skills. Under the CONNECTED Learning strategy, District 39 will be:

Committed to our Core Subjects
Opening minds to a Global Perspective
Nurturing the Characteristics of Successful Learners
Nourishing a sense of Social Responsibility
Empowering Communication skills
Cultivating Collaboration
Transforming Technology into a continuous knowledge tool
Evolving our Teaching styles, learning process and environment
Developing students of tomorrow
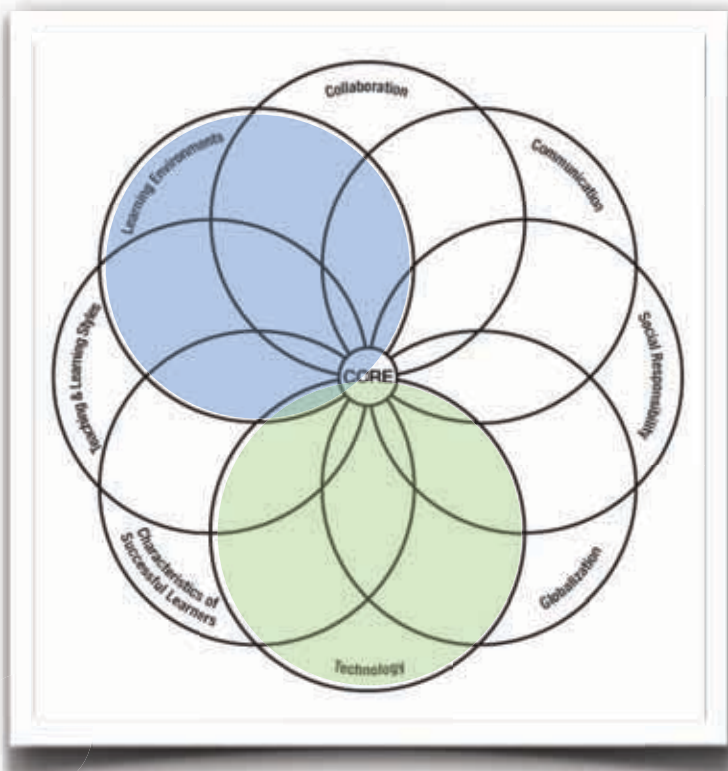
CONNECTED Learning prepares students to become productive citizens of the 21st Century by demonstrating the characteristics of successful learners. Students are inspired to explore and respect world cultures, encouraged to collaborate and communicate effectively, empowered to utilize technology, and motivated to take an active role in building community within and beyond our schools. District 39 provides educators with opportunities for differentiated professional development designed to integrate 21st Century skills into the classroom. The Wilmette community and parents are informed and actively engaged in the development of these 21st Century Learners. In building strong partnerships among students, educators, parents and the community of Wilmette, District 39 is connected to the 21st Century.

District 39 Strategic Guidelines for Technology in Learning Environments

The recommended approach is to adopt proven best practices in the use of technology enabled learning

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environments as appropriate to District 39 following the guidelines as outlined below. The CRC borrowed from a study by the Partnership for 21st Century Learning Skills [6] and District 39's current policy position regarding technology to establish four key guides for use of technology in learning environments:

1. Use Technology to Help Our Teachers Produce Better Learning Outcomes.

   Great teachers are and will always be the foundation of our students' education in District 39. New technologies and technology-supported approaches are powerful tools that should focus on supporting our teachers in their effort to improve learned outcomes. Technology for technology's sake is not the objective. Technology should be one component of a comprehensive approach to help our educators improve how they educate their students.

2. Use Technology to Support Innovative Teaching and Learning.

   To keep pace with a changing world, schools need to offer more rigorous, relevant and engaging opportunities for students to learn and to apply their knowledge and skills in meaningful ways. Used comprehensively, technology supports new, research-based approaches and promising practices in teaching and learning. These comprehensive approaches are termed "technology enabled learning environments."

3. Use Technology to Develop Proficiency in 21st Century Skills.

   Knowledge of core content is necessary, but no longer sufficient, for success in a competitive world. Even if all students mastered core academic subjects, they still would be woefully underprepared to succeed in postsecondary institutions and workplaces, which increasingly value people who can use their knowledge to communicate, collaborate, analyze, create, innovate and solve problems. Technology enabled learning environments should be used in a comprehensive manor to help students develop 21st Century Skills.

4. Use Technology to Create Robust Education Support Systems.

   To be effective in schools and classrooms, teachers and administrators need training, tools and proficiency in 21st Century Skills themselves. More broadly, operating effectively in technology enabled learning environments requires a level of training and support that many of our teachers, administrators,

students and parents have not received. The need for training and support cannot be overstated so that faculty, staff, students and parents can engage in these learning environments and use these tools effectively.

> "Technology is especially wonderful for work with differentiation. It meets the needs of students who need challenge, and it helps students who need a lot of extra help."
> - Quote from District 39 Teacher in the CRC Teacher Survey 2013

What are "Learning Environments" and "Technology?"

For the purposes of this report, the terms "Learning Environments" and "Technology" are defined as follows:

"Learning Environments" are the structures, tools, and communities that allow students and educators to attain the desired educational outcomes. Learning environments can be defined on four dimensions:

1. Space: Describes the physical and digital "places" that house the learning experience. For traditional site-based learning environments, space includes the physical school building and its features (i.e., configuration of classrooms, flexibility of space, function of the library, existence of common spaces, etc.). In addition to libraries and computer labs, learning spaces include newer concepts such as "learning commons" and "Small Labs." Learning spaces can also include the Internet sites where students and educators meet, share resources, communicate, and collaborate.

2. Time: Describes the ways in which the learning experience is organized. This includes class scheduling (i.e., organization of the school year, year-round vs. agrarian school year, period scheduling, flexible scheduling, block scheduling, etc.), student groupings (i.e., age, interest, competency, etc.), and access to learning outside of scheduled school hours.

3. Tools: Describes the learning resources that are employed by teachers, students, and administrators. This includes the physical resources (books, projectors, computers, mobile devices, etc.) and digital resources (software,

networks, applications, etc.) used to facilitate the interaction between students and educators. This report investigates innovative new learning tools such as problem based learning and flipping.

4. Participants: Describes the people who are interacting in the learning experience. It also describes the ways in which they are interacting. In addition to students, this can include live classroom instructors, live online instructors, pre-recorded instructors, other information sources (i.e., subject experts, consultants, etc.), administrators, parents, and other community members.

The classic learning environment is a classroom in which the instructor occupies a position of focus (the place) during a prescheduled class period (the time) and students receive information via lecture (the tool). Modern learning environments, including those in District 39, have evolved into more interactive spaces where teachers and students collaborate and exchange information.

> "Significant advanced planning is required [for access to iPads], but much of the time we have a spontaneous need."
>
> - Quote from District 39 Teacher in the CRC Teacher Survey 2013

New information and communication technologies are enabling further changes to learning environments. New technology enabled learning environments can include online communities (the place) where students gather at will (the time) to peer review an essay (the tool). They can also include traditional classrooms (the place) where students gather at prescheduled times (the time) to execute an online lesson that has been personalized to their specific learning needs (the tool). Pedagogy and the roles for teachers and student can vary significantly based on the learning environment in place.

"Technology" includes the hardware, software, networks, media, and other digital tools that serve the following functions in the educational system:

(1) Student Instruction: Students today can receive instruction, complete assignments and tests, and collaborate with classmates through a wide variety of technology empowered channels. Technology can be integrated into student instruction on four primary levels:

i. Substitution: Technology acts as a direct substitute for an existing tool or process, but there is limited functional improvement to the assignment (Limited Enhancement). Examples include typing an assignment with a word processing program or using a drawing application to draw and label the parts of a plant.

ii. Augmentation: Technology acts as a direct substitute for an existing tool or process, and it provides material functional improvement to the assignment (Enhancement). Students could use an electronic thesaurus or use the word count feature while word processing. Students could also use a math fact review game or input data into a spreadsheet and then create a graph.

iii. Modification: Technology acts as a new learning tool, allowing for significant task redesign and new task creation (Transformation). An example might be to use multimedia to add sound and video to a presentation, elements that were not present in the project before technology was introduced.

iv. Redefinition: Technology allows for the creation of entirely new tasks that were previously inconceivable (Transformation). Examples include using the internet to publish student work, collect feedback from a global peer group, or facilitate collaboration on a group project. Another example is digitally recording student presentations and then using these recordings immediately to illustrate teaching points.

(2) Communication and Data Exchange: All stakeholders in the educational process (administrators, teachers, specialists, students, parents, community members, etc.) need convenient and effective communication channels and methods to exchange data. Traditional methods (including phone, email, mail and live conferences) are now being augmented by new technology enabled methods (including web sites, wikis, blogs, Google Docs, Google Drive, Drop Box, Skype, etc.). These new methods are improving the speed, convenience, reliability, and security of many communications.

(3) Data Collection and Analysis: Our schools produce a myriad of data about student performance and achievement every day. This data can be collected (District 39 currently uses a data warehouse program called INFORM) and analyzed to help us understand and improve educational outcomes. This includes the measurement of learning outcomes from various

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educational tools and strategies (including new technology enabled learning environments). Longitudinal data can be used to track detailed student performance over time and this performance data can be mapped against other individuals and cohorts to both measure relative performance and prescribe individualized learning plans. In addition, the data can also be used to improve the efficiency and productivity of our schools.

(4) Teacher Training and Development: Similar to corporate training in other industries, training and development tools are increasingly available through new technologies. This includes online learning, training software, and interactive online communities. District 39 uses technology extensively in its Professional Growth Networks for teachers.
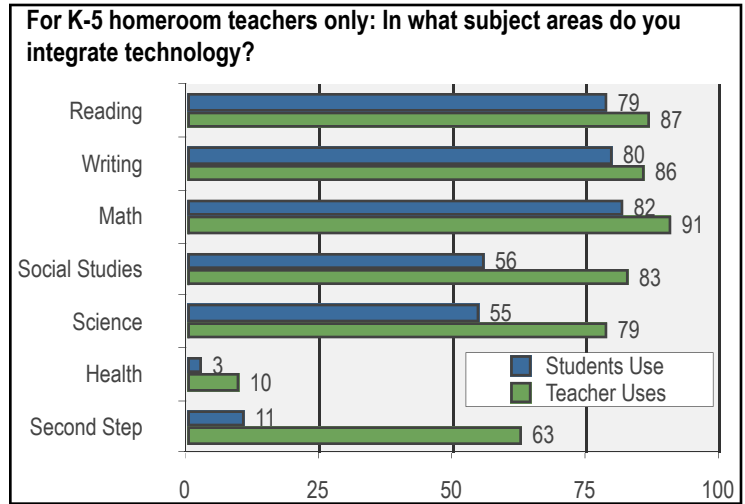
> "Technology hardly ever gets in the way during lessons, but it allows students to explore the content in more ways."
>
> - Quote from District 39 Teacher in the CRC Teacher Survey 2013

This report does not address the enterprise management systems and other technologies that are used to manage the school District's non-educational "back office" functions (human resources, physical asset management, finance, etc.). This topic could be considered for future review by the District and CRC.

What are the Benefits of Technology Enabled Learning Environments?

Research indicates that new technology and learning environments can improve student achievement in both traditional and 21st Century learning skills. One of the most comprehensive studies completed to date (The Study of the Impact of Technology in Primary Schools in the European Union, 2007) demonstrated that both traditional and 21st Century knowledge, skills and competencies are acquired though the use of new technologies and learning environments. The study indicated a positive impact on learners' basic skill acquisition as well as wider educational goals such as attendance, behavior, motivation, attitudes, confidence and

For K-5 homeroom teachers only: In what subject areas do you integrate technology?

Subject	Students Use	Teacher Uses
Reading	79	87
Writing	80	86
Math	82	91
Social Studies	56	83
Science	55	79
Health	3	10
Second Step	11	63

engagement.[7] The sources of this positive performance are numerous and include increased student engagement, more sophisticated feedback on learning outcomes, and improved differentiation and tailored instruction.

While the broad and varied implementation of technology enabled learning environments makes it difficult to measure the outcomes of specific applications, several common themes emerge about how both technology and technology enabled learning environments enhance student learning:[8]

1. Building Proficiencies in 21st Century Skills: Digital literacy is at the foundation of the 21st Century Skills that District 39 strives to provide its students. The ability to use information and communication technology to learn, communicate, collaborate, and solve problems is essential to their future academic and professional success.

2. Increasing Student Engagement: Today's students are "digital natives" whose personal lives are immersed in information and communication technology at all levels. Technology enabled learning can provide teachers with tools, which capture students' attention and achieve the desired learning outcomes. Research shows that students are more engaged and more successful when they can connect what they are learning to situations they care about in their community and in the world.[9] Technology provides access to real-world data, tools, and resources, and can help students link learning to life.

3. Expanding Personalized Learning Opportunities: The increasing demand for education that is customized to each student's unique needs is driving the development of new technology enabled learning environments that allow for differentiated instruction for all students. Traditional classroom teaching provides a one-size-fits-all education with limited opportunity for customization. Strategies were developed in traditional classrooms to provide

differentiated instruction to students at each end of the bell curve, but there was no differentiation for the students in the middle despite the diversity of their educational needs and learning styles. "Today new technology and learning environments can provide individual choices about the amount and type of educational content and methods of teaching." [10] Detailed individual learning outcomes can be tracked and the resulting data can be used to provide a customized educational plan for every student.

4. Facilitating Communication and Collaboration: Communications technologies provide pathways for the connections among students, parents, and educators that are at the heart of all strong learning communities. School management information systems and class websites support the home-school connections that are essential to children's academic success. E-learning and online professional development programs enable busy educators to learn anytime, anywhere, while fostering the exchange of ideas and best practice with peers. Online mentoring and coaching programs also provide educational professionals opportunities to learn from and with others in real-time, and asynchronous exchanges across town and across the globe. [11]

5. Providing After-Hours Access to Learning: Today's students expect to be able to work, learn and study whenever and wherever they want to. They need easy and timely access not only to the information on the network but also to the social networks that can help them interpret it and maximize its value. Educators that are able to accommodate after-hours access to learning tools can significantly expand the time and place for learning, thereby giving their students more power to control their own educational outcomes.

6. Meeting the New Common Core Standards: Illinois has adopted new standards for K-12 education based on the national Common Core State Standards (CCSS), a set of guidelines designed to provide a single national educational framework that prepares our children for college and the workforce in the 21st Century. The CCSS are different from existing state standards and, in many cases, increase performance expectations significantly. The standards will be assessed in Illinois by the PARCC (Partnership for Assessment of Readiness for College and Careers) starting in 2014-15 as the ISAT (Illinois Standards and Achievement Test) is phased out. In the interim, the new CCSS are being phased in and the ISAT is being infused with some questions that apply to the CCSS. In addition,

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DISTRICT 39 TECHNOLOGY POSITION

"Technology supports the District vision for 'teaching tomorrow's leaders,' and providing the best place for students to learn, teachers to teach, and families to flourish in an ever-changing technological society. We nurture, guide, and challenge children to acquire the solid academic foundation and sound character they need to be intelligent, creative thinkers, productive, responsible citizens, and compassionate, caring leaders of their future families, communities, and vocations.

*District 39 utilizes **instructional technologies** to support and enhance the academic foundation of students by providing engaged learning and curriculum differentiation opportunities. We also facilitate challenging and exciting lessons that develop effective and creative problem solving techniques and critical thinking skills. Our instructional and administrative staff access District **informational technologies** for collaboration with the school community and to communicate District data and future trends. We also incorporate technology that provides unique opportunities that connect students with the world outside of school, particularly with the local community. The delivery of effective instructional and informational technology is possible due to our robust and expandable **telecommunication infrastructure and data delivery system.**"*

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the ISAT cut scores are being raised to align with the anticipated rigor of the PARCC.

Implementing the CCSS will require District 39 to change not only content but also the ways in which this content is taught. The CCSS devotes less time to memorization and performing procedures and more time to demonstrations of understanding, problem solving, and analysis. New technologies and learning systems could improve District 39's ability to accomplish this task.

Results from CCSS testing will create national standards for student academic achievement, teacher performance, and District performance. This standardization will produce a wealth of data that can be analyzed and, with the right tools, be used to improve educational outcomes.

In addition to these student achievement standards, a new teacher evaluation protocol is required in Illinois. This protocol (the Danielson Frameworks) requires more teacher facilitated instruction and less teacher led instruction.

7. Assessing Student Performance: Student assessment strategies that balance both summative and formative assessments can improve measurement and performance

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Technology Enabled Learning Environments

over time. Technology can help with both types by providing educators with real time diagnostic information that deepens understanding of student learning gains and challenges. [12]   Student performance tracking systems can enhance instructional decision making by helping teachers pinpoint appropriate interventions. Such systems can result in significant improvement in student achievement, particularly in core subjects such as mathematics and English. [13]   District 39 currently uses Performance Series testing for these purposes.

New integrated student information systems (SIS) provide the ability to manage a wealth of student data. Research shows that the benefits of a SIS include increased accountability at all levels of the system, greater access to instructional resources, and an empowered teaching force that uses data for self-reflection and instructional decision-making. [14]

8. <u>Giving Teachers More Time to Teach:</u> Teachers spend a significant part of their day on mundane (but necessary) administrative tasks such as data collection and recording, organization of teaching tools (books, copies, etc.), and communications with parents, administrators, and other teachers. Our goal should be to maximize teachers' time with students by implementing the systems and processes needed to reduce their administrative burdens.

What Challenges Does District 39 Face in Implementing New Technology Enabled Learning Environments?

District 39 already employs a wide variety of technology in its schools today. Computers and tablets are available and used at all grade levels. Internet access is used for multiple tasks (communicating, research, publishing, collaboration, etc.) and various online learning applications. District 39 invests significant financial and human resources to bring new technology to its schools. Despite its well-organized focus on integrating technology enabled learning into its curriculum, District 39 faces several significant challenges in managing its technology curriculum going forward:

1. <u>Rapid Rate of Change:</u> In addition to the thousands of options for technology enabled learning in the market today, new educational technology tools are being introduced everyday. The spectrum of options available is so vast and the pace of change is so rapid that individual teachers and administrators have little hope of keeping ahead of them. Additional resources are needed to identify, evaluate, recommend, and implement new technology enabled learning environments in our schools.

In addition, this rate of change is significantly faster than existing 6 or more year curriculum review cycles. New teaching tools and techniques traditionally have been implemented during curriculum reviews where a team of District educators could review the options and implement them. This planning cycle needs to be amended to allow for new technology tools to be implemented more rapidly.

2. <u>Student Empowerment:</u> Unlike traditional instructional tools, our students and other community members often have access to new technology before our schools do. Many of these technology tools are already fixtures in our student's personal lives (iPads, internet access, learning apps, etc.) and they prefer for them to be integrated with their academic lives as well. This creates a "customer" demand unlike anything that our schools have faced in the past. Additional resources are needed to solicit, review, and react to community input on technology enabled learning environments in our schools.

3. <u>Teacher Training:</u> Our teacher survey indicated that the majority of District 39 educators have embraced technology in their classrooms. However, teachers need continued support and training to optimize their use of technology enabled learning. Research indicates that while many teachers use technology to enhance their traditional lesson plans, most teachers lack the pedagogical foundation to refine their classroom activities with technology and produce 21st Century lesson plans. In addition to ongoing technology training and support, additional resources are needed to fundamentally re-train our teachers to optimize their use of technology.

4. <u>Assessment and Implementation:</u> Teachers are the primary drivers of new technology enabled learning in District 39 classrooms today. They identify new technologies, use them in the classroom, and review their efficacy based on their individual standards. If they like the results, they share the new technology tools with their peers who then adopt them if desired. This organic process is an important mechanism for bringing new ideas into the school system. It is also critical to allowing teachers to control the tools and techniques that they use. However, this process lacks a standard system for quantitatively assessing new technology tools and their impact on learning outcomes. Its also lacks a mechanism for installing successful technology tools quickly into other classrooms around the District.

5. <u>Communication of Strategy:</u> Despite the widespread use of technology learning tools throughout the District, many District 39 stakeholders don't understand the strategy

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> **The Consortium for School Networking concluded that that "the allure of engrossing digital tools, entertaining experiences and social networking communities outside of school is making it increasingly difficult for educators to motivate and engage a large majority of students in academic learning with traditional pedagogy. Schools must create learning environments that are as engaging and relevant as the ones that students gravitate to outside of school."**

driving it. It is imperative for all stakeholders in the District that educators and administrators, communicate the District's technology enabled learning strategy with both students and parents. Improved communication has the additional benefit of potentially attracting new teachers and homeowners. A clearly articulated and easily accessible technology enabled learning environments strategy statement could improve results by providing all constituents with a common purpose.

6. <u>Access to Devices:</u> District 39 offers its teachers and students a wide array of hardware devices for us (desktop computers, laptop computers, tablet computers, etc.). However, most of this equipment is shared and access is not always guaranteed when requested. This uncertainty prevents some teachers from using iPads or other technology tools in their lesson plans. Better anytime access to devices could increase uses of technology enabled learning in our schools.

7. <u>Community Reaction:</u> District 39 is a highly regarded school district that produces superior educational outcomes. Given this track record of success, changes to the system will be closely scrutinized. Experience in multiple school districts also shows that the introduction of new technology tools into schools can draw additional scrutiny. District 39 needs to design a communications strategy that can help all of its stakeholders understand the merits of technology enabled learning in our schools, including issues of cost, impact on educational outcomes, impact on social skills, and impact on student achievement in traditional core skills (reading, writing, and math).

TABLE 2: Summary of Existing Professional Technology Training

	Lunch & Learn	Academy 39	Professional Development Days	Collaboration	Faculty Meetings	Tech / Library Department Meetings	New Teacher Training	Teacher email / Blogs
Voluntary	✔	✔		✔			✔	✔
Required Training			✔	✔	✔	✔	✔	
Occurs During School Day	✔		✔ Institute Days No Student	✔	✔ Only during contractual time	✔	✔	✔
Occurs Outside of School Day		✔		✔			✔	
Frequency	At Least 1 per quarter (7-8) As needed K-6	15-20 offerings per year	3 times per year	K-4 4 to 5 times per year; 5-8 occurs weekly	1 to 3 times per month	Quarterly	2 Tech Sessions during New Teacher Week	Weekly 7-8 Monthly 5-6 As needed K-4
Notes	Example Topic: How to use a new app	Opportunities for technology training	Technology sessions are the most requested sessions. Example Topic: Integrating technology in the classroom	Informal collaboration among teachers and librarians	Meetings often focus on technology prof. dev. topics	District Tech Direct meets with Technology and Library Departments	Orientation Training on resources, devices, and internet safety	Technology Tips and Tricks, Web 2.0 resources, Technology Integration Ideas

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Technology Enabled Learning Environments

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Recommendations

1. Pursue 1:1 Device Availability in the District

The CRC teacher survey indicates that District 39 educators are enthusiastic about using technology enabled learning environments in their classrooms. However, access to technology (particularly hardware) can be limited and unpredictable. This lack of reliable access limits educators' ability to integrate technology enabled learning into lesson plans.

Recent changes in hardware costs and functionality, combined with ubiquitous wireless access and a growing number of cloud-based software and apps, now make it possible to explore deploying a 1:1 student-to-device ratio. This provides the certainty of access that would allow educators to integrate technology enabled learning into all of their lessons. It would also provide District 39 students with uniform access to technology for all of their studies.

2. Establish a District 39 Incubator for Technology Enabled Learning Environments

The incubator will be accountable for the exploration, identification, development, testing, implementation, quality management and audit of new educational technologies and learning environments in District 39. It will identify promising technology tools, assess their fit with District strategy and objectives, determine their efficacy as learning tools, and promote their timely adoption in classrooms across the District. By providing a conduit between our educators and the vast (and growing) universe of technology enabled learning environments, the incubator will provide a more uniform approach across our schools and allow teachers to focus on using rather than assessing technology enabled learning environments.

The CRC envisions an educational think tank comprised of a cross-functional team of District 39 teachers and administrators. This group may also include community members, thought leaders and subject experts as appropriate. We envision an active organization with formal responsibilities and clear deliverables, which will be managed by the District's senior technology administrator.

The goals of the incubator are to:

- Identify technology enabled tools to be implemented broadly across D39
- Accelerate the widespread adoption of target technology enabled learning environments
- Reduce the burden on individual educators to identify and test new technology tools
- Create a central depository of vetted technology enabled learning tools for the benefit of all stakeholders
- Create a formalized process for managing a rapidly changing but an increasingly important set of new educational tools

Responsibilities of the cross-functional incubator team:

- Identification: Includes establishing priorities and criteria for searches (subject, grade level, differentiation, etc.), identifying promising technology learning tools that meet the search criteria, evaluating their educational efficacy and efficiency, and assessing their fit with District 39.

- Evaluation: Includes establishing formal evaluation protocols including quantitative and qualitative criteria to determine educational efficacy and cost efficiency, and creating a focused list of technology tools recommended for pilot programs.

- Development: Includes development of the D39 model for targeted technology enabled learning environments. Prior to launching a pilot, the incubator team will need to carefully define the roles of educators, administrators, students, and parents in the pilot as well as determine how the piloted technology enabled tools will be used and supported.

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- **Pilot**: Includes collaborating with educators to run pilot programs in selected District 39 classrooms. The pilot programs will be used to measure changes in efficacy and efficiency versus existing teaching methods. If the pilot program demonstrates improved outcomes, the technology enabled learning tools and environments will be recommended for District-wide adoption.

- **Presentation and Training**: Includes communicating with educators the recommended technology learning enabled environments via both active presentations (live presentations, webinars, training sessions) and passive information sources (web sites, blogs). Presentations will include details on search criteria and pilot program results. They will also include training on how the recommendations can be used to enhance or transform existing methods.

- **Implementation**: Includes collaborating with educators to manage the rapid implementation of new technology enabled learning environments using a cohesive and standardized methodology across all classes in a grade level across all schools in the District.

- **Audit and Data Capture**: Includes measuring the efficacy and efficiency of newly adopted technology enabled tools and learning environments after implementation. Data will be captured to provide guide future recommendations and aid the determination of which recommendations need to be reviewed or replaced.

While the primary function of the incubator is to support District 39, we believe that it could be possible for the incubator's recommendations and database to be monetized in the future. We believe that other school districts would see value in District 39's recommendations on technology enabled learning environments and may be willing to pay for access to the incubator.

3. Establish a Technology Enabled Learning Environments Traveling Committee

Many school districts across the country are using new and innovative technology enabled learning environments in their schools. The traveling committee will visit organizations that are innovating new ways to use technology enabled learning to improve their educational and training outcomes. This will allow District 39 to learn from what other organizations are doing and import successful new ideas rapidly.

The Traveling Committee will schedule periodic trips to schools, corporations, research centers, and other organizations that use innovative new technology enabled learning environments. It will make formal presentations of key findings and recommendations to senior administration.

4. Maintain Focus on Technology Enabled Learning Environments Training for Educators

District 39 currently provides extensive teacher training for all relevant topics, including technology. The rapid pace of change in technology makes it critical for the District to continue to provide its educators with highest quality training that is constantly refreshed to reflect the latest developments. This training should focus on the instructional strategies that use technology to transform teaching and learning. The Administration should encourage flipping through the provision of professional development, including speakers, books and other resources. Only by helping our educators adopt the newest pedagogies can we transform our schools into true 21st Century learning environments.

5. Pursue the Development of New 21st Century Learning Spaces in the District

There are a wide variety of new 21st Century learning spaces, which improve student engagement, from the transformation of a library to into a technology lab to the build out of SmartLabs. Each school could select, fundraise for and build out at least one new learning space in its building. Ideally, each school would select a unique type, so that at the end of several years, the District can compare performance and impact of the spaces in order to consider future investments.

6. Develop Technology Training and Support Systems for Parents and Students

As the use of technology in District 39 expands, more support systems will be required. In particular, if students are asked to use computers to complete homework, communicate and collaborate outside of school, both students and their parents will need remote support to solve issues and complete their assignments. The District 39 may want to explore options for both in-sourced and out-sourced tech support alternatives. Alternatively, some districts train students to provide peer tech support.

The District should establish technology training opportunities for parents as well as consider after-school additional technology curriculum training including typing and executive functioning skills as suggested in the feedback portion of the parent survey.

7. Establish a Technology Enabled Learning Environment Communication Plan

The communication plan will provide clear and easy to access information about how District 39 uses technology enabled learning to community members, educators, parents, and students. Technology is an increasingly important, and sometimes divisive, part of our educational system as reflected in the CRC Parent Survey on Technology. An effective communication plan will help our key stakeholders understand how and why technology enabled learning environments are being used to improve educational outcomes.

As part of the communication plan, we recommend District 39 communicate the strategic vision for technology enabled learning environments as outlined in this report. This will provide a common message to all stakeholders so that they can work collaboratively to improve the use of technology enabled learning in our schools.

8. Engage Parents and Students as Stakeholders in the Process of Adopting New Technology

Parents feel very passionately about this topic. These feelings are directly and indirectly conveyed in the comments of the parent survey. Many parents wrote paragraphs in response to some of the questions and many parents expressed gratitude for the opportunity to share their input on this topic. Parents want to be engaged in this process and while a large majority are very supportive of Technology, a few parents expressed strong feelings about the integration and potential expansion of technology in our curriculum. Some were very insistent that Technology was critical to their child's success, others expressed significant concerns. The dataset resulting from the Teacher and Parent Surveys conducted by the 2012-2013 CRC is a rich resource and deserves further attention and analysis. Moreover, this dataset could provide the basis for additional data collection from parents in our district. Suggestions for further study:
- Conduct focus groups with parents
- Create age appropriate surveys for students

9. Open up District 39 Technology Resources, Spaces and Learning Opportunities to the Broader Wilmette Community

As our students develop greater understanding of technology and its usefulness, there may be opportunities for them to share knowledge with others in the community. The committee suggests that the innovative recommendations in this report may allow for new and different options to encourage social responsibility.

LEARNINGSPACES

> **"The SMALLab has single-handedly changed the dynamics of teaching and learning. As a 6th grade Language Arts teacher, I struggle with the ways to keep my students motivated. The SMALLab has significantly increased the students' motivation and desire to learn."**
>
> **Rachael Egan, Grade 6 Language Arts Teacher**

Touring robotics and computer science course expands classroom curricula.

LEARNINGSPACES
How Innovative Designs Foster Technology Infusion and 21st Century Skills

According to Schlager and Fasco, 2003, "building culture and communities that focus on student learning, peer collaboration, and reflective dialogue help all members grow." In the world of education, the notion of space is only recently being elevated to the level of importance of curriculum and instruction. 21st Century learning demands different spaces in order for students to utilize the tools necessary to accomplish these educational needs. "As we increasingly move toward an environment of instant and infinite information, it becomes less important for students to know, memorize, and recall information and more

> *"They need to move from knowledge-able to knowledge-able"*
> *-Dr. Michael Wesch*

important to be able to find, sort, analyze, share, discuss, critique, and create information. They need to move from knowledgeable to knowledge-able," (Wesch, 2008).

An innovative learning space is an evolution of the library and computer lab model. It is a responsive approach to helping schools focus on learning collaboratively. It is an adaptable space for learning that creates a student-focused environment that creates and empowers learners and provides boundless opportunities for growth. This promotes the development of "learning partnerships", where students and staff can work and learn together. Per Webb and Palinscar, (1996) "The ability to

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become a good collaborator -ability to resolve discrepancies, negotiate, and share information- requires engagement of all members, and therefore enhances learning."

The innovative learning space is also a place that allows students to develop higher-level conceptual understanding of materials, also allowing for differentiated experiences due to the varied modalities of learning that can be utilized. The space can also provide an avenue for students to improve intrinsic motivation for learning via opportunities for self-directed learning experiences.

LEGO Mindstorms robot waits for programming instructions

What are the Possible Components of a Flexible Learning Space?

Flexible learning spaces vary significantly, depending on the space requirements of the technology and the intended use of the room. The four case studies below demonstrate wide variety of furnishings, technology and space required.

CASE STUDY: THE IDEA, GLENBROOK NORTH HIGH SCHOOL

Two years ago, Technology Director, Ryan Bretag of Glenbrook North High School came up with an idea. An under-utilized area that originated as a professional development space, consisting of a table, chairs and desk-space, was transformed to increase the of use of technology and professional development. Over time, the space that was originally meant for teachers, grew into a space where students could learn as well.

The task took over two years of development. It required extensive interviews with teachers and students. The goal was to develop a common learning space to be used for multiple students under an umbrella for "learning." After feeling unsatisfied with architect drafts and visits to spaces in schools across the country, Bretag ventured out to nontraditional education spaces and eventually modeled the space after retail spaces, combining ideas from companies like Apple, Caribou Coffee, and Sur La Table as well as corporate "innovation hubs" and executive centers. The goal was to create a room with no front - a departure from previously utilized "isolationist" lecture style classroom to enhance the notion of cooperative learning.

The space contains four micro-environments: 1) a design studio that contains iMac desktops, high end multi-media equipment for project-based learning; 2) a professional development center with six moveable tables with the ability to move them into multiple configurations and an LCD panel to record professional development sessions and a professional development library; 3) a "genius bar" with an elevated table, conversation and "help desk" area, and 4) a collaborative learning space with low and high tables and floor to ceiling "idea paint" on all writing surfaces to create an area for students, faculty, or classes to meet.

The space was paid for through the technology and building budgets. Bretag reports that staff and students "alike" utilize the space enthusiastically. Results of formal data collection have indicated tremendous qualitative and quantitative increases in use of space. Students and faculty both report an appreciation for the "openness of space" that is inviting and easier to access. The space is staffed by a full time technology trainer and student lab assistants. Currently, there are an estimated 75-100 schools across the country that have requested visits and information about the development of the space and multiple requests from community groups to use the space as well.

CASE STUDY: NORTH SHORE COUNTRY DAY SCHOOL

A learning lab and flexible space for the classroom is going to look different for each school and space but for North Shore Country Day in Winnetka, Illinois they started with the vision of adding more light and brightness to the school and ended up with a much different result. They wanted their building to be more representative of how they teach, but they were limited by the space they had. Before their changes, each classroom had a lack of flexibility with their furniture and how to use space. Many classrooms were having small groups pulled out of the classroom for projects and learning and were using hallways and corners, thus using space that isn't connected and plugged in for use of technology or other manipulatives.

As of now, North Shore Country Day School is one and a half years into their evolution to common learning spaces. They have more mobile furniture, seminar rooms which are attached to their rooms and libraries for small group meetings, SMART boards, Apple TV, a sound system and each teacher has their own Mac laptops and iPads. In terms of their media spaces, each child is 1:1 and there is a 5:1 ratio in the classroom. In their media lab, they have a laptop cart, eight workstations, media scape and a large form computer. Looking forward they are expecting to renovate their arts center and this will include a recording lab. They also are moving to 1:1 technology with grades 6 through 8, then finally up through grades 9-12.

These changes did not happen overnight. There was a need for new faculty and staff development and it is still a learning process for many of their teachers. The architect they used designed many other schools around our area. North Shore Country Day is looking to move to 1:1 technology and needed the infrastructure first to do this. They are now looking into adding a space downstairs where the lower grades will be able to utilize the materials and areas. These would be more traditional settings, as the need for staff and supervision is much greater.

Wondermat: SMALLab @ Elizabeth Forward Middle School

CASE STUDY: SMALLAB LEARNING AT ELIZABETH FORWARD MIDDLE SCHOOL

"The SMALLab has single-handedly changed the dynamics of teaching and learning. As a 6th grade Language Arts teacher, I struggle with the ways to keep my students motivated. The SMALLab has significantly increased the students' motivation and desire to learn. While in the lab, the students are learning team building skills and communication skills, as well as learning the target for the day," states Rachael Egan, Grade 6 Language Arts Teacher.

Elizabeth Forward Middle School, located outside Pittsburgh, Pennsylvania, seeks to reshape their curriculum to improve student interest and knowledge in STEM subjects. As part of that initiative, it sought and obtained a grant to build a SMALLab, which opened in the fall of 2012. SMALLabs are very new, with only three installed in schools to date.

SMALLab stands for Situated Multimedia Arts Learning Lab and as developed out of Arizona State University. It was created by an interdisciplinary team of designers, researchers, engineers, computer scientists, psychologists, media experts, educators and artists, let by Dr. David Birchfield. The MacArthur Foundation, the National Science Foundation, Intel Research, the Kauffman Foundation, and private funders supported SMALLab's development.

In a SMALLab, students experience learning in a whole new way called "embodied learning." Learning becomes a physical experience, as students interact with motion-capture technology that allows them to become immersed in the material they are learning. When doing a math unit, they become the points that make the parabola. They shift, the graph shifts. When learning about physics concepts like velocity, they can hear the sound of their actions getting faster. They can see graphs and equations that represent their motions in real time. They can feel the weight of an object in their hand as they interact in real physical space.

SMALLabs can be installed in existing classrooms with minimal modifications, provided the room is at least 25' x 25' and has a minimum 10' ceiling height, has two standard power outlets and one Ethernet connection. SMALLabs are purchased through SMALLab Learning, LLC (http://www.smallablearning.com). The company includes a 2-day on-site installation with purchase. SMALLab equipment includes 12 cameras, audio speakers, and a video projector mounted on the ceiling. A moveable foam 15' x 15' "wondermat" is on the floor where students interact. The motion-capture system works similarly to Wii and other interactive gaming devices. From the projector comes any number of backdrops such as graphs for math or science classes. Students then, individually or in small groups, interact with the projection onto the "wondermat" by holding two wands and moving around the mat.

The presence of technology isn't as noticeable as the absence of the trimmings and techniques in traditional

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Concord NH School District / Photo: Ed Wonsek

"How do we fill the gap between saying we must encourage innovation and teaching students how to actually generate and execute original ideas? The answers are emerging from classrooms across the country where pioneering teachers are making innovation a priority. Their strategies vary widely, from tinkering workshops and design studios to digital gaming and global challenges. By emphasizing problem solving and creativity in the core curriculum, these advance scouts are demonstrating that innovation is both powerful and teachable." - Suzie Boss

teaching spaces. Rather than rows of desks and chairs, there are bright green and purple walls with an open floor plan. Rather than teachers being at the front of the class teaching, they are side by side, with everyone being active participants in their learning process. This type of collaborative learning encourages students to take charge of the material and their learning.

While the SMALLab has only been in operation since the fall, students, teachers and administrators report higher levels of student engagement and excitement around learning. To hear from them directly, watch http://www.youtube.com/watch?v=Od_4qJXvTtA&feature=youtu.be.

Elizabeth Forward partners with Carnegie Mellon's Brain STEM team to create scenarios and games for use in the SMALLab. The District received a $20,000 grant from the Center for Creativity (http://centerforcreativity.net) to create the SMALLab as part of a STEAM initiative. The Center for

Creativity is a technology professional development organization, jointly funded and managed effort between two school districts. It provides a digital playground and a yearlong speaker series for teachers.

CASE STUDY: CRAFTON ELEMENTARY STEAM STUDIO

Located in Pittsburgh, PA, Crafton Elementary School sent its 6th graders to the Challenger Learning Center in West Virginia each year, at great expense (http://clc.cet.edu). In 2010, they wondered how they could get an e-mission for less money. They applied to a local foundation for funds to enable Skype and video conferencing capabilities. In 2011, they continued their quest for digital upgrades by obtaining funding for and buying flip cameras and ActiVotes, a wireless student response system. Inspired by the Childrens' Museum of

Pittsburgh's MAKESHOP (https://pittsburghkids.org/exhibits/makeshop), in 2012, they applied for a $20,000 grant to build a STEM Lab. MAKESHOP is a space within the museum that integrates digital tech projects and media access with DIY maker elements to produce a robust place for exploration, creativity and curiosity.

The school bought simple materials, wires, light bulbs, K-Nex, snap circuits and robotics materials. In addition, they purchased 10 iPads and 10 iPods. Teachers schedule class time in the room. Students take simple materials to meet specific challenges. For example, they may need to build a complete circuit or a bridge. There is also a lunch group, where children tinker with an adult mentor present. The room is best for children 8 and above.

Since the STEM lab opened, the principal, Jacie Maslyk, reports seeing "the lab connecting to other things - teachers modifying existing lesson plans to include concepts of making." She also states that she asks teachers to give students more performance based units, more open-ended challenges. Kids are responding favorably. They like making their ideas. They are talking about what happens in the STEM lab and want teachers not engaged with the Lab to become involved. One room is invigorating a whole school.

STEAM Studio at Crafton Elementary School / Photo: Ben Filio

LEARNINGSPACES

Recommendations

1. **Develop an exploratory committee and travel to local and national sites.**
   The purpose of the site visits would be to see the spaces and have formal/informal interviews with students, staff and other stakeholders. Site visits would allow District 39 staff to explore more deeply the variety of options that exist. In Chicago site visits could include:

   - YOUMedia at Harold Washington Library - an innovative space for collaboration, media production, programming and opportunities to work with mentors. The site was developed as a demonstration site, implementing the findings of MacArthur funded research (http://dmlhub.net/sites/default/files/ConnectedLearning_summary.pdf). Based on its success, more than 30 YOUMedias or "learning labs" are being developed in museums, libraries and schools around the country. See www.youmedia.org
   - The Fab Lab - a state-of-the-art digital fabrication laboratory at the Museum of Science & Industry (http://www.msichicago.org/whats-here/fab-lab/), is one of 100 such labs developed worldwide, created by Massachusetts Institute of Technology. All Fab Labs share software, equipment and core capabilities, so that people and projects can be shared among all sites. Users engage in problem-based learning, and hands on fabrication, becoming inventors.

   Nationally, the team could consider a several day trip to Pittsburgh. Pittsburgh seeks to be the best place in the country to be a kid. To achieve that goal, the adults have come together and transformed the Pittsburgh area is a model for learning innovation. Not only does Pittsburgh have a variety of new and innovative learning spaces, it has an infrastructure that supports on-going innovation.

   Some of the special learning spaces to visit include:
   - Elizabeth Forward Middle School: SMALLab
   - Elizabeth Forward High School - Entertainment Technology Center
   - Crafton Elementary STEM Studio
   - Winchester Thurston School - Mobile App Lab
   - The Center for Creativity - A digital playground for teachers
   - The Labs @ Carnegie Library of Pittsburgh - where teenagers in grades 6-12 have a space to learn and use creative digital media.
   - Children's' Museum of Pittsburgh's MAKESHOP
   - Full Immersion Simulator - The Dream Flight Adventures™ at Shaler Area Elementary School in Glenshaw, PA

   In addition to meeting with school leadership, team could meet with the two local foundations that support and help drive this work: Cathy Lewis Long from the The Sprout Fund (www.sproutfund.org) and Gregg Behr from the Grable Foundation (http://www.grablefdn.org).

2. **Create a new 21st century learning space in each school in the District.**
   There are a wide variety of new learning spaces. The district schools could select, fundraise for and build out at least one new learning space in each school. Ideally, each school would select a unique type, so that at the end of several years, the District can compare performance and impact of the spaces in order to consider future investments.

LEARNINGSPACES
Technology Enabled Facilities

3. **Include youth in the planning and design of new learning spaces.**

   Many of the YOUMedia spaces were built with student input. Administrators report having made adjustments based on student feedback that greatly improved the space. In addition, children obtain planning and design experience as a result.

   For example, the Nashville Public Library is developing a YOUMedia facility. It surveyed youth about what they would like to see in the teen space. Then 12 youth were selected to participate in the planning of the space, alongside of the architect and planners. Over 13 Sessions, the teens were being challenged to understand their physical surroundings and extend this understanding into virtual worlds and augmented reality. Most importantly, they are designing the new "Learning Lab" for the Library Teen Space that will include Gaming, Making, Writing, and Music Spaces for experimentation and media creation. This new area will provide spaces for teens to work with professional artists to learn how to create their own Music, Games, Videos and much more.

4. **Explore possible partnerships for funding and curriculum support.**

   In Pittsburgh, the Elizabeth Forward School District partners with nearby Carnegie Mellon University on design and uses of its new spaces, development of curriculum for the SMALLab. It also partners with local foundations for funding and new innovation ideas. It partners with the neighboring district to fund and staff the Center for Creativity for teachers. In Wilmette, possible partners include Northwestern University, the Village of Wilmette, New Trier Township Sender Districts, Wilmette Public Library and local or national foundations.

Part simulator, part video game, part classroom, new immersive learning environments teach students to work together to solve complex problems.

The IKS Titan, an immersive learning environment at Shaler Area Elementary School / Photo: Ben Filio

DEVICE INTEGRATION

Photo: Steve Christo

DEVICE INTEGRATION
Assessing 1:1 Learning Environments for District 39

In a 1:1 learning environment students are assigned their own laptop or tablet device (such as an iPad) to use throughout the school day and in many cases to take home. Many of these initiatives begin with a pilot phase consisting of select teachers, teams, or grade levels participating in the program. Future expansion of these initiatives are often spread out over a few years, but in some cases there is a large scale implementation where an entire school or district will adopt the program at the same time. In most cases cart models, where teachers check out a cart of devices for their class, are used prior to piloting a 1:1 learning environment. Over the past ten years many school districts have utilized laptops for their 1:1 learning initiatives. However, with a lower price point, better battery life, a smaller form factor, built in cameras, and powerful processing abilities, many schools are now turning toward tablet devices. Some

school districts with large 1:1 learning environments can be found in Maine, where every seventh and eighth grade student has their own laptop, as well as schools in South Dakota, Pennsylvania, New Hampshire, Texas, Georgia, Louisiana, California, Virginia, Florida, Kansas, Massachusetts, and Michigan. Some recent large tablet initiatives in Illinois include Gurnee District 56, the Chicago Public Schools, Lincolnwood District 74, Palatine District 15, Palos Heights District 128, Glenview District 34, and many area high schools. In addition, all New Trier sender schools are in some phase of a 1:1 implementation with New Trier High School recently approving the expansion of their current Mobile Learning Program to include 2300 students receiving an iPad during the 2013-2014 school year, and all remaining students during the 2014-2015 school year.

While many schools are implementing 1:1 learning environments, they are still relatively new programs and more research and data needs to be collected. However, after a careful review of the existing data, case studies, and literature including recommendations from Project Red, The Horizon Report, The National Education Technology Plan, the Illinois Common Core Learning Standards, the National Education Technology Standards (NETS), and the District 39 CONNECTED Learning Plan, many student benefits from 1:1 learning environments have been identified. Some student benefits include:

- Transforming students from consumers of information to creators of content
- Increasing student engagement and ownership in learning
- Providing access to "anytime learning"
- Supporting the requirements of the Illinois Common Core Learning Standards and the National Education Technology Standards (NETS)
- Promoting the District 39 CONNECTED Learning initiative

Transform students from consumers of information to creators of content

Ruben Puentedura (2010) outlines a technology framework, the "SAMR" model, that suggests technology is a continuum and that lower-level technology integration can be categorized as "Enhancement" of teaching practices, while higher-level technology integration is defined as "Transformation" of teaching and learning. The four levels of technology integration as defined by Puentedura are as follows:

1. Substitution- Technology acts as a direct tool substitute, with no functional change (Enhancement).

2. Augmentation- Technology acts as a direct tool substitute, with functional improvement (Enhancement).

3. Modification- Technology allows for significant task redesign (Transformation).

4. Redefinition- Technology allows for the creation of new tasks, previously inconceivable (Transformation).

In level one substitution, technology is used to complete the project, as you would normally do without technology. It does not involve any modification of the assignment. An example of this might be typing an assignment with a word processing program or using a drawing application to draw and label the parts of a plant.

In level two augmentation, technology offers some improvement to the project, but technology is still a direct tool substitute. The assignment is not changed, but the student may use an electronic thesaurus while word processing or use the word count feature. A math fact review game may also qualify

as a level two assignment as well as inputting data into a spreadsheet and then creating a graph.

In level three modification, a different kind of assignment is now given using technology as the learning tool. An example might be to use multimedia such as adding sound and video to an assignment. Multimedia components added to a student project can enhance the project and offer something not available with the non-technology traditional format of the project.

In level four redefinition, students use technology to do something they are not able to do without technology. Some examples include posting a project to the Internet and providing the audience an opportunity to give feedback on the student work, thus giving students a global audience. This may be done through wikis, blogs, collaborative writing, and posting multi-media projects online. When students have access to their own device and teachers are provided with appropriate staff development, 1:1 learning environments have been able to produce these transformative products more often than schools that have to share computers or tablet device resources.
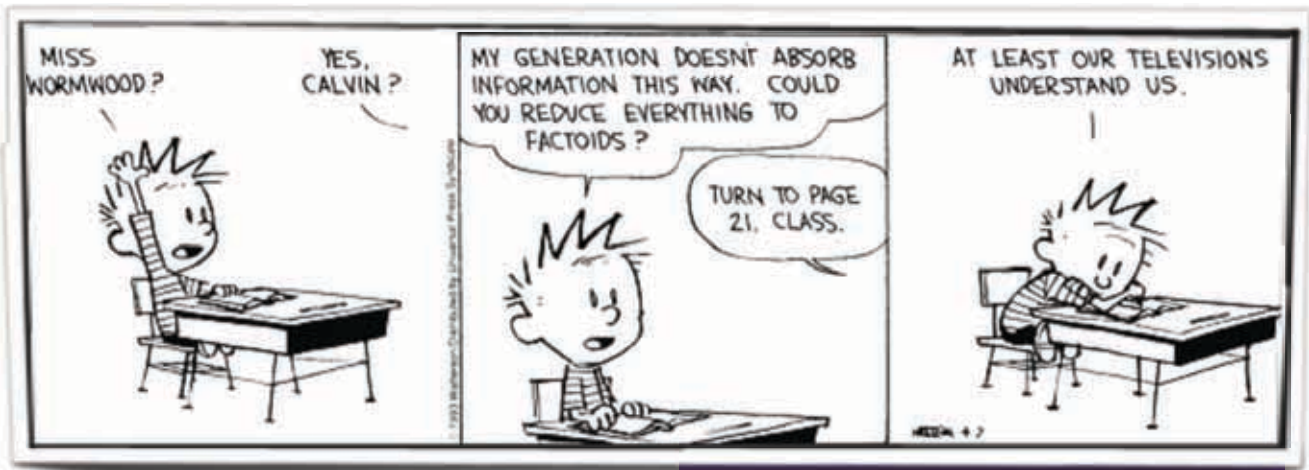
Increase student engagement and ownership in learning

The use of technology increases student engagement and enables teachers to personalize instruction. Technology helps students visualize learning and make abstract ideas more concrete. The ability for students to collaborate with others through online learning opportunities such as Google Drive, email, video chatting, and other Web 2.0 options improves student learning and increases student engagement. Researchers (Bebell & Kay, 2010) analyzed the impact of 1:1 learning environments at five Massachusetts middle schools. Teacher surveys indicated that student engagement and motivation improved in these programs. Of the responding teachers, 83% indicated that "traditional" students were more engaged in the 1:1 setting. It also indicated that 71% of the teachers believed that students were more motivated having their own device. Other studies have also indicated an increase in student engagement in one-to-one programs.

The opportunity to have a 1:1 device on a daily basis helps improve student learning. The National Education Technology Plan (2010) refers to personalization as "instruction that is paced to learning needs, tailored to learning preferences, and tailored to the specific interests of different learners" (p.12). With easy access to information and the fact that teachers no longer have the answer to all questions, students become motivated and empowered to find and validate their own resources.

Provide students access to "anytime learning"

The goal of the Anytime Anywhere Learning Foundation (AALF) is to ensure that all children have access to unlimited opportunities to learn anytime and anywhere and that they have the appropriate tools to make this possible. In schools that have adopted 1:1 learning programs, students have been able to

MISS WORMWOOD?

YES, CALVIN?

MY GENERATION DOESN'T ABSORB INFORMATION THIS WAY. COULD YOU REDUCE EVERYTHING TO FACTOIDS?

TURN TO PAGE 21, CLASS.

AT LEAST OUR TELEVISIONS UNDERSTAND US.

collaborate on projects and communicate with their peers and teachers outside of the school day. Students can access information and resources when they have time in their schedules and when there is a learning need. A student can check out electronic books on topics they are interested in from home, instead of waiting for library time at school to check out a paper copy. Many teachers participating in 1:1 learning environments have reported their students collaborating on projects with their peers and communicating with them during the evenings and on weekends.

Support the requirements of the Illinois Common Core Learning Standards and the National Education Technology Standards (NETS)

The Illinois Common Core Learning Standards state:

"To be ready for college, workforce training, and life in a technological society, students need the ability to gather, comprehend, evaluate, synthesize, and report on information and ideas, to conduct original research in order to answer questions or solve problems, and to analyze and create a high volume and extensive range of print and nonprint texts in media forms old and new. The need to conduct research and to produce and consume media is embedded into every aspect of today's curriculum. In like fashion, research and media skills and understandings are embedded throughout the Standards rather than treated in a separate section."

Each grade level learning standard gives further examples for technology integration. Fourth grade requires teachers to

"Integrate information presented in different media or formats (e.g. visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue." Eighth grade requires students to "Evaluate the advantages and disadvantages of using different mediums (e.g. print or digital text, video, multimedia) to present a particular topic or idea."

The Wilmette technology department has begun identifying technology integrated lessons and tools that align with the Illinois Common Core Learning Standards at all grade levels.

DEVICEINTEGRATION
Assessing 1:1 Learning Environments for District 39

Aligned to the National Education Technology Standards (NETS) http://www.iste.org/standards

With effective staff development and support, a 1:1 learning environment provides a tool to align curriculum to the National Education Technology Standards (NETS). The NETS standards promote excellence and best practices in learning, teaching, and leading. Some of the benefits that make up the NETS standards include:

- Improving higher-order thinking skills, such as problem solving, critical thinking, and creativity
- Preparing students for their future in a competitive global job market
- Designing student-centered, project-based, and online learning environments
- Guiding systemic change in our schools to create digital places of learning
- Inspiring digital age professional models for working, collaborating, and decision making

Promote the District 39 CONNECTED Learning initiative

The student benefits of a 1:1 learning environment align with many of the goals of the Wilmette School District's CONNECTED strategic plan. The CONNECTED Strategic Plan focuses on teaching styles and learning processes that shift the emphasis from what our students are taught and what our students learn to how our students are taught and how our students learn. The Learning Goal for students in the CONNECTED plan is to create a community of learners who can master the multidimensional abilities required of them in the 21st Century. Students in a 1:1 learning environment would personify the CONNECTED characteristics of successful learners: creativity, flexibility, risk taking, empathy, persistence, problem solving, self-awareness/discovery, and life-long enthusiasm for learning. A 1:1 learning environment that uses technology as one tool to deliver core instruction, will also provide students with opportunities to view global perspectives, learn and practice social responsibility, collaborate in learning, and develop strong communication skills. It is these CONNECTED skills that will prepare students to be lifelong learners and develop the skills and knowledge for the future.

Research, Case Studies, and Article Reviews on 1:1 Learning Environments

PROJECT RED

Project Red is made up of a team of educators and industry professionals who conducted a large-scale national study to identify and prioritize factors that make great K-12 technology implementations. "Findings demonstrated that schools employing a 1:1 student-computer ratio and key

Table 3 provides a breakdown of the inventory of devices at each school in the District. As is mentioned in the teacher survey, there is an interest among teachers to have access to additional devices. Of note each school has a cart of 30 iPads available for use by check out, regardless of the number of students attending the school. As a result on average, there are 20 students sharing the use of a single iPad in the District. On the other hand district wide on average 2 students share a device, when all devices are included (laptops, desktops available in classrooms and in labs, as well as iPads).

TABLE 3: Inventory of Devices by School

School	# of Students	Student : Laptop Ratio	Student : Desktop Ratio	Student : iPad Ratio	Student : Device Ratio
Central	502	3.5	5.4	16.7	1.9
Harper	394	4.3	5.1	13.1	2.0
McKenzie	556	4.1	7.2	18.5	2.3
Romona	488	3.4	6.3	16.3	2.0
Highcrest	878	3.6	6.0	29.3	2.1
WJHS	828	4.2	3.7	27.6	1.8
District Wide	**3646**	**3.8**	**5.2**	**20.3**	**2.0**

Notes:
Devices included in the table are only those available for student use
iPod Touches are not included as they are not available to the general student population
iPads assigned for specific students or for specific uses (e.g. ELL) are not included
Each school has one cart of 30 iPads available for use by check out

implementation factors outperform other schools, and reveal significant opportunities for improving education return on investment by transforming teaching and learning."

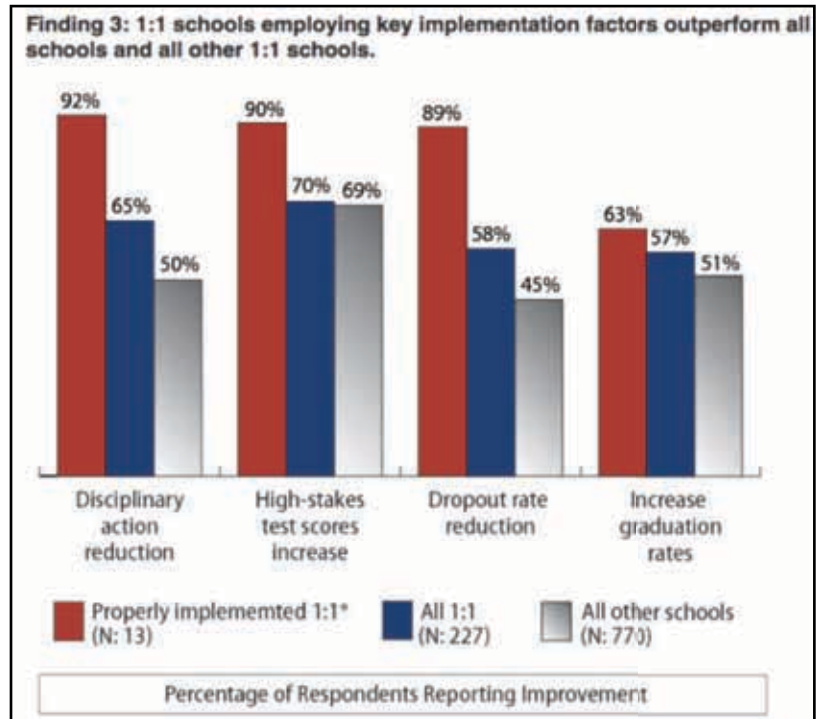Here are Seven Major Findings from the Project Red Study:

1) Implementation factors linked most strongly to education:
   - Intervention classes: Technology is integrated into every intervention class period.
   - Change management leadership by principal: Leaders provide time for teacher professional learning and collaboration at least monthly.
   - Online collaboration: Students use technology daily for online collaboration (games/simulations and social media).
   - Core subjects: Technology is integrated into core curriculum weekly or more frequently.
   - Online formative assessments: Assessments are done at least weekly.
   - Student-computer ratio: Lower ratios improve outcomes.
   - Virtual field trips: With more frequent use, virtual trips are more powerful. The best schools do these at least monthly.
   - Search engines: Students use daily.
   - Principal training: Principals are trained in teacher buy-in, best practices, and technology-transformed learning.

2) Properly implemented technology saves money.

3) 1:1 schools employing key implementation factors outperform all other schools and all other 1:1 schools.

4) The principal's ability to lead change is critical. Change must be modeled and championed at the principal level.

5) Technology-transformed intervention improves learning.

6) Online collaboration increases learning productivity and student engagement.

7) Daily use of technology delivers the best return on investment (ROI).

It is important to note that in the above findings, there is a significant discrepancy between schools that properly implemented 1:1, using the key implementation factors listed, and schools who simply had access to 1:1 technologies.

The Project Red study also indicated that technology facilitates differentiation. When students have a 1:1 device, they are able to move at their own pace. The teacher is heavily involved in the learning process, but is able to spend most of their time in a one-on-one or small-group model, as opposed to

a lecture-drive classroom. A 1:1 environment also lends itself to creating a "flipped classroom". In addition, Project Red found that technology-transformed interventions in ELL, Title I, special education, and reading intervention are the top-model predictor of improved high-stakes test scores, dropout rate reduction, course completion, and improved discipline.

Using 1:1, from the Project Red studies, illustrated the power of a student-centered approach, enabled by technology. Students are able to work at their own pace and take the time they need to complete learning objectives and demonstrate achievement.

Finding 3: 1:1 schools employing key implementation factors outperform all schools and all other 1:1 schools.

Teaching the iGeneration

In the February 2011 ASCD Educational Leadership journal, Larry D. Rosen discussed how schools should respond to the fact that our children and youth are immersed in technologies on a day-to-day basis. "To them, the smartphone, the Internet, and everything technological are not 'tools' at all - they simply are... Their WWW doesn't stand for World Wide Web; it stands for Whatever, Whenever, Wherever" (Rosen, Teaching the iGeneration, 2011).

The iGeneration is defined in the article as those born in the 1990s and beyond - "the i represents both the types of digital technologies popular with children and adolescents (iPhone, iPod, Wii, iTunes, and so on) and the highly individualized activities that these technologies make possible. Children and youth in this new generation are defined by their technology and media use, their love of electronic communication, and their need to multitask."

Throughout the United States, studies have found that once teachers relegate much of the content dissemination to technology, they can spend class time more productively - helping students analyze, synthesize, and assimilate material

(Johnson, Smith, Levine, & Haywood, 2010; Project Tomorrow, 2010).

New Trier Feeder Schools and 1:1 learning environments

The technology leaders from the New Trier Township schools have been meeting regularly to discuss and share resources on their current and future mobile learning plans. The following summary of current and future initiatives was compiled. The summary represents plans currently under development, which in some cases are subject to further administrative review or Board of Education approval.

Avoca District 37

Avoca is currently in the ninth year of a 1:1 laptop program using Macs, which now includes grades 4-9. They plan to continue the same program.

- K-3: Two iPad carts; remain the same next year.
- Grade 4-9: 1:1 with Macs and iPad cart; remain the same next year.

Glencoe District 35

Glencoe currently uses iPads in the lower grades, and has a Bring Your Own Device program in the middle school. They will likely continue this model in the future.

- K-2: Five iPads per classroom, iPad carts; remain the same next year.
- Grade 3-4: iPad carts; remain the same next year.
- Grade 5-8: Bring Your Own Device, 1/4 of students bring their device on a given day; remain the same next year.

1:1 Jr High "Bring Your Own Device" program, and a laptop check-out option integrated into their library system. They also support iPad learning for student support needs and an iPod health program for their PE department.

- Kindergarten: 5 iPads per classroom and access to laptop carts.
- Grade 1: Access to laptop carts.
- Grade 2-4: 1:1 with iPads; remain the same next year.
- Grade 5: Access to iPad and laptop cart; likely shift to 1:1 or BYOD next year.
- Grade 6-8: Bring Your Own Device (40% of students on a daily basis), access to laptop carts, laptop checkout available for students in library; classroom sets of iPads for certain subjects; remain the same next year.
- New "Genius Bar" style area set-up for BYOD that includes charging stations (USB and plug) and TV hook-ups for collaboration.

Sunset Ridge District 29

Sunset Ridge currently has a mixed mobile device program that includes 1:1 laptops, iPads, and cart-based laptops and iPads. Next year, they will continue to expand their 1:1 iPad program.

- Kindergarten: six iPads in each classroom; remain the same next year.
- Grade 1-2: six laptops in each classroom; switch to 1:1 iPads next year.
- Grade 3: 1:1 Mac laptops and iPad cart; remain the same for next year.
- Grade 4-5: 1:1 iPad; remain the same next year.
- Grade 6: 1:1 laptops; switch to iPads.
- Grade 7: currently 1:1 laptops; remain the same next year.
- Grade 8: currently 1:1 laptops; switch to iPads.

Winnetka District 36

Winnetka currently uses laptop and iPad carts, as well as computer labs. They are currently undertaking a strategic planning process, and a possible recommendation will be a 1:1 program using iPads.

- K-4: Computer labs, laptop cart, and iPad cart; remain the same next year.
- Grade 5-8: Laptop carts and computer labs; likely 1:1 iPad pilot in grades 5 and 7.

New Trier

New Trier High School is currently in their second year of a 1:1 Mobile Learning Program, which includes 700 students having their own iPad to use in the classroom and at home. New Trier recently approved the expansion of their current Mobile Learning Program to include 2300 students during the 2013-2014 school year and all remaining students for the 2014-2015 school year.

Surveys and Case Study Findings

The results of a CRC Survey sent to area technology leaders were combined with similar Surveys from local technology users. These surveys highlighted some of the schools participating or planning 1:1 learning initiatives as well as documented some of their implementation strategies. There was a wide range in results with some districts just beginning implementation and another district in their 12th year of a program. Many schools with established programs are using laptops and a trend was found toward districts choosing tablet devices in newer 1:1 learning environments. Nearly all districts surveyed have developed a formal staff development plan for participating teachers. Most districts allow the students to take home their device, and some offer insurance through an insurance vendor or a self-insurance program. In addition, many schools are utilizing a mobile device management tool to configure and support these devices, and many districts are charging user fees for the program.

A site visit was also made to Glen Grove School in Glenview School District 34 where they are in their second year of a 1:1 iPad pilot program. Classroom observations were made as well as follow-up communications. One of their teachers reported, "We are currently in the second year of a pilot with 1200 students and 50 staff members. We are looking to recommend a full implementation based on both qualitative and quantitative data around student utilization as a resource for learning."

"We've really loved teaching in a 1:1 environment and we like to help other districts come to the same conclusions we have if at all possible."

"As far as creation and production activities, we use them frequently... The iPads are a great tool for project/ problem based learning because the students have everything they need in one place. They can collect data and information through online research, e-book research, observation (video/audio/picture). Then they can take notes on those items in an all-purpose note-taker like Evernote, organizing notes with tags and adding multimedia directly alongside text. Later students can analyze this information and use it to create presentations, videos, and etc. all on their iPads! This can also be collaborative, as it is easy for students to share information and communicate with one another, either through email, collaborative documents like Google Docs or Prezi, or with FaceTime. I always thought it would be cool to have students collecting data in different parts of the school and using FaceTime to share their findings in real time."

An upcoming visit in May is being planned with Burley School in Chicago. They are one of the leaders in the 1:1 iPad initiative and have been featured in conferences, literature reviews, and highlighted by Apple.

Ongoing Professional Development

One of the major keys to a successful 1:1 program is professional development. The professional development should provide teachers the skills they need to effectively utilize the vast potential and benefits of having a 1:1 program at their fingertips.

Consistent implementation among all staff members is essential for the success of a 1:1 initiative (Donovan & Green, 2010). According to Donovan and Green (2010), professional development needs to be offered in phases and be ongoing. It should accommodate teacher schedules and be differentiated based on teacher readiness levels. The first phase of the 1:1 initiative should be to prepare teachers for what a 1:1 learning environment entails. Participants should include principals, the technology director, resource teachers such as technology

Matt Rivera / NBC News

integration teachers and librarians and all teachers participating in the program. A forum such as a blog should also be provided for teachers to ask questions and discuss the 1:1 program. A second phase should include teaching the educators how the device selected for the 1:1 program works, and then teaching them to use the device to enhance instruction and provide extended learning opportunities (Zwang, 2011). Teachers should have support and time devoted to develop lessons that utilize the 1:1 device to deliver curriculum goals and learning standards.

The third professional development phase, according to Donovan and Green (2010), should be an extension of the second phase. Teachers should continue to learn how to use the devices to their fullest potential with students. This phase should also provide opportunities for co-planning and collaboration. Further professional development should be planned as new research, teaching methods, and resources are discovered. There should also be time for staff to discuss the progress of the program and share positive and negative experiences. Concerns should be addressed and future professional development should be provided in those areas as needed. Staff that feel confident to facilitate professional development sessions on topics that they have expertise on should also be encouraged during this phase.

The International Society for Technology in Education (2012) offers a comprehensive description of technology coaching in the NETS-C Standards (National Educational Technology Standards for Technology Coaches). The Standards provide several models for coaching in school and offer the following advice:

- Technology professional development with a Technology Coach must be revisited and cannot be done in one year (expect a 3–5 year period of implementation).
- Technology Coaches can provide peer leadership and professional training to small and large groups.
- Review the effectiveness of technology professional development programs at least annually.
- Effective programs require functioning technology and technology resources.

According to Puentedura (2010), professional development programs should be designed to allow teachers to move from Substitution to Redefinition along the continuum.

DEVICEINTEGRATION
Assessing 1:1 Learning Environments for District 39

In a comprehensive set of recommendations regarding technology professional development in schools, Rodriguez and Knuth (2000) state that, "Whether technology should be used in schools is no longer the issue in education. Instead, the current emphasis is ensuring that technology is used effectively to create new opportunities for learning and to promote student achievement."

Technology Support

A 1:1 learning environment requires a proper technology infrastructure. This includes a wireless network with enough capacity, both in bandwidth and area coverage, to support additional devices on the network. The infrastructure should support Internet content filtering on the chosen device as well as accommodate any necessary network device management resources. Support personnel is also critical for a successful program. There needs to be enough support team members to configure devices for deployment as well as support troubleshooting, updating, and repairing the devices throughout the year. Monitoring of the program and bandwidth usage would need to be done throughout a pilot program as well. District 39 has a technology team in place that can spearhead and support a 1:1 pilot program.
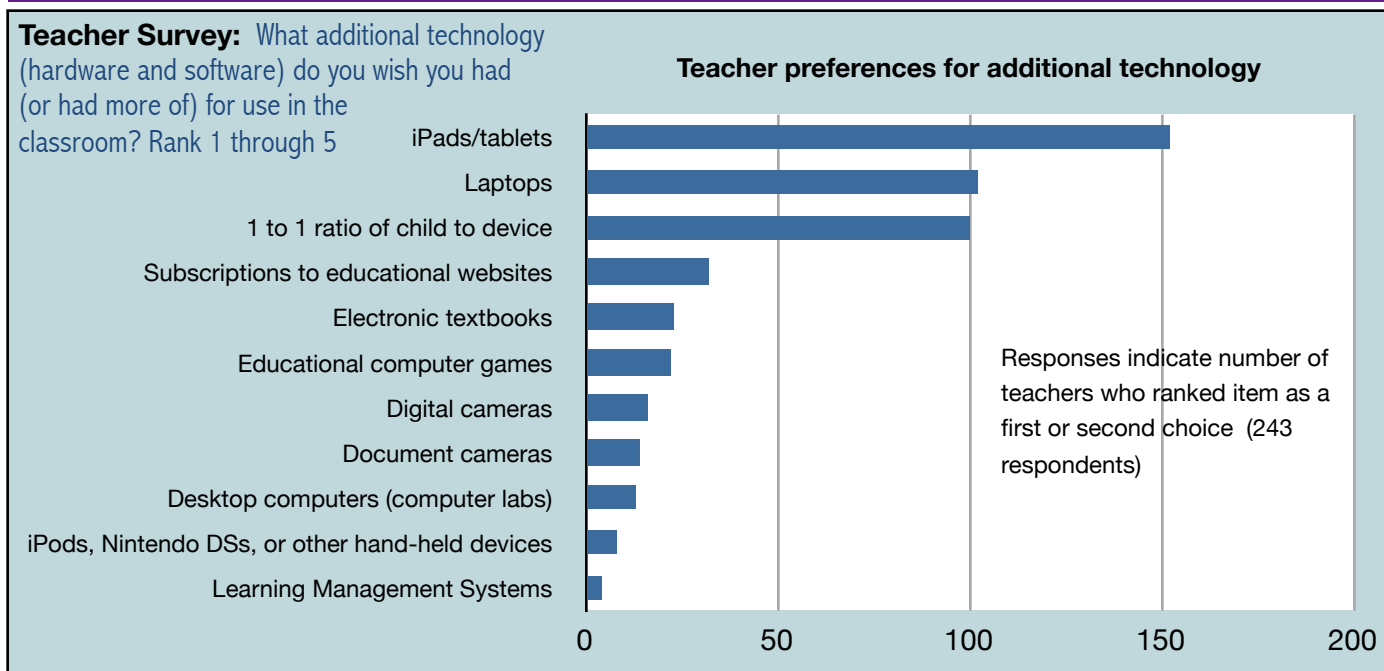
The technology teachers should support the 1:1 learning environment by working closely with the classroom teachers and the Department of Curriculum and Instruction (C&I).

This collaboration and professional development would ensure that teaching and learning of the curriculum goals are transformed by the devices available to students, rather than merely enhancing what currently exists. Professional development for staff should be developed jointly by the technology teachers and C&I to support the 1:1 learning environment. Technology integration teachers in Wilmette have a collaboration model where they work closely with their teachers to help integrate technology into their curriculum. In sixth, seventh, and eighth grade the technology teachers do this full time, while the elementary and fifth grade technology teachers integrate classroom curriculum into their technology classes in addition to collaborating with all teachers throughout their school. Along with the Technology Integration Teachers, the technology parapros in the buildings should also assist staff where appropriate in a 1:1 learning environment.

Equipment

Currently all Wilmette schools have shared laptop and desktop resources. Teachers sign-up to use these devices on a first come first served basis. Each school has at least one desktop iMac computer lab and one library lab with iMacs or laptops. The middle school and junior high have more total resources than the elementary buildings, as their student populations are higher. Every school also has 4-6 Mac laptop carts available for teachers to checkout. In addition, every

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TABLE 4: Teacher Preferences for Additional Technology

Teacher Survey: What additional technology (hardware and software) do you wish you had (or had more of) for use in the classroom? Rank 1 through 5

Teacher preferences for additional technology

Responses indicate number of teachers who ranked item as a first or second choice (243 respondents)

Item	Responses
iPads/tablets	~153
Laptops	~102
1 to 1 ratio of child to device	~100
Subscriptions to educational websites	~31
Electronic textbooks	~22
Educational computer games	~22
Digital cameras	~16
Document cameras	~14
Desktop computers (computer labs)	~13
iPods, Nintendo DSs, or other hand-held devices	~8
Learning Management Systems	~5

school has 1 cart of iPads available for teacher checkout. While there are a lot of shared resources at each school, they are not always available when needed. There are also several online testing periods every year when there is very limited (if any) opportunities for teachers to use the resources with students. Also when the devices are shared, managing data storage and network accounts, as well as charging devices, checking them out, and rolling them down to the room, all negatively impact student productivity time. Throughout the last two years many district staff have requested additional iPads for student use and surveys have indicated a desire for teachers to have more access to technology resources.

Funding

Many school districts with 1:1 learning environments charge yearly student fees for the program. In many cases districts try to offset these fees by decreasing supply fees such as calculators, textbooks, and other supplies that may no longer be needed with the addition of a 1:1 device. Many schools also allow students to keep the device after the yearly cycle of fees has been completed and/or as students graduate from their schools. Research on what other districts are doing about insuring devices as well as charging fees was found. Of the twenty-five districts responding to a recent survey, there was a range of fees between $0-150 dollars per year. In addition, some districts apply this fee as their own self-insurance program or to pay for an outside insurance program. Many districts are also able to adopt 1:1 learning environments without increasing the district's overall budget. To do this they re-allocate and prioritize current budgets to purchase and support fewer shared resources (laptops, desktops, servers) to purchasing 1:1 devices, funding staff development, and new software (or apps), and device management tools as needed.

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Recommendations

Based on the benefits of student learning documented through this report, as well as the limits of shared computer and iPad resources in District 39, the CRC committee recommends the following:

1. District 39 should pursue a 1:1 learning environment.

- Gather feedback during the pilot phase of the program. Surveys should be conducted for students, parents, and teachers participating in the project.
- Explore a variety of fee structures with potential insurance or ownership options for families. Effort should be made to minimize or offset potential fees.
- Explore ways to fund a 1:1 learning initiative by reallocating current funds and not increasing the overall budget.
- Conduct a feasibility study to determine the scope of a future expansion of the program.
- Create a student and parent handbook for the 1:1 learning environment.
- Post student, teacher, and parent resources online.
- Provide an additional cart of iPads to any schools that may not participate in the pilot program. This will allow teachers to continue to explore and familiarize the integration of iPads with instruction.
- Assign participating teachers in the pilot program a device to use prior to the start of the pilot program.
- Facilitate opportunities to continue to visit schools with current 1:1 learning environments.
- Create a blog or similar tool for teachers to collaborate, share ideas, concerns, problems, and solutions.
- Continue to align technology integrated lessons with the devices to the Illinois Common Core Learning Standards as well as the CONNECTED framework.
- Maintain collaboration with other 1:1 learning environment schools in the areas including New Trier High School and New Trier sender schools.

2. The district should develop a formal staff development plan for 1:1 learning environments.

- Require all piloting teachers to participate in the staff development program.
- Encourage additional teachers who may be part of a further expansion of the program as well as related arts and student support teachers to participate in the staff development program.
- Offer a variety of times and formats to accommodate teacher schedules. This may include during the summer months, through evening or weekend staff development classes, on dedicated institute days, during lunch and learn sessions, and even through videos.
- Continue collaboration and co-teaching between the piloting teachers and the technology integration teachers, differentiation teachers, and librarians.

3. Prepare the network infrastructure where necessary to support a pilot program.

- Monitor the network infrastructure and capacity during the pilot phase.
- Prepare the infrastructure where needed to accommodate any future expansion of the program.

4. Identify electronic curriculum content and other resources for 1:1 learning devices.

- Look for electronic textbooks or opportunities to create district electronic textbook during the curriculum review cycle. The district should also explore licensing ebooks through an ebook distributor.
- Consider adopting an electronic learning management system that would allow teachers and students to easily organize and submit work online, take assessments, and collaborate.

Salman Khan of Khan Academy uploads fun educational videos, allowing students to learn at their own pace / Photo: Corbis

INSTRUCTIONALAPPROACHES
Technology Enabled Methodologies: Flipped, Project and Problem Based Learning

A sub committee of CRC worked on a review of instructional approaches and tackled the following questions:

- Why is District39 experimenting with different instructional approaches?
- What is the justification for using these approaches?
- What are the details of these different instructional approaches?

INSTRUCTIONAL APPROACHES: FLIPPED LEARNING

A flipped classroom takes the emphasis off of the traditional style of lecturing students during lessons and refocuses the teacher's efforts on interacting with their class.

This shift in the classroom paradigm refocuses both the role of the teacher as well as that of the student. The teacher's role shifts in that they go from being a lecturer to having a more intimate role in the students learning. The student role shifts from trying to absorb something being taught to them via lecture to a more proactive, inquisitive learner.

In the traditional classroom methodology, students listen to a lecture in class, and then go home to do work on the subject matter. In the "flipped" scenario, the student does a substantial portion of their learning at home, where the content (or concept) is introduce to them via video or other means. After watching the video lesson the students write down questions that they had about it for the following day's discussion or could possibly initiate in an online discussion with peers/teachers from home. In the classroom, the student works on

assignments and engages in problem solving surrounding the concept(s) that were presented in the video lesson. The teacher serves to assist the student with any questions they have, and interacts with them more on a one-to-one basis addressing any issues. It is important to note that, in the flipped classroom, the time spent in the classroom is just as important as the time the student spends at home learning. Since the teacher is interacting with students more on a one-to-one basis, and addressing their specific issue or concerns, a high level of differentiation occurs in a flipped classroom. Interaction time between teacher and student in the classroom is inherently more efficient since the teacher and student can spend more time specifically addressing concepts the student is having difficulty with.

Age/Subject Matter Appropriateness of Flipping

Age and subject matter need to be considered when approaching the flipped classroom. In order for the flipped classroom approach to be utilized successfully, there must be a customized application. As with any curriculum or teaching methodology, one size does not fit all with flipped classes.

In the case of subject matter, the flipped classroom tends to work better when applied to curricula that are more linear in nature. Examples of these types of classes include science, math and foreign languages where each lesson serves as a stepping-stone to the next. For example, in mathematics, a student needs to learn addition and subtraction before proceeding to multiplication and division. This linear structure works well since, as the lessons progress, the difficulty of what the students will be reviewing both in the flipped portion of the class at home, as well as in the classroom, will be increasing. Students need to master each topic in order to progress. Teachers are able to differentiate their instruction (or activities) more effectively based on knowing where students' starting point. In a non-linear setting, such as an English classroom, the issue that is presented is that the work that the students are completing is not necessarily based on prior work and measuring mastery is difficult. Teachers need to be creative in their method of flipping a non-linear subject area. This makes it more difficult for the teacher to devise a lesson for the student to complete at home, as well as to gauge what will be done during class time.

The age of students must be kept in mind while preparing the portion of the lesson that is viewed at home. When using video as a lesson, for example, the length of the presentation should be approximately one and a half minutes per grade level. A student in the first grade would, therefore, watch a considerably shorter video than a freshman in high school.

Perceived Benefits and Research of Flipping

There are many perceived benefits to the flipped classroom approach. It gives teachers more time to spend in the classroom helping students in small groups or one-to-one, thereby aiding differentiation to meet the needs of all students and building stronger student/teacher relationships. It allows teachers an opportunity to differentiate content with different videos and accompanying materials designed for varying student readiness levels and varying student interests; it provides teachers a way to share information with other faculty, substitute teachers, students, parents, and the community easily. Flipped classrooms provide a clear benefit in that they allow students the ability to "rewind" lessons and master topics; and it creates a collaborative learning environment in the classroom.

As flipping the classroom is a relatively recent development, formal research studies into its effectiveness are few. Many studies are in process, looking at measuring how the flipped approach to instruction affects student achievement, engagement, and satisfaction.
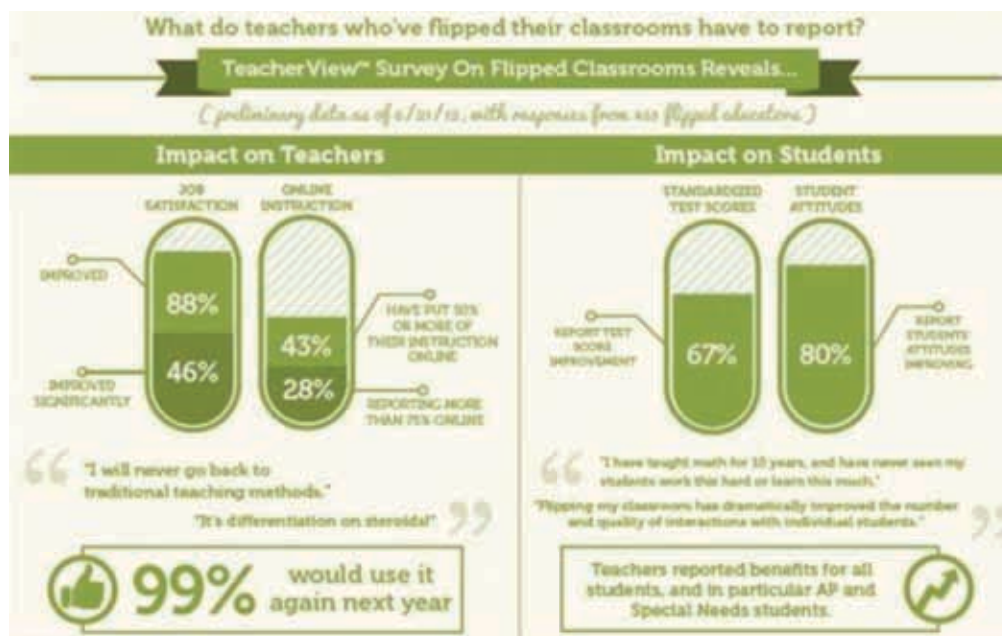
Formal Research Results for Flipping

In March 2012, Dr. Jeremy Renner and Dr. Lisa Johnson presented the results of a study testing the effect of using a flipped classroom approach in a high school computer class on student achievement. They had two groups of students and exposed one group to the flipped method of learning, while one group was using the traditional method of learning. No significant difference was found between pre- and post-test scores of students who did and did not participate in the flipped classroom approach. However, according to Dr. Renner, "It is the opinion of the co-investigators that this is not a result of the flipped method of instruction, but rather a failed attempt at the flipped method of instruction." Dr. Renner emphasized that he supports the flipped instructional model, and that as a result of his research he was able to formulate these guidelines for a more successful "flipped" experience:

- The expectation of spending time doing homework should be clear
- A flipped class implementation does not have to be "all or nothing"
- Students do not automatically prefer cooperative group work, nor do they intuitively know how to work in a group successfully
- Teachers do not have to create all of their own content for a flipped class
- Lecturing is not bad pedagogy, but it should not be the primary or sole means of instruction
- Pre-testing in K-12 classes warrants further study
- Students respond to multiple means of representation

In Fall 2011, Dr. David Marcey of California Lutheran University compared the learning outcomes in a traditional versus "flipped" undergraduate introductory biology lecture class. One section (32 students) was taught in a long-established, traditional manner, with lectures delivered during class, readings assigned in a textbook, and access to lecture graphics/slides provided via the online syllabus. The other, "flipped" section (16 students) lacked both required reading assignments and in-class lectures. Instead, students were assigned online cinematic lectures for viewing outside of class. These lectures, delivered via YouTube, incorporate multiple presentation media. In class, students were broken into small groups and conducted learning activities that varied from building physical molecular models to constructing concept maps of key topics. Often, these groups were responsible for presenting material to the class as a whole. Accounting for all sources of content, the subject material covered was the same for both sections and assessments of learning were identical quizzes and examinations. Statistically significant differences in learning were observed during the first half of the semester, with the flipped-class students performing better on all tests and quizzes. These differences disappeared in the second half of the semester, coincident with a large increase in the number of views of online lectures recorded on the course YouTube channel. Survey of the traditional class revealed that approximately 2/3 of the students had learned of the online lectures and had added viewing of these to their study. According to Dr. Marcey, these results provide strong evidence that supports the conversion of traditional Biology lecture classes to a flipped model.

In 2007, Dr. Jeremy Strayer of Ohio State University studied student satisfaction with the learning environment in a flipped classroom. He compared the flipped classroom structure with the traditional lecture/homework structure in two different college level introductory statistics classes. In the flipped classroom, an intelligent tutoring system (ITS) was used to deliver the lecture content outside the classroom. Students completed active learning projects in the classroom that often required the use of a spreadsheet computer program to help students work with the concepts in the course. In the lecture/homework classroom, students attended lectures on course content that included PowerPoint slides, and then students practiced with the course concepts by completing homework from their books outside of class. Students were given the College and University Classroom Environment Inventory (CUCEI) to measure both their learning environment preferences and their learning environment experiences. In addition, data were collected via field notes, classroom transcripts, student interviews, student focus groups, researcher journal entries, and student reflections. Dr. Strayer's findings showed that students in the flipped classroom were less satisfied with how the structure of the classroom oriented them to the learning tasks in the course. The variety of learning activities in the flipped classroom contributed to an unsettledness among students that traditional classroom students did not experience.

Informal and Anecdotal Data on the Flipped Classroom

Anecdotal results from teachers employing the flipped classroom approach are becoming more plentiful. On the whole, they show higher student achievement, engagement, and satisfaction in flipped classrooms.

Greg Green is the principal of Clintondale High School in Michigan, where the ENTIRE school curriculum has been flipped. Green reports that failure rates have dropped, standardized test scores have improved, discipline incidents have dropped, and graduation rates have increased since the school flipped its classrooms.

At Envision Academy in Oakland, California, high school students who had failed algebra were randomly assigned to one of two summer school classes. The "control" classroom received a traditional five-week summer school curriculum for Algebra 1. The "treatment" classroom used Khan Academy for almost all of the period each day, and both classes had the same teacher. At the end of the course, students in the two groups scored roughly the same, each showing some slight improvement over the five weeks.

In a pilot flip of a biology class at Achievement First Amistad High School in New Haven, Connecticut, data revealed a marked increase in student homework completion. Also, students praised the new class format, and both teachers and administrators noted the increased depth in classroom discussions.

INSTRUCTIONALAPPROACHES
Flipped, Project and Problem Based Learning

Stacey Roshan, an AP Calculus teacher at Bullis High School in Potomac, Maryland, flipped her classroom during the 2010-11 academic year. At the end of the year, grades were higher and students' AP test scores increased from an average of 3.59 to 4.11. Also, students took on more responsibility as independent learners and seemed to be less anxious about the class work and the AP exam.

An algebra teacher in southern California, Crystal Kirsch, saw grades rise in her classroom after flipping her instruction. Students also felt they learned the material better with the flipped approach: approximately 72% of the students felt the Flipped Classroom helped them to learn the material better than a traditional class, and 90% of the students felt they learned the same or better.

Simone Parker, a chemistry teacher at Trigg County High School in Cadiz, Kentucky, reports that student scores increased ten to fifteen points on average after she flipped her classroom.

A TeacherView survey of more than 500 teachers showed an overwhelmingly positive response to the flipped classroom approach. According to the survey results:

- 88% of educators said flipping their classroom improved their job satisfaction
- 67% report improved student test scores
- 80% claimed improved student attitude
- 99% would use it again next year

Design/Launch/Operation and Recommendations for Flipping

Flipping a classroom for the first time involves several steps. Teachers have to figure out how to select an appropriate lesson for flipping, how to prepare for and record an effective video, how to upload that video and make it available through the internet, how to develop written materials to accompany video viewing, how to prepare students for the flipped learning experience, and how to design in-class activities that allow students to apply what they have learned through the video. According to Jon Bergmann, a flipped classroom pioneer and teacher at Sears School in Kenilworth, the best way to introduce the flipped approach into a school is from the bottom up, and that is how Sears has chosen to promote flipping within its staff. Bergmann stresses that teachers need to buy into the method - they need to see it working in a colleague's classroom - and once they see the value of flipping, it will spread.

District 39 has already begun to encourage teachers to flip lessons. Jon Bergmann led a two-hour introductory session on flipping for the District 39 staff on February 19th. It was well attended by approximately 60 staff members and also videotaped for teachers who could not attend. So far, a few teachers in District 39 have flipped some of their lessons:

- Beth Kalish, Jon Rennels - 8th Grade Social Studies
- Jenn Wood - 8th Grade Mathematics
- Liz Lipke - 6th Grade Mathematics and Science, who

states:
> "Flipped classrooms require a team effort (as does all successful education). The parents have to understand and be on board with concept. When this happens, it offers a unique opportunity for differentiation within the classroom, allowing time for students to practice, reteach, or strengthen their skills in direct contact with the teacher."

- Leora Sher - 6th Grade Mathematics and Science, who states:
> "Flipped classrooms allow for a high level of differentiation and targeted support that can not always be achieved when content instruction happens in the classroom."

Many more teachers in District 39 are exploring and discussing flipping their classrooms for specific lessons or units.

To ease the transition into flipped classrooms at Sears School, and on Bergmann's recommendation, the school purchased a program called Camtasia Relay. The program simplifies the process of recording and uploading videos, making it much easier for teachers to flip lessons. This might be a program District 39 should consider.

Cost/Risk/Obstacles of Flipping

Flipping involves few costs. Both teachers and students need access to technology, but most, if not all, already have access to a computer, smart phone, or other connected device. Screencasting programs abound, and most of them are free or have a version that is free. Sears school invested in Camtasia Relay to make flipping the classroom easier for teachers. This program gives teachers a "one button" easy way to record and then upload videos to a webpage. The program costs approximately $5,000 for educational institutions. There are professional development options available to help teachers with introducing flipped lessons, such as the Jon Bergmann session that District 39 provided to approximately 60 staff members in February. (As a side note, Jon Bergmann would be available to conduct further professional development during the summer months at approximately $3,500 per day.)

One obstacle is the amount of preparation time for teachers initially flipping a lesson, unit, or whole class. Often, the first year is highly time intensive, as the best videos are videos the teacher makes for his or her own students. (According to Bergmann, a teacher creating a video for his or

Recommendation

1. **Administration should encourage flipping through the provision of professional development, including speakers, books and other resources.**

her students is entering into a "social contract" with the students, letting them know that the teacher cares about their learning and has taken the time to create a video explaining and demonstrating the skills they need.)

Another obstacle is dealing with students who do not watch the instructional video at home. To ensure students will do the homework - watch the videos - teachers should set clear expectations with students, communicate with parents to get them on board, and provide appropriate consequences for lack of preparation as they would with any type of homework. Bergmann had students who did not do the homework watch the video in the back of his classroom; he found that most students watched the videos at home because they wanted the class time to work on applying their skills or asking him for clarification. Bergmann also found that students appreciated watching the videos as homework because it gave them a clear expectation as to how long their homework would take at night, easing anxiety over homework burdens.

Impact of Flipping on the Learning Environment

Flipping the classroom is not just providing instructional videos. It is the interaction of video instruction and meaningful in-class learning activities that is most important. A peak inside a flipped classroom reveals the following:

- An environment where there is increased interaction and personalized contact time between students and teachers
- An environment where students take responsibility for and construct their own learning
- An environment where the teacher is not the "sage on the stage," but the "guide on the side"
- An environment where students who are absent don't get left behind
- An environment where content is permanently archived for review or remediation
- An environment where content can be leveled and tailored for individual students
- An environment where all students are engaged in their learning
- An environment where students cooperatively apply and extend their learning

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INSTRUCTIONALAPPROACHES
Flipped, Project and Problem Based Learning

INSTRUCTIONAL APPROACHES – PROJECT-BASED AND PROBLEM-BASED LEARNING

Problem-based and project-based learning are different instructional approaches, both involving use of well-designed learning units in which students work collaboratively in small self-directed groups to complete projects or solve problems.

Problem-Based learning is commonly defined as an instructional strategy in which students work cooperatively to investigate and resolve an ill-structured problem based on real-world issues or situations. Instructors pose a "driving question," and guide students in defining their research questions, conducting research and experimentation, and formulating an end product (e.g., presentation, performance, prototype model, etc.) to summarize and share their findings and analysis. Example:

Students are presented with a range of information through print and digital media on the energy crisis. They are asked to investigate ways in which their community contributes to the energy crisis, and formulate recommendations for reducing utilization and using renewable energy.

Project-Based learning is an instructional strategy in which students work cooperatively over time to create a well-defined product, presentation or production. The teacher's role is to support students to organize and find resources, and to guide them through the process of self-learning. Example:

At Manor New Technology High School in Manor, Texas, instructors in English and World History jointly developed a project that capitalized on the wild popularity among their students of the best-selling novel The Hunger Games. Built on specific English and world history state standards, the project covered concepts including the pre-World War II global economic crisis, the rise of totalitarianism, and the societal moral dilemmas that world leaders at that time faced, and then had students draw parallels to similar fictional themes in the book.

Age/Subject Matter Appropriateness of Project-Based and Problem-Based Learning

There are examples of project-based learning used in classrooms across most grade levels, including early elementary school years. However, more in-depth projects and more complex problems are better suited to children in older grades. Project-based and problem-based learning units can be thoughtfully designed to cross multiple subjects, and are considered more engaging when they do. Research emphasized the need to carefully plan the activities so that they will teach concepts and skills required by state or district standards.

Anecdotal evidence showed that project-based and problem-based learning methods are often helpful for students with learning disabilities. The reasoning is that when

effectively managed, these approaches allow for more individual teacher-student interaction, and teachers can support and differentiate instruction in real-time.

Project-based and problem-based learning can be implemented across entire schools, for entire subjects, or for specific units or lessons. Many of the instructors interviewed for this paper emphasized that it may be impractical to teach every skill or subject using project-based learning. For some content areas, traditional teaching methods may be better suited (e.g., mastery of basic math computation).

Perceived Benefits and Research of Project-Based and Problem-Based Learning

Research studies conducted over the past 20 years have found that problem-based learning if implemented effectively can be more effective than traditional instruction at:

- Increasing academic achievement on annual state-administered assessment tests. (1)
- Teaching mathematics (2,3), economics (4), science (1,5,6), social science (7), clinical medical skills (8) and for careers in the allied health occupations (7) and teaching (7).
- Achieving long-term retention, skill development and satisfaction of students and teachers (1,9,2)
- Preparing students to integrate and explain concepts. (10)
- Instructing lower-achieving students. (1,4,6)

Problem-based and project-based learning are thought to benefit students and teachers in a number of ways:

- Students are thought to be more engaged and absorbing more content.
- Learning activities are more realistic simulations of real-life work situations students will encounter in later years.
- Teaching approach is aligned with the digital environment, in which children can instantly find facts and information through the Internet. It orients the educational experience toward analysis of information and "meaning making," rather than fact-gathering, memorization and recitation.
- Allow teachers to provide immediate one-on-one feedback to students as they are working.
- Provides environment for students to demonstrate, practice and develop many of the skills listed in District 39's Characteristics of Successful Learners which include:
  - Transfers Knowledge to New Situations
  - Thinks Flexibly
  - Is a Self-directed Learner
  - Thinks Reflectively
  - Listens Actively
  - Demonstrates Perseverance
  - Strives for Personal Best
  - Takes Responsible Risks

- Acts Responsibly
- Responds Effectively
- Maintains Focus
- Thinks Inter-dependently
- Self-advocates

Design/Launch/Operation for Project-Based and Problem-Based Learning

Problem- and project-based learning have been in practice at higher education organizations for decades in the form of case studies and applied laboratory units. Within District 39, many educators have already designed units to be taught using this approach.

Expanding use of problem- and project-based learning can be resource intensive until curriculum materials that can be used over multiple years are developed. Although many case studies and learning unit modules are broadly available through national teaching organizations, they must be adapted to individual school environments, and thoughtfully reviewed for alignment with state and district learning standards and expectations.

When units are designed that cross academic subject matter, collaboration and planning among teachers in different disciplines is necessary. Depending on the task and objective, schedules may need to be modified to allow student teams longer periods to work on projects. In some schools, facility modifications have been made to provide non-classroom space for teams to work and also have access to computers, electronics, multimedia, building materials, or other resources that may be needed for project completion.

Cost/Risk/Obstacles of Project-Based and Problem-Based Learning

A number of obstacles to rapidly adopting widespread problem- and project-based learning were identified for the various stakeholder groups. It should be noted that many of these concerns can be effectively mitigated through paced implementation, education and awareness of best practices.

Students:
- Fear of not succeeding as well/achieving as high of grades in problem- and project-based learning as in traditional learning environments
- Frustration with becoming familiar with a new type of learning
- Potentially more complicated schedule

Teachers:
- Lack of time to plan effective problem- and project-based learning modules

- Uncertainty about how new methods will impact their students' mastery of skills, achievement on standardized tests or readiness for higher education
- Fear that their performance assessment will suffer
- Multiple years to "work out the kinks"
- Challenges in adapting material to apply differentiation strategies

Administrators:
- Challenge of managing change among many schools, teachers, parents and students
- Potential cost of purchasing educational modules, offering teacher inservices, or investing in materials or facility to enable problem- and project-based learning
- Uncertainty about how new methods will impact students' mastery of skills, achievement on standardized tests or readiness for higher education
- Difficulty finding the highest quality resources to utilize

Parents:
- Concern that approach may benefit some but not all students
- Skepticism that new approach can improve outcomes in an already high-achieving school district
- Concern over cost

INSTRUCTIONALAPPROACHES
Flipped, Project and Problem Based Learning

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Student engineers designed robots that can collect your trash and rehabilitate endangered animals.

Student engineers at the STEM Design Challenge featuring K'Nex / AIU

APPENDIX A: DISTRICT OVERVIEW
Teacher Survey Results

In March 2013, the CRC distributed a survey to District 39 teachers concerning their use, needs and opinions with regard to technology. The response rate was high with 280 teachers participating out of a possible 325 respondents. All grade levels and schools were well represented. Overall, the results of the survey indicated that survey respondents throughout District 39 are using technology across the curriculum. It is apparent from survey respondents' written comments, however, that a number of teachers feel constrained by the current level of access to devices (e.g., iPads, laptops, computer labs). Based on these comments the CRC recommends that the District further investigate access to devices and determine whether more devices are needed at each school. The survey results are summarized below.

What grade levels do you teach? (Please check all that apply.)

Grade	Count
EC	6
Kindergarten	40
1st	64
2nd	64
3rd	70
4th	66
5th	52
6th	50
7th	46
8th	44
N/A	13

In what building do you work? (Please check all that apply.)

Building	Count
Central	42
Harper	28
McKenzie	46
Romona	44
Highcrest	79
WJHS	70
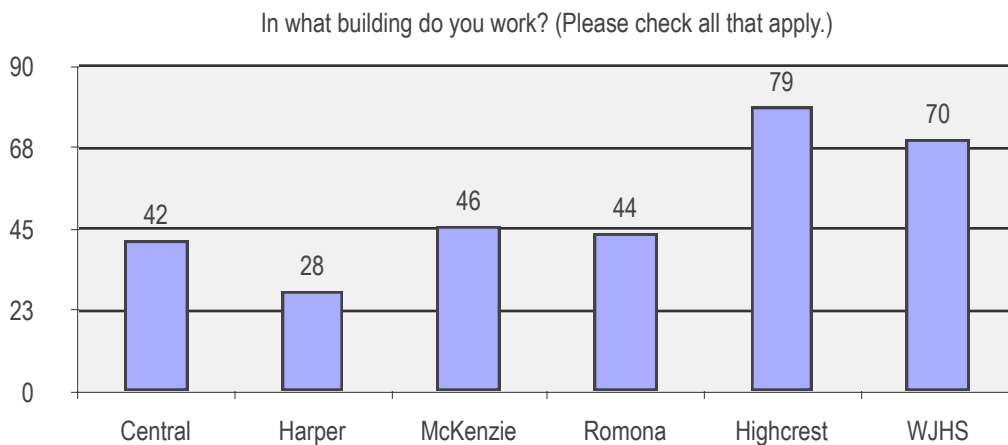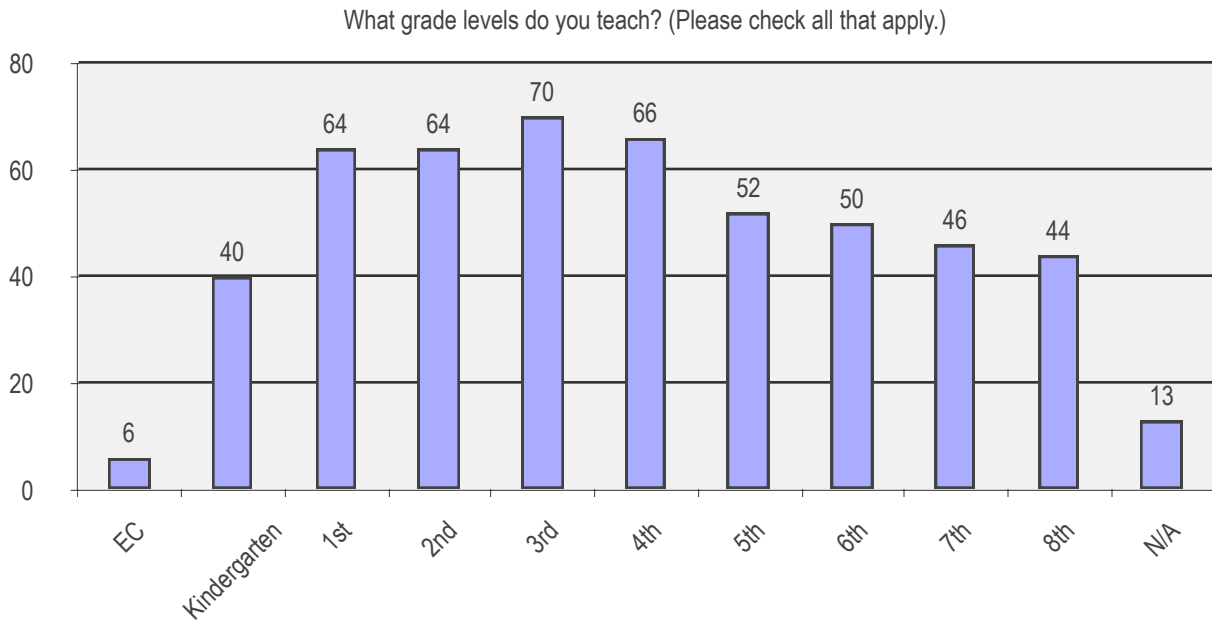
APPENDIX A: DISTRICT OVERVIEW
Teacher Survey Results

Teacher Survey Question: In what subject areas do you integrate technology? Kindergarten through fifth grade homeroom teachers reported that they and their students use technology across the curriculum, and in a variety of ways. Higher technology use was reported in reading, writing and math than in social studies and science, while health and Second Step reported relatively low student use.

For K-5 homeroom teachers only: In what subject areas do you integrate technology?

Subject	Students Use	Teacher Uses
Reading	79	87
Writing	80	86
Math	82	91
Social Studies	56	83
Science	55	79
Health	3	10
Second Step	11	63
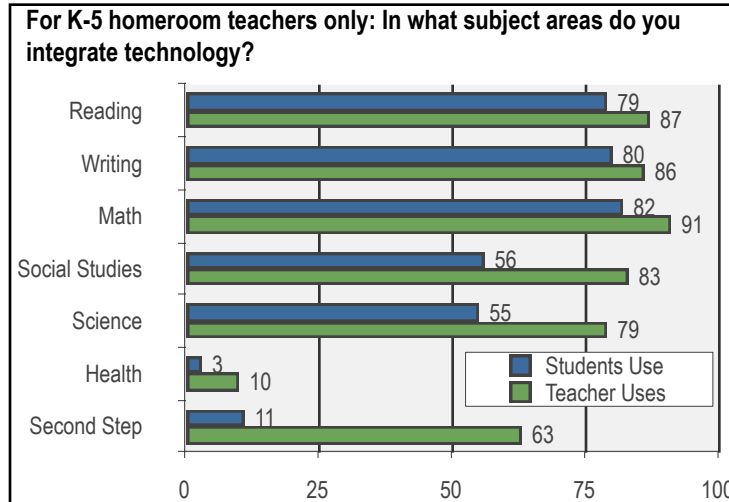
Teacher Survey Question: Please indicate if your STUDENTS use technology in the ways listed below. Teachers responded that their students use technology for a wide range of activities including collaborating with teachers and peers, conducting research, and creating presentations. The teachers noted that slightly less than 50% of students used technology for organizational skills, which matches comments from parents recommending a higher emphasis on teaching executive functioning skills in the technology curriculum.

Please indicate if your STUDENTS use technology in the ways listed below, and whether you need more professional support for any of these.

Answer Options	Yes	No	I need more professional development for this	Response Count
Communicate and collaborate with classmates and teachers	176	59	9	239
Communicate and collaborate with others beyond the classroom	117	107	27	234
Access online resources and information	211	29	5	241
Create projects	210	27	13	240
Share and represent information and data	181	54	5	238
Access materials and tasks at their individual levels of learning	191	37	23	238
Practice curricular skills (math facts, spelling, map skills, grammar, etc.)	195	38	6	236
Explore, solve, and communicate curricular problems	138	89	18	235
Complete assessments	166	67	12	237
Improve their organizational skills (time management, communication with teachers, homework assignments, etc.)	114	111	19	232
Other (please specify)				7
			answered question	243
			skipped question	37

Teacher Survey Results

Teacher Survey Question: Please indicate how the uses of technology impacts students' level of self-directed learning. Based on the survey responses and comments, it appears that most teachers who responded to the survey believe that using technology in the classroom positively impacts their students. Respondents reported that they prima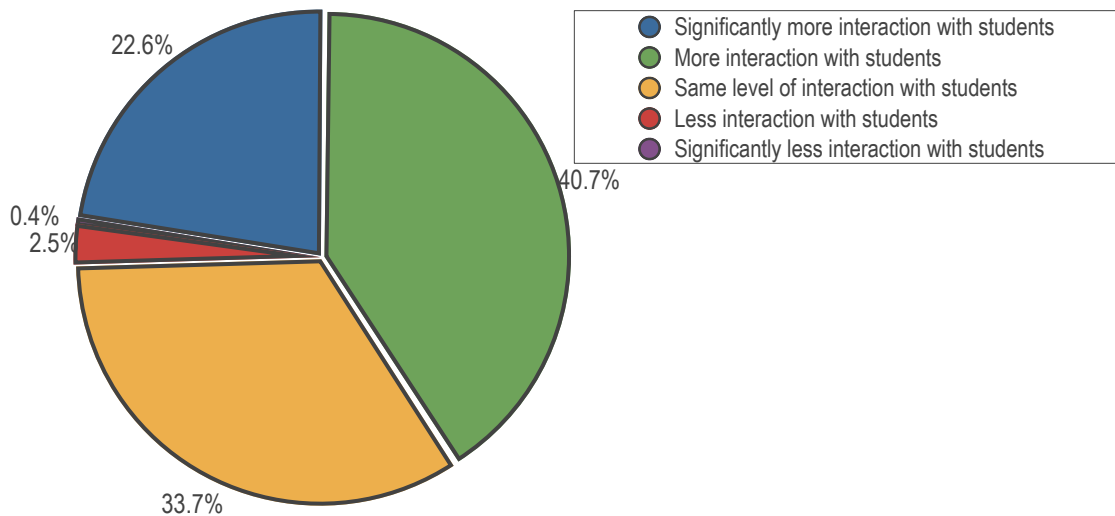rily evaluate the effectiveness of technology by looking to the engagement of students, the quality of work produced, student feedback, and collaboration among students. Ninety percent of teachers who responded to the survey feel that technology increases self-directed learning.

9.5% 0.4%
31.7%
58.4%

- Significantly increases self-directed learning
- Increases self-directed learning
- No increase in self-directed learning
- Decreases self-directed learning
- Significantly decreases self-directed learning
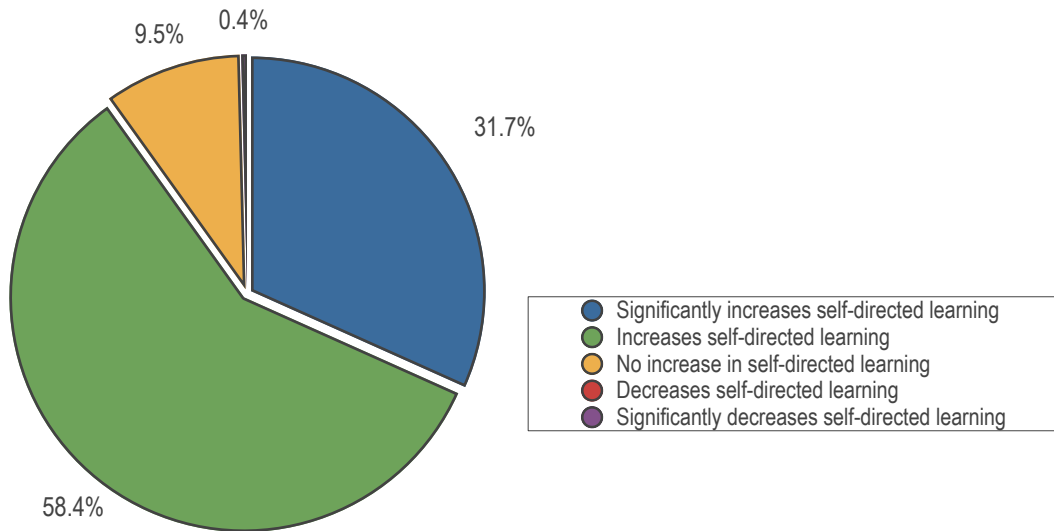
Teacher Survey Question: Please indicate the impact of technology integration on your ability to interact directly with your students. Over sixty percent believe that technology increases their interaction with students.

22.6%
0.4%
2.5%
33.7%
40.7%

- Significantly more interaction with students
- More interaction with students
- Same level of interaction with students
- Less interaction with students
- Significantly less interaction with students

Many respondents cited increased student engagement as a positive effect of technology. One teacher stated, "technology hardly ever gets in the way during lessons, but it allows students to explore the content in more ways." Several teacher respondents also appreciated the immediate feedback that technology provides. One teacher commented, "I love the instantaneous student assessments …." And, many teacher respondents found technology assisted them in differentiating instruction. For example, one respondent stated, "Technology is especially wonderful for work with differentiation. It meets the needs of students who need challenge, and it helps students who need a lot of extra help."

APPENDIX A: DISTRICT OVERVIEW
Teacher Survey Results

Some negative aspects of technology that teacher respondents cited include frequent technology glitches/malfunctions; students becoming distracted by the "flashiness" of technology; students' ability to "goof around" during technology-based projects by browsing the internet, changing the computer settings, etc.; and the difficulty in assessing how much students are actually learning while engaged with technology.

Teacher Survey Question: Are technology tools (laptops, computers labs, iPads, and software) available to your students for lesson implementation?
Although the majority of respondents reported that technology tools are available to their students for lesson implementation most of the time, respondents'
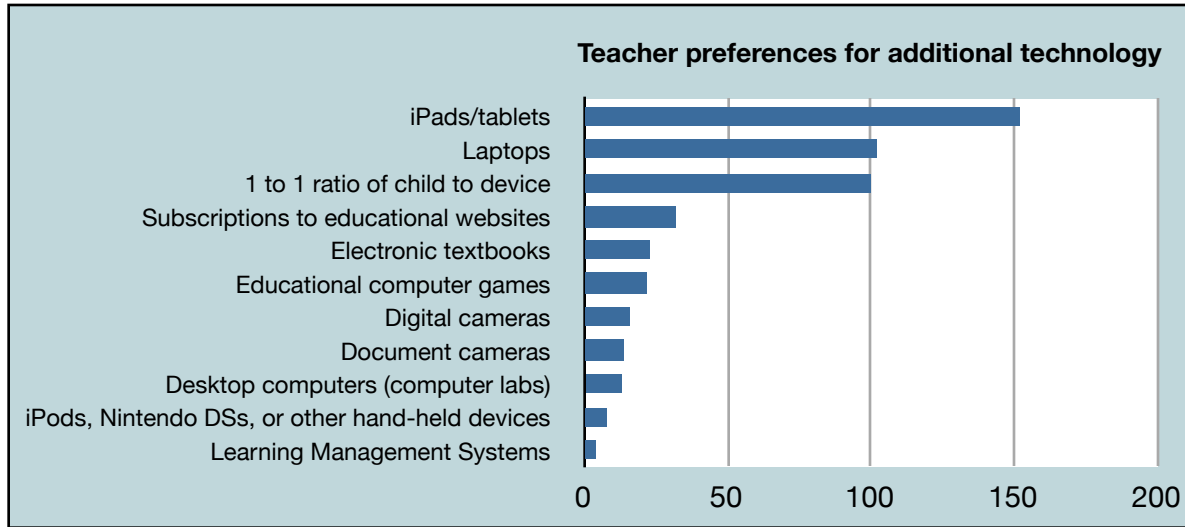
Are technology tools (laptops, computer labs, iPads, and software) available to your students for lesson implementation?		
Answer Options	Response Percent	Response Count
Always	12.3%	30
Most of the time	48.6%	118
Some of the time	23.9%	58
Rarely	2.5%	6
Only with advanced reservation (sign-up) of the devices	12.8%	31
If tools are not always available when the learning need arises, explain why.		53
answered question		243
skipped question		37

Written comments indicate that they often experience difficulty in gaining access to iPads, laptops and computer labs when desired. Multiple comments from respondents indicated a desire for more devices. One respondent stated, "We desperately need more technology ...." Others echoed those sentiments: "there aren't enough tools;" "it's very difficult to get to use the iPads;" "we would use everyday, on a regular basis, if there were enough…." Some respondents reported that while they can gain access to technology tools with advanced planning, the devices are not available on short notice or if students need more time than anticipated on a project. One respondent remarked, "significant advanced planning is required, but much of the time we have a spontaneous need." Several respondents noted that the use of computers for assessments and testing takes priority over classroom use, which hampers availability. The comments indicate that District 39 should further investigate access to devices and determine whether more are needed.

APPENDIX A: DISTRICT OVERVIEW
Teacher Survey Results

Teacher Survey Question: What additional technology (hardware and software) do you wish you had (or had more of) for use in the classroom? (Please rank the top five.) When asked what additional technology teachers wished they had for use in the classroom, an overwhelming number asked for iPads/tablets and laptops. Many wished for a 1 to 1 ratio of devices to students. About 73% of respondents chose either iPads/tablets or a 1 to 1 ratio of child to device or laptops as their top two choices for more technology.

Teacher preferences for additional technology

Category	Value
iPads/tablets	~155
Laptops	~105
1 to 1 ratio of child to device	~102
Subscriptions to educational websites	~33
Electronic textbooks	~22
Educational computer games	~20
Digital cameras	~15
Document cameras	~13
Desktop computers (computer labs)	~13
iPods, Nintendo DSs, or other hand-held devices	~8
Learning Management Systems	~4

Teacher Survey Question: To what extent, do you feel you are provided adequate technical support to successfully integrate technology into the curriculum? Over sixty percent of survey respondents reported that technical support is helpful and available in successfully integrating technology into the curriculum.

To what extent, do you feel you are provided adequate technical support to successfully integrate technology into the curriculum?		
Answer Options	Response Percent	Response Count
Support is helpful and available when I need it.	61.3%	149
Support is somewhat helpful and available.	25.1%	61
Support is helpful, but not always available when I need it.	13.2%	32
Support is not helpful or available.	0.4%	1
	answered question	243
	skipped question	37

Not surprisingly, it appears that respondents have a range of comfort levels when it comes to using technology, which impacts their professional development needs. For example, a couple of respondents commented that they find that the technical professional development activities are "helpful, but basic" and "aren't as advanced as I am ready to be learning" while a couple of others reported that they feel behind and "need a private technology tutor." Most respondents are highly complimentary of technology support staff, but some cite that the support employees often are overworked or not available when teachers need them.

APPENDIX B: DISTRICT OVERVIEW
Parent Survey Results

PARENT SURVEY RESULTS

In April 2013, the District 39 Community Review Committee asked parents of students to complete an online survey about their children's school-related use of technology at home. The survey asked about specific ways children use technology and surveyed parents about the importance of technology as a learning tool. It also encouraged parents to describe their children's positive and negative experiences using technology at home and offer suggestions or other feedback.

Parent Survey Question: Which District 39 schools do your children attend? (Please check all that apply) Response to the survey was high with 770 parents participating and district schools were represented.

Which District 39 schools do your children attend? (Please check all that apply.)		
Answer Options	Response Percent	Response Count
Central	21.3%	164
Harper	13.1%	101
McKenzie	18.7%	144
Romona	17.7%	136
Highcrest	36.1%	278
WJHS	32.5%	250
	answered question	770
	skipped question	0

Parent Survey Question: In what grade is your eldest District 39 child currently? While about two-thirds of responses came from parents of children in fifth through eighth grades, the CRC received responses from parents of children at all grade levels, including early childhood.

In what grade is your eldest District 39 child currently?		
Answer Options	Response Percent	Response Count
District 39 Early Childhood	0.8%	6
K	5.3%	41
1	6.9%	53
2	6.5%	50
3	10.6%	82
4	11.8%	91
5	11.3%	87
6	13.1%	101
7	17.0%	131
8	16.6%	128
	answered question	770
	skipped question	0

APPENDIX B: DISTRICT OVERVIEW
Parent Survey Results

Parent Survey Question: New Trier High School and all other New Trier elementary sender school districts are pursuing some form of 1:1 personal learning initiatives. This means providing students with a tablet or laptop device to use at home and throughout the school day. How important is it to you that District 29 investigates a 1:1 personal learning initiative if there is no increase in overall student fees or to the District budget? At the junior high level, 79.8% of parents gave a response of important or very important. At the middle school level, 64.7% of parents gave a response of important or very important. At the elementary level, the highest frequency responses were neutral (34.7%) to not important (30.6%). 141 parents provided comments to this particular survey question.

New Trier High School and all other New Trier elementary sender school districts are pursuing some form of 1:1 personal learning initiatives. This means providing students with a tablet or laptop device to use at home and throughout the school day. How important is it to you that District 39 investigates a 1:1 personal learning initiative if there is no increase in overall student fees or to the District budget?

Answer Options	Very important	Important	Neutral	Not important	Response Count
In the junior high	**399**	201	96	56	752
In the middle school	224	**245**	179	76	724
In the elementary schools	122	123	**245**	216	706
Comments:					141
				answered question	770
				skipped question	0

Parent Survey Question: Which technology devices do your children have access to at home? (Please check all that apply.)

Which technology devices do your children have access to at home? (Please check all that apply.)

Answer Options	Response Percent	Response Count
Tablet (Android, iPad, Google Nexus, Kindle Fire...)	79.0%	608
Handheld technology (iPod Touch...)	69.0%	531
eReader (Kindle, Nook...)	43.6%	336
Desktop computer	69.0%	531
Digital camera	77.3%	595
Digital video camera	44.4%	342
Gaming system (Nintendo, X-Box 360, Sony Playstation...)	72.3%	557
Laptop computer	77.3%	595
Other (please specify)		40
	answered question	770
	skipped question	0

APPENDIX B: DISTRICT OVERVIEW
Parent Survey Results

Parent Survey Question: Do you feel you have adequate technology devices at home, such as computers or tablets, to support your children's learning or homework requirements? Wilmette District 39 families are well equipped with technology and 90% of District 39 parents feel they have adequate technology devices to support their children's homework requirements, according to the responses the CRC received.

Do you feel you have adequate technology devices at home, such as computers or tablets, to support your children's learning or homework requirements?		
Answer Options	Response Percent	Response Count
Yes	90.4%	696
No	9.6%	74
Comments:		99
	answered question	770
	skipped question	0

Parent Survey Question: How often do you see your ELDEST child using technology at home for the following activities? About 40% said their child uses technology to complete homework daily, 38.0% said their child uses technology to communicate with peers daily, 28.1% use it to conduct research daily, 24.7% use social media daily, 24.3% said their children are gaming daily and 17.8% use technology daily to learn about the world outside of school. Respondents said other activities involving technology occur less frequently, such as collaborating on projects, communicating with teachers, expressing creativity (through blogs, music, movies, graphic arts or presentations), and accessing supplemental educational resources.

How often do you see your ELDEST child using technology at home for the following activities?							
Answer Options	Daily	Several times per week	Once a week	Twice monthly	Not at all	I don't know	Response Count
Completing homework	313	228	60	63	99	3	766
Assisting with organizational skills (calendar, note-taking, reminders)	94	100	63	38	421	31	747
Conducting research on core academic subject areas	128	238	112	135	142	10	765
Conducting research in personal interest areas	215	260	105	79	93	12	764
Collaborating on projects	71	171	110	105	266	35	758
Communicating with peers	289	129	54	59	224	6	761
Social media	185	103	39	30	381	12	750
Communicating with teachers	43	102	111	159	293	47	755
Expressing creativity (blogs, graphic arts, desktop publishing, movies, music, presentations...)	98	160	116	136	220	24	754
Gaming (non-school related)	187	303	131	67	69	11	768
Learning about the world outside of school	135	279	159	105	61	19	758
Accessing supplementary educational Internet resources (Khan Academy, StarFall, etc.)	56	124	123	101	242	104	750
If your children are accessing supplementary educational Internet resources, please share which resources.							163
						answered question	770
						skipped question	0

APPENDIX B: DISTRICT OVERVIEW
Parent Survey Results

Parent Survey Question: In your opinion, how important is technology as a learning tool? 90% of parents responding to the survey said technology as a learning tool is "extremely important" (54.4%) or "important" (36.8%), while 18 people (2.3%) rated it as "unimportant" or "extremely unimportant." Many comments demonstrated strong support for technology while others cautioned that it should be treated as a tool and used thoughtfully.

"21st Century Learners absolutely need technology as a learning tool to compete and succeed in our ever changing world." Quote from District 39 Parent Survey
 "I think it is important to treat it as a tool, not the answer to all problems or a shortcut for doing the work." Quote from District 39 Parent Survey

| In your opinion, how important is it technology as a learning tool?		
Answer Options	Response Percent	Response Count
Extremely important	54.4%	419
Important	36.8%	283
Neutral	6.5%	50
Unimportant	1.9%	15
Extremely unimportant	0.4%	3
Comments:		82
	answered question	770
	skipped question	0

Parent Survey Question: In your opinion, how well is the district preparing students to use technology tools for future academic years and careers? Three out of four parent respondents said they believe District 39 is preparing students "well" or "extremely well" to use technology tools in future academic years and careers, while 4.2% said the district was performing "poorly" or "extremely poorly" in this area.

In your opinion, how well is the district preparing students to use technology tools for future academic years and careers?		
Answer Options	Response Percent	Response Count
Extremely well	19.6%	151
Well	56.0%	431
Neutral	20.3%	156
Poorly	3.1%	24
Extremely poorly	1.0%	8
Comments:		97
	answered question	770
	skipped question	0

APPENDIX B: DISTRICT OVERVIEW
Parent Survey Results

Parent Survey Question: On an average day, how much time does your child need to use a computer, tablet or other device for school related work? Most parents (54.0%) responding to the CRC survey said their children spend 20 minutes or less on average each night using a computer or other technology device for homework. About one in four (24.7%) of respondents said their child spends 5 minutes per night using technology for homework, while a similar percentage (24.0%) said their child spends 45 minutes or more with technology for school work. A scant 3.4% said their child spends 95 minutes or more with technology for homework.
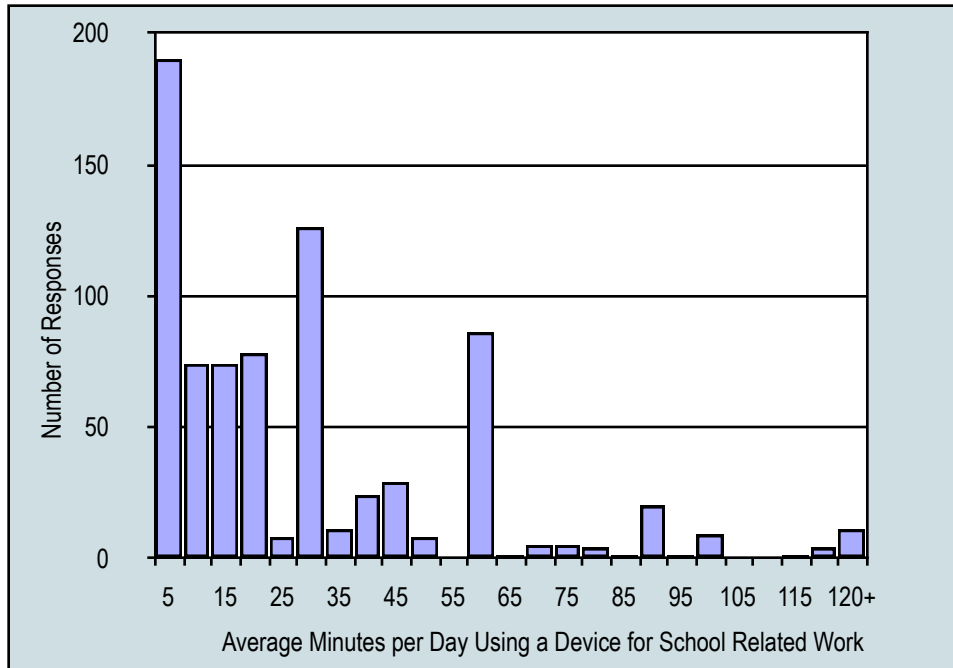
Parent Survey Question: How would you rate the amount of time your child spends using technology to complete homework on an average day? 73.2% of parents responding said the amount of time their child spends using technology for homework on an average day was "the right amount."

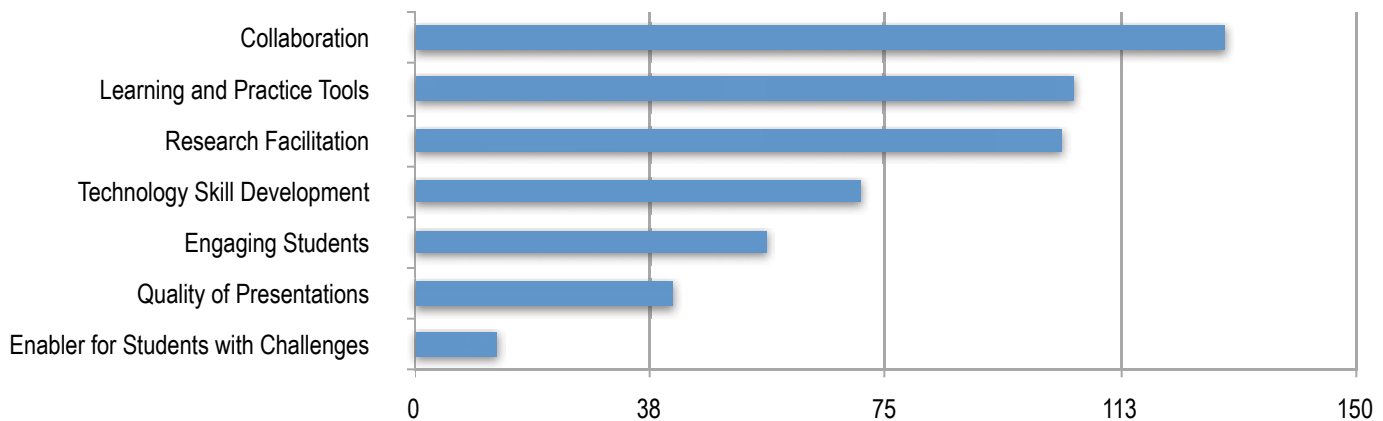| How would you rate the amount of time your child spends using technology to complete homework on an average day?		
Answer Options	Response Percent	Response Count
Too much	3.5%	27
More than the right amount	7.7%	59
The right amount	**73.2%**	**564**
Less than the right amount	9.0%	69
Too little	6.6%	51
	answered question	770
	skipped question	0

APPENDIX B: DISTRICT OVERVIEW
Parent Survey Results

Parent Survey Question: Please describe any positive experiences that their child/children may have had related to the use of technology for school-related work and activities. ? There were 391 valid unique responses and a summary of the responses is below. The majority of the responses fell within the following categories:

- Collaboration - Collaborative interactions with peers and easy flexible contact with teachers. Includes use of Google Docs, blogging tools, and homework notification and tracking. Mentioned 129 times as a positive experience.

- Learning and Practice Tools – On-line tools designed to teach or reinforce specific subjects, including Khan Academy, Raz Reading, various math practice, language learning sites, etc. Mentioned 105 times as a positive experience.

- Engaging Students – Technology integrated within the learning process to create excitement about the subject and to facilitate unique opportunities to explore, learn and create. Use of technology engages the student to a higher degree, resulting in a greater understanding of and appreciation for the subject. Mentioned 56 times as a positive experience.

- Research Facilitation – Use of technology and on-line resources to facilitate research and ability for students to explore subjects of interest. Both faster access and depth of understanding. Mentioned 103 times as a positive.

- Quality of Presentations – Quality of subject matter and deliverable presentations. Mentioned 41 times as a positive.

- Technology Skill Development – Learning how to use technology. Building the necessary technology skill base for our students to function and compete in today's world. Mentioned 71 times as a positive experience.

- Enabler for Students with Challenges - Use of technology to help students who learn differently, have learning disabilities or have other impairments. Mentioned as a positive 13 times.

- Other noted positive experiences:

  - Facilitation of in-class teaching using the Smart Board was mentioned as a positive 4 times and the Flipped Classroom was mentioned as a positive 3 times.

Mentions - Positive Technology Experiences

Category	Mentions
Collaboration	~131
Learning and Practice Tools	~105
Research Facilitation	~103
Technology Skill Development	~71
Engaging Students	~56
Quality of Presentations	~41
Enabler for Students with Challenges	~13

(Horizontal axis: 0, 38, 75, 113, 150)

APPENDIX B: DISTRICT OVERVIEW
Parent Survey Results

Here are some examples of quotes from parents in regards to collaborative interactions with peers and easy flexible contact with teachers:

"The Blog created by the English teacher was a fun way for the kids and teacher to interact outside the classroom. My child also seemed to forget that he was writing ad thinking analytically while using the blog. Using a combination of FaceTime and Google Docs, my son and his collaborators completed a project."

"Since they all had various activities after school, the virtual meeting was awesome!"

"Email access to teachers after-hours has been very positive. Mr Dubnow was available after 9 pm one evening to clarify a lab science project due the next day. Access to alternative explanations and examples found on various topics not found in the basic textbook provides different perspectives and helps solidify the lesson. For example, simple Google searches regarding algebra topics provide helpful information for both child and [the] parent who is trying to explain."

"My eighth grader's social studies teacher posts videos, podcasts and slideshows that create an interactive out of school learning experience. This is an excellent use of current technology!"

Here are some examples of quotes from parents in regards to practical applications for tracking homework, practicing math and spelling facts, practicing reading:

"Being able to track homework online especially when missed school is wonderful."

"Practicing math facts and spelling words on the computer make those tasks more fun. The computer is an important tool in assisting my son with writing. He dictates his responses to literature and then practices editing. His class has a weekly blog which requires a brief response but is relevant to topics learned in class."

"Raz Kids has been great for my son learning to read. I was able to save money since I didn't have to purchase books for him to practice and its greener. Plus we can easily track his progress and see what level he was reading at. My daughter uses Google docs to submit her papers."

"I love the homework/teacher information online. That is very helpful. I love the Parent Portal - my child likes checking it too to make sure he stays on track. I like having access to the grade book to show him how much one score can affect a grade etc. and also for his accountability. I like them doing assignments on Google Docs. It allows them to work on assignments from anywhere w/o the fear of losing anything or not being prepared with the proper materials to complete assignments."

Here are some examples of quotes from parents in regards to creating excitement about learning and facilitating unique opportunities to explore, learn and create:

"They are able to much more creative in their assignments - they are able to focus on learning instead of memorizing, they are able to come to their own conclusions regarding information and they are able to organize information much better, i.e., use of excel, powerpoint, etc."

"I have been extremely impressed by her Google projects she's completed. She used the computers at school and in some instances, collaborated with other students on her project. She's able to go on any device to show them to me! Also, each time she's able to use the latest device at school, there's a level of excitement."

"My 8th grader uses the reverse learning technique (watching the lectures at home and doing homework at school). I think that this works for her. I also like that the textbook is online so we don't have to search the house for it. Great projects utilizing online tools for papers, presentations, etc."

"Allows my children to see and experience different cultures and viewpoints from around the world that they may never have known about. Also allows them to communicate with friends and family that are far away and thus be more connected to them."

APPENDIX B: DISTRICT OVERVIEW
Parent Survey Results

"I think technology enables research to be extensive and thorough, and gaining knowledge about a given research topic is at a much higher level. The use of homework calendars and blogs is quite efficient and allows students to stay on top of their assignments. The ability to send documents to teachers rather than print, or collaborate with a group on Google docs are definitely strengths."

"My daughter had trouble understanding why the multiplication of two negative numbers resulted in a positive number. After browsing I found that the Khan academy website provided different explanations, one of those fitted my daughter's type of learning."

"I have been so impressed by how much our kids have learned about technology and its many uses. They are able to find information, images and music to create projects. For example, if my son (4th grade) is studying something in science that he finds interesting, he will look up additional info. on the subject on the internet. We often use the internet to figure out proper spelling, word definition or for general fact checking."
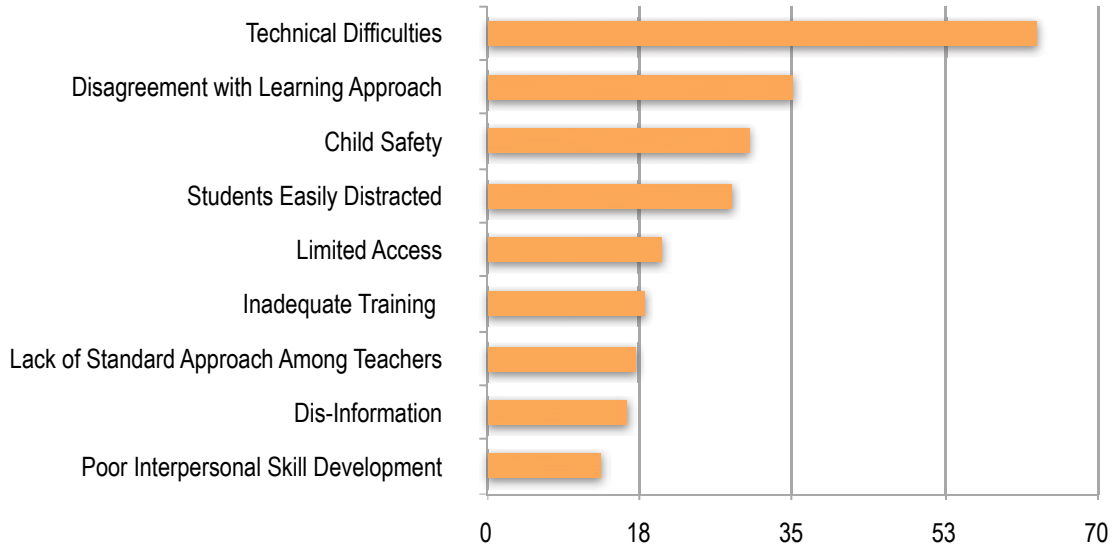
Parent Survey Question: Please describe any negative experiences that their child/children may have had related to the use of technology for school-related work and activities. There were 256 valid unique responses and a summary of the responses is below. The majority of the responses generally fell within the following categories:

- Technical Difficulties — Difficulties using technology tools such as losing work, slow connections with internet/school servers, software not available at home, Google docs with limited features. Mentioned 63 times as a negative experience.

- Disagreement with the Learning Approach — Comments regarding how the use of technology can detract from the learning process or is being inappropriately used to teach their children. Mentioned 35 times as a negative experience.

- Child Safety - Challenges regarding children's safety and well-being. Includes concerns about exposure to inappropriate on-line content, too much screen time, cyber bullying and other inappropriate use of technology. Mentioned 30 times as a negative experience.

- Students Easily Distracted — Issues with students not being able to focus on on-line homework assignments because of too many other on-line distractions and temptations such as social media, emailing, texting, games, etc. Mentioned 28 times as a negative experience.

- Limited Access - Concerns about at-home access to devices required to do homework. Includes lack of computer and only having one computer for multiple children. Mentioned 20 times as a negative experience.

- Inadequate Training — Issues with students and parents not having the required skills to complete assignments that require specific technology tools or software. Includes comments about students not receiving proper training and parents not having the technology skills to help theoir children when they have difficulty using the tools. Mentioned 18 times as a negative experience.

- Lack of Standard Approach Among Teachers — Observations on the wide variation between teachers on how they employ technology tools in their teaching methodologies. Includes comments on the lack of standardization on software used, websites recommended, and the amount of technology-based homework given. Mentioned 17 times as a negative experience.

- Dis-Information — Issues the quality of on-line Information. Includes comments on the lack of training for students on how to find high quality information sources and the propensity for students to take whatever they find on-line as the "truth". Mentioned 16 times as a negative experience.

- Poor Interpersonal Skill Development — Concerns that the amount of on-line collaboration detracts from the development of face-to-face interpersonal skills. Includes experiences where the on-line collaboration process did not work. Mentioned 13 times as a negative experience.

- Other noted negative experiences:

    - Issues with Xtra Math Tool — This tool was mentioned with great frustration by 9 respondents. Due to technology limitations (no number entry keypad), these families indicated that their children were not able to enter responses fast enough to satisfy the timer.

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Mentions - Negative Technology Experiences

Category	Mentions
Technical Difficulties	~64
Disagreement with Learning Approach	~35
Child Safety	~30
Students Easily Distracted	~29
Limited Access	~20
Inadequate Training	~19
Lack of Standard Approach Among Teachers	~18
Dis-Information	~17
Poor Interpersonal Skill Development	~13

Here are some examples of quotes from parents in regards to technical difficulties:

"Google Docs is frustrating because it often doesn't hold format or do spell check and the kids are required to use it. I understand why, but its features are lacking and it seems it would be better to allow use of Microsoft word and the use of a memory stick. More hours have been logged fiddling with technology issues instead of doing homework. This goes for other sites his teachers ask him to use to complete homework. Also sometimes the school servers are slow and accessing files and student's account can be problematic."

"My child has completed projects that are on the shared server and are lost or deleted accidentally. This has been a source of frustration and loss of many hours. I personally feel that some of the programs particularly for presentations are just gimmicks and don't contribute to learning."

"Servers have been down and not able to access information for projects due the next day."

"The incompatibility with the school's chosen software is an ongoing challenge."

"Financial limitations prevent the home environment from having the latest and greatest."

"It is difficult to switch between mac and pc applications."

Here are some examples of quotes from parents in regards to the challenges regarding children's safety and well-being technical difficulties:

"I'll be honest, I recognize the importance of technology for research and communication with teachers, homework resources but I do feel that kids are on some sort of device too much in general. The personal devices the kids have are excessive and they're staring at them constantly. I feel there should be more regulations regarding personal devices at school. Instagram/Facebook also need to be regulated more...too much potential for danger."

"Every search brings some inappropriate material at some point."

"When my child, like so many others, has homework that needs to be completed on the computer either I have to sit with her looking over her shoulder the entire time or it takes six hours, because she spends most of it on YouTube, Facebook, and more dangerous places. So many parents actually think their child has six hours of homework. I know mine does not. A school provided computer or tablet with the same limitations as the school computers would be a godsend. I also see that the kids talk to each other on line, including some really nasty

bullying, both in class and when doing homework. I also see kids provoke cyberbullying so they can use it as a threat against the child who does not understand that what is said online is there forever, and can be taken out of context. I think the school is terribly naive about its role in this."

Here are some examples of quotes from parents in regards to concerns regarding distraction, interference with learning:

"Technology can be an easy distraction for children with ADD. It is easy for them to "get lost" in the research and takes a real effort to stay on task while online."

"It can be a distraction. Just a few letters, a .com, and hitting enter, you are just a mouse click away from a fun game."

"When she's on the tablet for homework, she easily gets distracted with her other things she likes to do on there (YouTube, games, surfing, fan blogs of TeenTitans and Dr. Who), and homework can take all night or be rushed and done poorly because she finds the other things much more interesting."

"Frankly, I think that technology can become a crutch for kids when they rely on it to do their thinking for them. I appreciate the volume of information that's accessible to them but think that relying solely on technology fails to foster a love of learning for learning's sake and distracts kids from that ultimate goal. Creating a flashy presentation is beside the point. The content is what matters and I am discouraged by how little my kids and my school grasp that. Additionally, I don't think school does an adequate job of teaching kids to be smart consumers of online information. They take at face value the validity of any information that comes to them over the internet, especially if the information was sought for a school related project."

"Group projects conducted on Google Docs have the potential to discourage group discussion and participation. Kids can avoid contributing, which isn't as easy to do when you're face-to-face. -On that same note, there sometimes is a lack of human interaction in class - kids seem to avoid actual conversations with other kids, preferring to text later. - There have been some overly long, drawn out homework nights when my daughter FaceTimes with a friend as they both complete the math assignment, problem for problem. -Problems with how a digital format lays out type or divides documents/technical issues have had my younger kids in tears."

Here are some examples of quotes from parents in regards to access to devices:

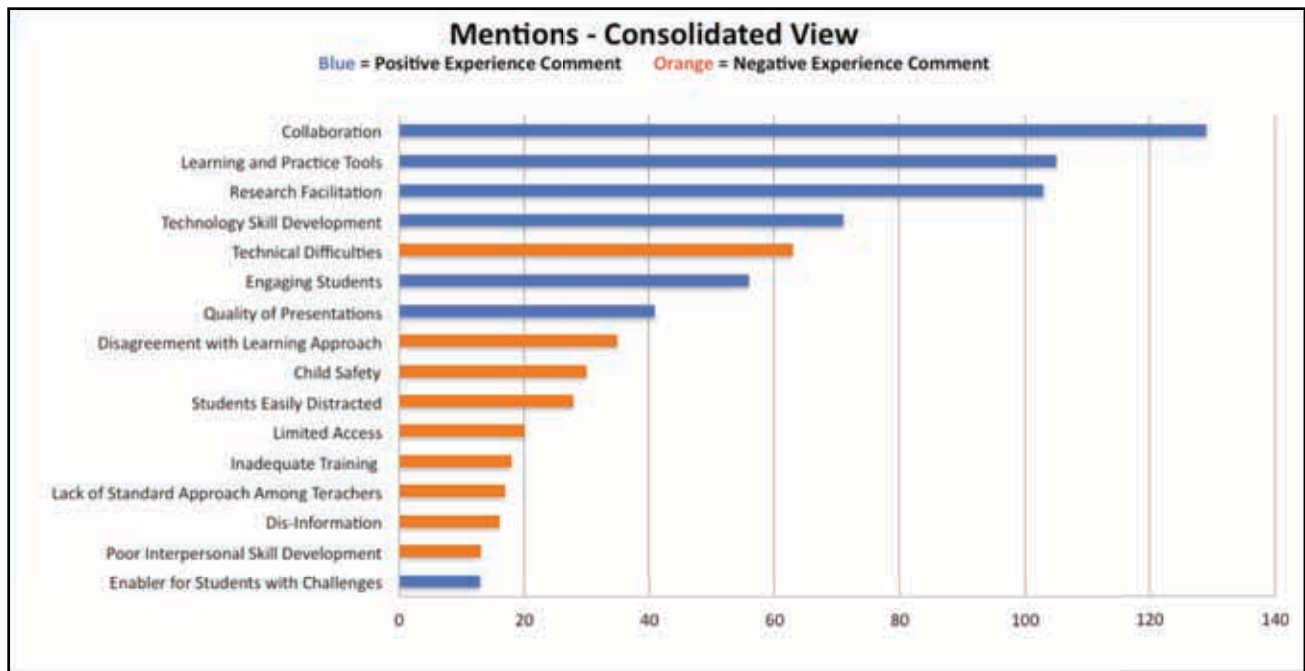"The only negative is when several of us need to use the same laptop at the same time."

"When my sixth grader has a lot of homework on the computer that it is tough for my third grader to have a turn at the computer! No other problems, luckily."

APPENDIX B: DISTRICT OVERVIEW
Parent Survey Results

Summary of Positive and Negative Input

The freeform responses have been categorized by positive technology experience categories and negative technology experience categories as outlined in the chart below. There were 391 positive experience responses and 256 negative experience responses.

Mentions - Consolidated View

Blue = Positive Experience Comment   Orange = Negative Experience Comment

Category	Value
Collaboration	~130
Learning and Practice Tools	~105
Research Facilitation	~103
Technology Skill Development	~71
Technical Difficulties	~63
Engaging Students	~56
Quality of Presentations	~41
Disagreement with Learning Approach	~35
Child Safety	~30
Students Easily Distracted	~27
Limited Access	~20
Inadequate Training	~18
Lack of Standard Approach Among Teachers	~17
Dis-Information	~16
Poor Interpersonal Skill Development	~13
Enabler for Students with Challenges	~13

Parent Survey Question: Please share any considerations or suggestions they would like to make about the use of technology tools in school. There were 276 unique responses and a summary of the responses is below.

The responses to this survey question reflected a diversity of opinion. Many parents supported the expansion of the use of technology [32 responses] emphasizing the importance of being on the cutting edge and encouraging the district to not fall behind. On the other hand, there were some parents responding with "less is more" and those who cautioned the district to not get caught up in the next new thing [7 responses].

The consideration of tradeoffs such as: the potential costs of technology [6 responses]; the importance of face-to-face contact with other students and teachers [10 responses]; the potential for reduced handwriting skills [7 responses]; and critical thinking skills [6 responses] were well presented in the survey. In regards to trade-offs, the highest frequency of responses came from parents concerned with maintaining balance [25 responses] and those who expressed safety concerns [24 responses]. Respondents encouraged schools to promote safety by making rules strict and enforcing them as well as taking steps to restrict access to material on the web in the schools and in the potential use of 1:1 devices. A number of parents would like the schools to provide additional information on the apps and programs being used by children and also to provide parent training [14 responses]. There were some parents who expressed concern on the over-reliance on Apple products in the district [3 responses].

Many parents commented on the desire for the technology curriculum to emphasize the importance of teaching typing skills [12] as well as organization and executive functioning skills [6]. Parents expressed support for Khan Academy [4] as a teaching tool, and others expressed a desire to improve internet research skills including the ability to discriminate by site quality [3]. Parents also mentioned the need and importance of professional development in the district in order to keep up with emerging technologies [6].

APPENDIX B: DISTRICT OVERVIEW
Parent Survey Results

While there was a separate question in the parent survey devoted to the potential for a 1:1 device program in the district, many parents used question 13 to comment on the 1:1 program. The majority of the comments were positive [23] with additional support from some parents but only if for older students [3]. Parents commented on the benefits of reducing the weight of backpacks and going paperless. On the other hand, a significant number of parents expressed concerns [16] that the distribution of devices would increase unsafe use, provide distractions in class, or get lost or broken in the hands of the students.

Frequency of Response Types to the Parent Survey request to share any considerations or suggestions they would like to make about the use of technology tools in school

	HIGH FREQUENCY	MODERATE FREQUENCY			LOW FREQUENCY
General Comments	Positively inclined "More is better" "Don't fall behind"	Negatively inclined "Less is more"			
Frequency	32	7			
Trade-off Concerns	Safety, privacy, and security	Screen time and loss of socio-emotional skills	Handwriting / note taking skills	Critical thinking skills	Creativity skills
Frequency	24	10	7	6	2
Exploration of Pilot for 1:1 Devices Comments	Positively inclined. Paperless, green, reduced weight of backpacks	Negatively inclined. Responsibility of device, distractions, access to inappropriate websites			Positively inclined but only in higher grades
Frequency	23	16			3
Training Comments		Need for parent training & improved communications	Need for standardization across teachers, schools, and classroom web pages	Need for professional development	
Frequency		14	6	6	
Curriculum Comments	Need for balance	Emphasize typing, keyboarding skills	Emphasize organizational skills	Support for Khan Academy	Emphasize web filtering skills
Frequency	25	12	6	4	3
Request for Analytics		Determine cost & efficacy			Concern on reliance on Apple products
Frequency		6			3

APPENDIX B: DISTRICT OVERVIEW
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Parent Survey Question: New Trier High School and all other New Trier elementary sender school districts are pursuing some form of 1:1 personal learning initiatives. This means providing students with a tablet or laptop device to use at home and throughout the school day. How important is it to you that District 29 investigates a 1:1 personal learning initiative if there is no increase in overall student fees or to the District budget?

This survey question No. 3 drew 140 written comments in addition to the 770 quantitative responses. Many of the written responses supported the idea while others suggested reservations about a one-to-one program involving personal technology devices. Based on the written comments, it appears that many parents have a different perspective than the district's teachers voiced in their survey on the need for additional technology, or specifically personal technology devices, particularly in the lower grades. While the financial considerations of a one-to-one technology device program were a concern, some parent respondents also revealed a developmental philosophy with regard to technology in schools. One said what's good for New Trier students isn't necessarily good for District 39 students while another parent expressed concern that preparing for New Trier required experience with technology at earlier grades. Others suggested junior high school students had different technology needs from younger students.

Many felt strongly that a 1:1 program should not place responsibility to carry devices to and from school on younger students. A few suggested the devices could detract from their children's education. However, the responses also indicate a large majority of parents continue to support technology in the schools, with several specifically advocating the district help equip families who can't afford sufficient technology in their homes.

Parents who felt the district should explore one-to-one cited the benefits technology can provide:

"We had tablets at District 74 (Lincolnwood) and it had a very positive impact on my child's learning." (P. 1, Q3, Response 31).

"As a clear path to better organization, executive functioning and online workbooks, worksheets and textbooks emerges, d39 should embrace the efficiencies available. I use my mobile device to keep myself organized and find it saves me a lot of time. They are wonderful tools. It is less clear that devices are better teachers than humans in all areas. Devices should be employed as teachers where it does the same or better job as a teacher. Hopefully this will free teachers up to work in smaller groups in areas where live teaching makes a difference." (P. 1., Q3, Response 1).

"My son has an expressive language learning disability. Access to a computer would facilitate his written communication - his ability to organize his writing and then key it in." (P. 1, Q 3, Response 14).

"Everything is moving to digital platforms; it will benefit them in the future." (P. 1, Q3, Response 39).

"This is the way the world is moving and to the extent we can give our children familiarity with this technological evolution, that is a very positive thing." (P. 1, Q3, Response 83).

"What is most important is that they learn how to utilize technology to enhance learning opportunities." (P. 1, Q3, Response 92).

Others felt it was important for Wilmette to prepare students to use technology for later grades and to maintain parity with other similar schools in technology.

"We've got to keep up with the private schools who start this in 5th grade. This is all in preparation for New Trier (and ultimately college) and is the way the world is going. The kids should have this technology at their fingertips, be exposed to it, get comfortable with it, and master it before New Trier - so they're not behind the curve when they get there. This is critical for note-taking, research, project work communication and sharing of information, teaching kids the online resources available to them to help them with their school work." (P. 1, Q3, Response 34).

"Since this is an initiative at New Trier, it is important that our students enter high school fully prepared as their peers from other sender schools." (P. 1, Q3, Response 41).

"Kids and school teaching needs to stay current with technology and world competition, schooling in Japan. etc." (P. 1, Q3, Response 73).

"I strongly believe in and advocate for tablet use as it will be the 21st Century chalk tablet. I think it offers more personalized educational opportunities, more parental involvement and is environmentally friendly. They will use these devices in college. The sooner they excel at them, the better." (P. 1, Q3, Response 124.)

Many parents said Wilmette was behind in technology. Several pointed to Glenview as an early adopter of technology in the classroom. Others had knowledge of New Trier's iPad pilot.

I'm a teacher in Glenview district 34 and we are in the process of rolling out 1:1. My 7th grade students will go 1:1 iPads next year and I have been observing in several 1:1 schools. It's pretty amazing to see how engaged students are in the 1:1 model. (P. 1, Q3, Response 108).

"We are behind." (P.1, Q3, Response 5).

"I am a teacher in a nearby school district. We already have 1:1 laptops for grades 4-8. Our technology for K-3 far surpasses anything I have seen in Romona school so far. At Open House there seemed to be a very limited amount of technology for a building that houses 5 grades (K-4). I don't know if other schools in the district have more technology available to them because of PTA funding, but Romona did not impress me with the amount of technology available to students. I would think it makes reserving laptops, iPads, computer labs, etc., very challenging for teachers in that building." (P. 1, Q3, Response 90).

"This is technology time. We should allow students to do that because the Glenview district has done that long time before." (P. 1, Q3, Response 84).

"The closer kids get to New Trier, the more important it will be for them to have experience using devices in the classroom so that they are prepared as freshmen." (P. 1, Q3, Response 43).

"I visited a high performing Chicago Public School last week and saw children in seventh grade using iPads for their instruction. Each child had their own iPad and they reported that they used the iPads for most of their lessons. If CPS is using iPads for instruction, we should certainly be pursuing this in Wilmette at the earliest opportunity. Our children are digital natives and technology instruction can only be enhanced by the availability of home/school assignments." (P. 1, Q3, Response 135).

"My kids use IPads for all kinds of educational enrichment activities. District 39 seems way behind other schools in bringing this kind of technology to students, especially when the technology is comparatively inexpensive. There isn't a grade level that wouldn't benefit from 1:1." (P. 1, Q3, Response 141).

Some parents made observations based on their older children's experiences with the iPad program being tested this year at New Trier.

"I have a jr. at New Trier who is participating in the tablet program and it is a huge benefit." (P. 1, Q3, Response 47).

"My 9th grade daughter has used an ipad at home and in her Spanish class as part of this initiative, and she's really gotten a lot out of it. Would love to see more of this." (P. 1, Q3, Response 104).

"I prefer it NOT be done. My New Trier daughter is suffering headaches to a severe level this year, due in part to exponential screen time and awkward neck position. She is in one of the beta testing classes at New Trier of iPad introduction. The neck position required for an iPad is at a much higher angular degree than that with a normal monitor. Research is only just beginning to study the physical and psychological effects of prolonged screen time, and none of it is in favor of more screen time. The proactive approach is the reverse of what may intuitively be an answer for teens." (P. 1, Q3, Response 57).

"My Junior at New Trier has 2 classes using the NT iPad and my senior has 3 classes using the NT iPad program. It has eliminated papers, heavy books, and helped with organization. I hear that there are high schools around the country that have gone 'text less' by using iPads or tablets." (P. 1, Q3, Response 74).

"My sophomore daughter has been part of the NT 1:1 learning initiative. It has only slightly enhanced her experience in the classroom and has been somewhat helpful at home or traveling. In fact, she reports that the laptop often interferes with instruction as the teacher and students

are side tracked from the original lesson. Individual laptops may be appropriate for high school students but would be a distraction to younger students." (P. 1, Q3, Response 22).

Other parents expressed their positive opinion of technology without specific mention of device type.

"I am a fan of this option. I think our student are capable of much more sophisticated use of technology than I currently observe in my sons' work. It is part of the world we all live in." (P. 1, Q3, Response 102).

"I think that learning technology early in life is a wonderful positive attribute to have, which my generation didn't have." (P. 1, Q3, Response 9).

"This is the wave of the future and I think that it is critical to keep our schools current." (P. 1, Q3, 99).

"Teaching technology is VITAL! Every student should be using laptops!! " ("Would love to cut down on paper and "lost" homework." (P. 1, Q3, Response 117).

Some parents offered opinions on what devices should be utilized.

"Laptops are a much better option all around." (P. 1, Q. 3, Response 79).

"The Google Education platform is free for schools, and android-based tablets and laptops are very inexpensive. D39 could easily meet a 1:1 personal learning initiative without breaking the bank. Check it out here.
http://www.google.com/edu/ " (P. 1, Q3, Response120).

"I think it's important for children to have access to technology at all grade levels, buy not necessarily their own laptop." (P. 1, Q3, Response 130).

"While tablets look like they will be around for a while, I think it is more important for the schools to keep abreast of developing technology that is necessary for students to interact with the workforce and make certain that they make that available. I would want to be wary of investing too much in today's tech at the expense of tomorrow's." (P. 1, Q3, Response 136).

Some parents supported the idea behind one-to-one for ecological and ergonomic reasons, with several stating the technology devices help save trees by reducing the amount of paper used while also reducing the weight of backpacks students carry to and from school.

"I'm not for only using a tablet, but would love to cut down on the weight of their backpacks!" (P. 1, Q3, Response 58).

"Backpacks too heavy. Prefer to see kids use iPad or similar devise rather than carrying so much weight of old fashion paper supplies." (P. 1, Q3, Response 62).

"Would love to cut down on paper and "lost" homework." (P. 1, Q3, Response 129).

"If the idea could mean that the students could do more homework in a paperless fashion and not lug around quite so much 'stuff' from class to class, the idea might be a good one. However, I do not think the initiative should distract from learning. It is merely a tool." (P. 1, Q3, Response 98).

Many parents said they did not understand how the school district would be able to provide students with a tablet or laptop device with no increase in student fees or overall budget. The apparent confusion prompted a number of comments, including the following:

"Which part will have 'no increase in overall student fees or to the district budget' -- the investigation or the actual initiative to provide the devices to students?" (P. 1, Q3, Response 6).

"Your question has an assumption that is absurd. There is always an increase in fees/cost/budget." (P. 1, Q. 3, Response 19).

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"It is hard to believe providing each student with a tablet or laptop device to use at home and throughout the school day would not increase fees or the district budget." (P. 1, Q. 3, Response 54).

"The premise to the question is misleading. Of course providing every student with a tablet will increase costs." (P. 1, Q. 3, Response 88).

Several parents also questioned whether the school district should provide personal devices for each student to take home. Several used the terms "luxury" or "extravagant" in their comments to describe the one-to-one program, and one said providing a personal device in elementary school would spoil the children. Here's a sampling:

"I think this district is going overboard in this area with no thought of what is happening with family incomes in this economy." (P. 1, Q3, Response 23).

"If it would mean an increase in fees, I feel my student can wait until entering New Trier. Children learn quickly and would catch up with students from the other feeder schools." (P. 1, Q. 3, Response 55).

"I think it is spoiling children to provide a laptop or a tablet in the elementary stage....I would like elementary stage children to learn more about art, music or social skills. It is dangerous if we adults encourage children to choose to have communication with friends through the technology before they learn how to build up trust and friendship person to person. Please do not spoil them! Let them think and allow them to live as a child, please!!!" (P. 1, Q3, Response 40).

"I don't understand how this cannot eventually affect us financially. Every year we pay a fee for 'additional instructional materials'.... Our school district doesn't even provide these basic needs, so why not start there before giving our kids tablets or laptops? Besides, many kids in our area already have their own tablets or laptops. Why do they need a 1:1
personal experience with something the taxpayers would own collectively? I'm not opposed to advancing technology, but why can't it be accessible to kids and remain primarily in the classroom? Have there been successes with providing students individual laptops? Giving my child every advantage is not always giving my child an advantage. Some skills - discipline, perseverance, value, ethics, hard work - are extremely important and not reliant on technology." (P. 1, Q3, Response 101).

Many objected on a philosophical basis, pointing out that most families already have technology for their children to use at home and suggesting a one-to-one program was unnecessary and could detract from a focus on teachers. For example:

"Prefer focus stays on teaching quality." (P. 1, Q3, Response 110).

"We already have a computer she can use at home. I think this is an extravagance, frankly." (P. 1, Q3, Response 29).

"We live in a district where most households have the resources to avail themselves of technology and the kids are exposed to it on a regular basis. There are other areas in my student's education where I see deficits which are more basic and would not require an expenditure of resources in time and money, e.g. grammar, how to do research." (P. 1, Q3, Response 15).

Several said the district should provide a device only for those who couldn't otherwise afford one.

"Should be for needy students only." (P. 1, Q3, Response 38).

"Most families have adequate devices and/or the means to obtain them. Those that do not should be supplemented with school resources." (P. 1, Q3, Response 46).

"I think it is only important for the families that cannot afford these electronic devices to be provided with one because in reality and in New Trier school particularly, there are fewer families that need the help. I would like to see the money spent somewhere else, such as student enrichment programs or differentiated programs." (P. 1, Q. 3, Response 70).

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Some parents expressed concern that a one-to-one program could lead the district to reduce spending on other areas over time, and some parents suggested other opportunities might represent better use of the funds.

"Not sure how this could be done without increasing costs...would want to weigh/consider what is being traded out to fund this." (P. 1, Q. 3, Response 112).

"I am concerned about the cost of this initiative to the district, given that I would think most kids have access to computers at home. I think it sounds glitzy and forward-thinking, but not sure how necessary it is. I would rather see funds going to other areas, such as improved differentiation programming, foreign language opportunities, or overall increase in technology instruction." (P. 1, Q. 3, Response 137).

"I find it troublesome that the district is contemplating a 1:1 program with no increase in the budget, because that indicates to me that something else must be cut to make way for it....Further, the $640-per-student price tag that New Trier has put on its iPad program would seem to be a ridiculous amount to spend for each elementary school student. Given all of the time devoted to non-core subjects, such as related arts, P.E., foreign language, etc., I can't imagine why students would need a personal device every minute of the day. Can't several classrooms share the devices? A personal device for every child would seem to be a luxury (and certainly not a necessity) in a time when most families are watching their spending. I would urge the district to consider what else it could do with $640 per student to further their education before jumping on this particular bandwagon." (P. 1, Q3, Response 3).

Other parents citing the cost said they would prefer to fund other areas of education and that technology was a secondary consideration.

"Technology will change. It's a waste of money to buy one for every student....I would rather spend the money on TEACHERS! (Furthermore, most people have some device at home. Help the people who don't, but don't duplicate what's already there.)" (P. 1, Q3, Response 30).

"I would rather see the funds go toward curriculum development, whether or not delivered via IT." (P. 1, Q3, Response 46).

Further, some pointed out that technology by itself does not necessarily improve education, while another wanted to know what learning objectives the technology would accomplish.

"1:1 personal learning with a tablet or laptop sounds like overkill. I need to know how these devices will improve the current situation. Just throwing technology at the kids doesn't answer anything." (P. 1, Q3, Response 18).

"It matters to me more what learning objectives can be accomplished that aren't currently and that it go beyond learning to research on an iPad."
(P. 1, Q3, Response 21).

"Students already have access to laptops at home. We should be able to implement 1:1 learning today without getting hung up on technology. What's more important is designing learning tools that can hold students' interest and homework exercises that test that knowledge." (P. 1, Q3, Response 67).

"I'd be more interested if there was specific software that was being discussed. Computers are great (I work as a computer tech) but unless the right things are being taught, they're just toys." (P. 1, Q3, Response 128).

Some referenced the cost while also indicating that expecting children to be responsible for an expensive device was a concern:

"I would prefer that younger children did not have the responsibility for taking care of an expensive device. They can't remember to bring their coats home some days. Take a look at the lost and found -- do you want to see broken iPads there?" (P. 1, Q3, Response 32).

"Elementary kids are not responsible enough for these devices--at least mine aren't." (P. 1, Q3, Response 42).

"My son is in 5th grade and would lose an iPad. By the time they reach 6th/7th, they are more responsible." (P. 1, Q3, Response 53).

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Some parents who would support a one-to-one technology program at the junior high level said they would not want it in the elementary grades, and many parents expressed reservations about too much technology too soon, without specifically mentioning cost as a consideration.

"I would be horrified to find my elementary school child with their own laptop. Good grief, this would be very excessive, at an age where they are still so tactile and experience-oriented. And it would make it that much harder for parents to limit screen time, which is hard enough as it is." (P. 1, Q3, Response 105).

"Technology is important, but not in the elementary school! These kids need to be able to learn for themselves, without a device in hand." (P. 1, Q3, Response 77).

"I am strongly against this at the elementary and middle school level. I do not have a child in junior high and am unsure whether it would provide useful. Please read http://www.nytimes.com/2013/03/17/sunday-review/reading-writingand-video-games.html?pagewanted=all&_r=0. Also.....http://online.wsj.com/article/SB10001424052702304451104577392410798575008.html" (P. 1, Q3, Response 140).

"It can be frustrating how much work is required on the computer at home and this often leads to family arguments. Because there is so much computer work in their future, I believe elementary school age children should be creating more with their hands, learning to write with a pencil and reading books." (P. 1, Q3, Response 80).

"I do not agree with young children using tablets or devices when they are in school." (P. 1, Q3, Response 119).

"I feel young kids need to learn the basics of writing and doing work with paper and pencil before moving to an electronic device. In terms of older (Junior high) probably makes sense with certain controls and limits imposed." (P. 1, Q3, Response 111).

"It is my opinion that this could be quite beneficial in the upper grades. In the lower grades I do feel there is merit to learning through reading a traditional book, calculating math on paper and working on handwriting on paper." (P. 1, Q3, Response 123).

Some parents felt children simply don't need more technology, and many expressed concern over the amount of "screen time" their children currently have.

"I have sons and feel strongly that they do not need any more screens in their life to increase their 'addiction.'" (P. 1, Q3, Response 11).

"I sometimes think there are too many screens in my child's life and am frequently setting limits and restraints. There is some research about great quantities of screen viewing and eye/brain function. So, I have mixed feelings about this." (P. 1, Q3, Response 28).

"Kids already spend too much time on TV and computers at home." (P. 1, Q3, Response 36).

"Kids need less screen time. Not more. Schools should be focusing on how to engage kids in real hands on learning - not putting them in front of another screen." (P. 1, Q3, Response 56).

"Children spend enough time on computers. They need to write in cursive with a pencil. Ereaders slow down the reading rate. It will not save money in the long run. I have been teaching for over 20 years and I can get 10 years out of a textbook. As a taxpayer, I am not paying for laptops or iPads. As a parent, I limit screen time to 2 hours per day. I do not want my child spending more time on screens in school. I think there is too much time spent on computers now at Harper. And another thing... we should get rid of the Chicago math, worry about giving letter grades by 3rd grade, and give 4 report cards a year." (P. 1, Q3, Response 97).

"More old fashion paper homework. Kids don't need more technology." (P. 1, Q3, Response 20).

"As a teacher myself, nothing beats a pencil and paper." (P. 1, Q3, Response 86).

Some were concerned about unsupervised Internet access or teachers using the devices to fill time.

"Don't like the idea of the kids having access to unsupervised Internet access & computer time. Unless the district allows the parents to change settings to meet each families' individual rules and expectations, I'm not in favor of devices for these ages." (P. 1, Q3, Response 16).

APPENDIX B: DISTRICT OVERVIEW
Parent Survey Results

"You are currently having an Instagram problem among Highcrest students and that reflects on the immature development stage that cannot responsibly handle tech devices. Elementary students have no need for
1:1 learning through tablet or otherwise. Our 2nd grade child already thinks
Googling is the source for answers to everything and her curious, investigative sense of resources has already narrowed due to Internet access." (P. 1, Q3, Response 19).

"Do not let them play games unsupervised under any circumstances. I will be furious, disappointed beyond belief at the District if this is allowed and would consider homeschooling my children. Do not introduce technology at the expense of developing the skills to communicate using penmanship - either cursive and printed. This skill must NOT be lost and as a cognitive learning cannot be replaced by keyboarding." (P. 1, Q3, Response 44).

"Kids need to be able to type, do research, read on these devices; however, teachers need to get together and create some guidelines for their use - things like 'use to only enhance learning, be in step with how the devices are used in working professions....' We don't want the schools or teachers to use the device as a crutch or a time filler. " (P. 1, Q3, Response 68).

Others felt more technology use could limit development of social skills, become a distraction or dilute academics.

"I am overall concerned about this generation's reliance on technology and resulting impact on interpersonal skills and relationships in general. This seems like the schools telling us our children will have a device rather than parents deciding when it is appropriate. I am absolutely opposed to this for anything other than junior high and would like it to be Facebook disabled." (P. 1, Q3, Response 85).

"Primary use seems to be as a toy. The kids use don't seem to 'learn' anymore through this medium than any other. What happened to all the investment in Smart Boards? Are the kids 'smarter' as a result? They get enough screen time as it is. I don't endorse it." (P. 1, Q3, Response 76).

"My concern is that it decreases discourse, collaboration and teacher preparation. Would need to know more about the specific proposal."   (P. 1, Q3, Response 17).

"There is already too much technology in our children's lives. It does not assist them in communication skills which are critical to success. It also sends the wrong message to parents - that if we don't allow our children access to technology during the week that we are hampering their ability to do homework. This sets up a battleground at home." (P. 1, Q3, Response 91).

"The kids get enough technology at home. Let the teachers teach the kids. The kids also need to learn to interact with the teacher and kids in their classroom. There is too much technology focus! These kids need to learn interpersonal skills! Talking to one another teaches a lot." (P1, Q3, Response 8).

"We have tablets at home. The kids try to use it for everything but homework. I see that it may be a distraction." (P. 1, Q3, Response 96).

"I'm skeptical of the value of providing students with their own tablets or laptops. Seems likely to me to be more of a distraction, and to lead to an increase in non-educational screen time. I'd much rather have my child use a desktop machine in a public place at home so I can monitor what they are doing and how much time they are spending at a screen." (P. 1, Q3, Response 45).

"My children have consistently found that school technology integrated projects dilute the content learning by having such a technology focus. The projects become about the technology not the content being studied." (P. 1, Q3, Response 50).

"I strongly feel that 'device' learning is a less intense and engaging intellectual experience for the student. As a grad school level teacher, I have repeatedly seen that students who read dense material on devices do not retain detail of analytical themes. Further, students who take notes on devices take more of a 'stenographer' role, merely typing all that is said during class, rather than participating as fully in discussions and using discretion to take notes of only what is important or interesting. Finally, the possibility for distraction by nonacademic possibilities on the devices is especially great among students at this age group. Devices can be useful for some research, for collaborative projects and the like." (P. 1, Q3, Response 93.)

Parent Survey Results

"My son can't tear himself away from the iPad. I am hesitant to say he needs one throughout the school day. I understand the benefits it would have to teachers and enhancing the curriculum, but I would fear that the device would replace our school's most important resource: its teachers." (P. 1, Q3, 106).

APPENDIX C: INSTRUCTIONALAPPROACHES
Teacher Interviews

SUMMARY OF TEACHER INTERVIEWS ON PBL, GAMIFICATION, AND FLIPPED LEARNING STRATEGIES

Of the learning strategies reviewed by CRC 2013, project-based learning, problem-based learning, and the flipped classroom are currently implemented to varying degrees in D39.   Within the district, the terms project- and problem-based learning are often used synonymously.

Project-Based Learning - According to Differentiation Specialist Nikki Flanagan of HMS, "I think (project-based learning) is a strength of our district. Most of what we do culminates in a project, especially in social studies class." A new related arts class at HMS is being planned that integrates project- and problem-based learning.

Participants included:
Julie Mirabelli, 3rd Grade, Central, April 10, 2013
Katy Forsyth, 4th grade, Harper, April 9, 2013
Doug Wilson, ELL teacher at HMS, April 12, 2013
Sue Eppler, DST, McKenzie, April 10, 2013
Nikki Flanagan, 6th grade DST, HMS, April 10, 2013
Cherie Einum, 6th grade Language Arts and Social Studies, HMS, April 10, 2013
Kate Culligan, 7th grade Language Arts and Social Studies, HMS, April 10, 2013
Beth Kalish, 8th grade Social Studies, WJHS, April 10, 2013
Becky Bartsch, 5th grade, HMS, April 10, 2013

Problem-Based Learning - Interested D39 classroom teachers and DST's have recently taken training courses specifically in problem-based learning and are very enthusiastic about its benefits, especially as one the best ways to encourage higher-level thinking.

The Flipped Classroom - After attending a winter workshop in flipping, some teachers flipped their first lesson with the help of school based technology staff. Several junior high teachers have been flipping for a few years. Teachers are showing enthusiasm for the benefits of flipping: Primarily differentiation and more time to interact with students.

Training offered to D39 staff on these learning strategies

> PBL: Approximately 30 classroom teachers and DST's have taken problem-based learning through at least one of the following: Academy 39's monthly 2012-13 program, the Illinois Math and Science Academy's summer program (IMSA), the PBL Coaching Institute, Institute Days, and the Professional Growth Network (PGN).

> Flipping: In February 2013, D39 offered a professional development program titled "Introduction to the Flipped Classroom" with Kenilworth School District's Lead Technology Facilitator and Flipped Classroom Pioneer Jon Bergmann.

Interviews of D39 Teachers - Eight District 39 teachers, some from this year's Academy 39 PBL class, volunteered to be interviewed to discuss their application of learning strategies in the classroom. Interviews were primarily conducted by telephone. Those interviewed represented the following: Third grade, fourth grade, sixth grade, seventh grade, eighth grade, ELL, and Differentiation Specialists.

Common themes in teacher interviews:

> 1. Teachers have a positive attitude and are open to incorporating project- and problem-based learning units. They would like the district to continue to offer professional development in these strategies, as well as the flipped classroom. It was noted by teachers trained in problem-based learning that the features and benefits of this strategy are not widely understood. Some teachers trained in PBL state they are ready for more advanced training.

> 2. Teachers have more experience incorporating project-based learning units than problem-based learning units. They would like to see more collaboration time to develop problem-based learning units that address the new learning standards. If the district were to consider imbedding PBL somewhere in the curriculum, individual teachers would be less burdened by creating their own PBL's and the strategy

would be easier to implement district-wide. Training could focus on understanding individual PBL's and facilitation. Most teachers envision one or two (maximum) PBL's per year.

3. Students are highly engaged when working on projects or problems, and they learn how to work with each other and take responsibility in a group setting. It is a vehicle for social-emotional as well as 21st century learning. However, most teachers do not have hard data to show an increase in learning due to use of project- or problem-based learning approaches.

4. In regards to when problem-based learning is best implemented, full PBL's can be used with third graders (with support) and students begin to be more independent in fourth grade. Modified PBL's and features of PBL's can be used in lower grades.

5. There is interest in seeing a related arts class in PBL offered at WJHS, as one is being developed at HMS on the theme of Global Climate Change.

Barriers for teachers to tackle these new learning strategies:

- There are already many changes expected for teachers, for example: Core Curriculum, Second Step, Executive Functioning, new Science and Social Studies Curricula.

- The district offers numerous competing opportunities for continuing education and there is concern that there will not be ample professional development opportunities on these topics.

- The curriculum and schedule are already quite full, and PBL units in particular can require significant class time.

- Teachers are assessed on how their students do on the Performance Series; PBL won't and can't be assessed this way.

- Preparation for PBL's is so time intensive to prepare that only teachers who are interested and able/willing to go the extra mile will take it on. Project-based units, which also take time to plan, can vary in length and requirements. This makes it more flexible.

- It is more difficult to facilitate PBL's without another knowledgeable adult in the process.

- Technology resources are sometimes not available.

Of note the District is currently developing a PBL related arts class for Highcrest Middle School. The course will be a hybrid of two instructional strategies: problem-based learning and project-based learning. It is designed under the theme of Global Climate Change. Each quarter, the students will investigate and resolve an ill--structured problem based on real--world issues surrounding climate change. The topics include: Global Temperatures, Biodiversity, Drought, Human Health Effects, Ice Caps and Sea Levels, Volcanoes. Students will create and present a product that meaningfully addresses that question and conveys a possible solution. The district should consider offering a similar related arts alternative at WJHS