GRADE 8 MOBILE ONE-TO-ONE WITH IPADS
Component of the Millis Schools Personalized Learning Initiative

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August 2011
Executive Summary

What are the most essential aspects of a good education? The following generally appear on everyone’s list: preparation for responsible citizenship; a solid foundation in the skills and content knowledge that enable students to continue learning and become productive members of the workforce; the ability to enjoy and appreciate the arts; social, emotional and physical health and well being; and the collaborative interpersonal and communication skills necessary for success in life and the workplace. Is technology an absolutely necessary ingredient in education to achieve these? No, not always. There are certainly ways to achieve all of the above without technology. But, if technology is harnessed in effective ways, can it help achieve the above more efficiently and even more effectively? Yes, one-to-one, one could argue that without a solid foundation in how to use current technologies to learn, communicate, problem solve, and create, students would be at an extreme disadvantage since learning, work and even entertainment all rely heavily on technology.

Several years ago the Millis Public Schools embarked upon a path toward personalized learning to make education more relevant, more effective and more engaging through technology. We began building the capacity for integrating technology and utilizing blended learning environments among our staff members, particularly at the high school and middle school levels. Teacher training is the most essential ingredient for effective integration of technology to improve learning and that has been our focus. After over 5 years of training, teachers at both the middle and high schools have built blended learning environments and are chomping at the bit to personalize their classrooms even more by harnessing the power of one-to-one computing devices.

In February of 2011 Millis Gr. 8 students and their teachers piloted a one-to-one iPad initiative for 6 months. By all measures, it was a resounding success from which we, staff and students alike, have all learned. This report is a summary of what we have learned and outlines areas where we need to gather more information.

When asked what they want from education, students across the U.S. respond that they would like to see more of these five things: interactive technology, teachers as mentors, innovative teaching and learning strategies, the ability to have more choices and real-world application and relevancy (eSchool News, September 2011). The iPad Initiative delivered these and much more.

One-to-One Research

Personalized Learning and moving toward a new 21st century learning environment cannot be achieved without using technology. If implemented properly, a one-to-one program can have a major impact on achievement. Research for one-to-one programs show that there are fewer discipline problems, higher attendance rates, lower dropout rates, higher acceptance rates to college, and under the right conditions, an overall boost in achievement. For a district like Millis, a one-to-one program can level the playing field for our students and support all learners to achieve at higher levels.
Goals of the Pilot

The goals for the Grade 8 one-to-one iPad pilot were goals in support of our district-wide Personalized Learning Initiative. Millis Superintendent Nancy Gustafson tells us, “In a personalized learning environment, teaching and learning is tailored to the needs of the individual student. We believe this is something that we can be the best at in Millis.” The pilot will help us determine how mobile devices, like the iPad, can support individual learners by providing them with 24 x 7 access to an online learning environment for curriculum resources and tools.

Today’s students will be graduating into a world that is very different from the one their parents graduated. Students must be challenged and supported to master content as well as develop the skills often referred to as “21st Century Skills”. These include: creativity and innovation skills, critical thinking and problem solving, excellent communication and collaboration skills, technology literacy skills, civic and cross-cultural skills, and the productivity and leadership skills which will enable them to be responsible, self-directed learners and employees.

The essential elements to create an effective personalized learning environment are:

• Flexible anytime/anywhere learning
• Redefine the teacher’s role from director to facilitator/coach
• Provide authentic learning experiences
• Provide student driven learning opportunities
• Provide mastery, progression pacing for the essential learning outcomes.

The goals of the Grade 8 one-to-one iPad pilot are:

• Increase student engagement
• Increase student productivity
• Increase 21st century skill development
• Extend and expand learning beyond the school day
• Increase access to online academic resources, multimedia and technology tools
• Promote self directed learning
• Support personalized learning

Preparation for the Pilot

During the 2010-2011 school year, the Millis Middle School grade 8 students and teachers were asked to pilot 1st generation Apple iPad devices in a one-to-one student and teacher ratio in support of the district’s Personalized Learning Initiative. Millis purchased 130 iPads for this initiative for a total cost to the district of $70,000. The money to pay for this pilot was taken from the school choice account. The pilot serviced all of our 109 grade 8 students and 13 Grade 8 teachers in the following subjects: Math, Math Skills, Science, Social Studies, Spanish, English Language Arts, Technology, Art, Health, PE, Video Production, Careers and Music.
In preparation for the students receiving iPads in February 2011, teachers received their iPads in November 2010. This gave the teachers time to get acquainted with the device and to receive professional development training. From November 2010 - May 2011 teachers met in teams on a regular basis to learn about the device and the mobile APPS to support their curriculum. Teachers were given the freedom to take risks, rethink their classrooms, and try out ways to use the new device to support their curriculum and improve student learning. Teachers selected over 40 APPs to use in their classes for the pilot.

A few of the APPs selected:

- Graphing Calculator for Algebra
- iPocketDraw for Science
- Popplet Lite to Storyboard in English

The Evaluation Process:

Providing evidence of how the iPad performed against the pilot goals was achieved by collecting samples of student work and attitudes based on student writing and surveys. Surveys were also taken by other stakeholders including teachers, parents and outside educators who participated in our open-house classroom walk-throughs. We also looked at the various evaluations done by other iPad pilots both at the K-12 and higher ed levels in order to further validate that our observations and data from such a short pilot are in line with other similar pilots around the country.
The iPad Device

Similar to a pad of paper, pen or calculator the iPad is an unobtrusive device in the classroom with a multitude of functionality for teachers and students. We found in the pilot that the iPad has many advantages over a laptop and netbook as a personalized one-to-one device in the classroom. Some of the major reasons we liked the iPad device for students include:

1. The iPad has a very responsive Multi-Touch screen, which is a strong advantage over using a touchpad or external mouse.
2. The iPad has built-in accessibility. It comes with a screen reader, support for playback of closed-captioned content, and universal zoom feature which provides magnification of the entire screen of any application. There is even support for a wireless braile display and international braille tables.
3. The iPad is streamlined and portable.
4. The iPad boots up much faster, since it uses a solid-state hard drive.
5. The iPad is optimized for its hardware—the operating system was designed for the device.
6. The iPad video display is a large, high-resolution LED backlit IPS display.
7. The iPad can stay charged for an entire school day, with a 10-hour battery life.
8. The iPad is durable with the padded case and light weight for students to carry around.

Additionally, although given the option, no student requested an external keyboard or stylus to enter information into the device. Ninety percent of the Grade 8 students reported that the iPad was relatively simple to type on, and when asked how difficult it was to create on (reports, multimedia, drawings or presentations) 95% of the Grade 8 students reported that it was simple to very simple to create on. Teachers observed that students were very comfortable with using the device and it was evident in class and in the work they produced. One thing realized through the pilot was that although students could easily use the device and APPs on the iPad, all students did not necessarily know how to use the device on their own for their own personal productivity. In the future teachers will need to set up standard instructions for students on how to use the device, for example, to remember homework assignments, to keep schedules, to set reminders, to ask for help and/or to stay organized. Adding additional supports to aide with students executive functioning skills is necessary to fully utilize the potential of these devices.
Managing iPads

Managing mobile devices, in general, is a challenge in both business and educational settings. As network administrators, we were not able to manage the iPads as we can with computer systems. On a computer system (desktops and laptops) here in Millis we are able, from the technology office, to see and take control of every computer on our network. With limited staff this saves time and energy. If someone, staff or student, has an issue with their computer we can, in most cases, correct the problem from our office. We are also able to monitor multiple lab systems at a time from our office. Tools available for the iPad are not as robust at this time. We did purchase a management tool called Casper by JAMF; this tool does allow us to manage the iPads via reporting tools that can tell us who is on the network at any time, what APPS individual ipads are running on them and the version of the APPS. It also lets us lock down iPads and push out APPs over the network to the iPads. We believe that over time the tools available will become more robust than what is currently available.

GPS is built into all iPad devices and was another useful management tool that we did make use of during the pilot. From our office we could find misplaced iPads in the building or elsewhere as long as the devices were on a wireless network.

Filtering web content on the iPads was another area of concern. While the iPads were in school they were filtered the same way computers are filtered on our network, using our content filtering devices. The issue that we were concerned with had to do with when students took the iPads home was the web content filtered, and if not, who would monitor the students’ activities on the device? We decided to put a simple content filter, that was CIPA compliant, on the student iPads part way into the pilot. We found out very soon afterwards that using this content filter disabled some of the functionality that was built into the device. We know today that there are other solutions that are better and that work over the Internet so that the school can control filtering by device and that same filtering would be applied over the internet for home and school use. This system from LightSpeed Systems is also very proactive in monitoring student usage and will flag students who are accessing inappropriate materials frequently on the device.

During the 2011-2012 school year the technology department will evaluate new and improved management tools for mobile devices.
Increased Student Engagement:

The research shows that if you do not engage a student in school, the likelihood that he or she will drop out is very, very high. Engaged students succeed academically. Thus, student engagement is a crucial element to focus on. What are the indicators that students are engaged?

Evidence of a pedagogy that encourages student engagement in making, attending, problem solving, taking responsibility, and experiencing would be indicators for student engagement.

Evidence we have collected during the pilot of increased student engagement:

- Grade 8 attendance for the 2010-2011 school year averaged 95.6%. The state average is 94.6%.
- Grade 8 teachers observed that students who were unmotivated and off task in class prior to the iPads were more motivated and on-task when using the iPads in class.
- Grade 8 teachers observed that there were more opportunities for relevant, just in time conversations with students because of having the immediate access to current news and events in class.
- Grade 8 teachers reported that their students were more actively involved with learning with the iPads.
- Seventy-four percent of the Grade 8 students reported that they were more interested in doing their school work with the iPad than without the iPad.
- Sixty percent of the Grade 8 students reported that they spent more time on their school work when using their iPad than when working without their iPad.
- One hundred percent (33) of the educators who attended our Open House reported that they observed students who were engaged in learning and 85% observed students using the iPad in ways that enhanced the class lesson.

Increased 21st Century Skill Development:

The term 21st Century Skills, is defined by the organization, the Partnership for 21st Century Skills (www.p21.org) a national organization that advocates for 21st Century readiness for every student. They define 21st Century Skills as the following: Life and Career Skills, Learning and Innovation Skills, Information Media and Technology skills and The Core Subjects with 21st Century Themes. For the purposes of this pilot we have identified the 21st century skills that we will focus on as Core Content with 21st Century Themes and Learning and Innovation skills which are Communication, Collaboration, Critical think-
ing and Creativity. We refer to these as the Five C’s: Content, Communication, Collaboration, Critical Thinking and Creativity.

Our Grade 8 Millis Teachers were able to use the iPad in all subjects with students to support the Five C’s. Students were able to communicate and collaborate using tools like Moodle Forums and Google Docs. They used APPS for critical thinking like data analysis and graphing calculator and they used their creativity with APPS like Keynote (multimedia presentation), Pages (word processing and page layout), and iPocket Draw (scale drawings). The iPad APPS were found by all to be surprisingly powerful and reliable tools and most were available to students at little or no cost.

One example of how we were able to combine 21st Century skills with the Core Content and 21st Century Themes in Science can be illustrated with the Canal Jumping Project. Students in Mr. Benham’s Grade 8 Physical Sciences class after studying Sir Issac Newtons’ three Laws of Motion where given the opportunity to study motion in more depth through the Canal Jump Project. The purpose of this 3-week project was to give students a real application of the engineering design process, an application for the principals of motion and the universal systems model. Students had to design, build and analyze the motion of a scale model prototype car that could jump a canal. iPads were used in all aspects of this project from research, data recording, timing of the cars and the design of the scale drawings used to build the cars. Students collaborated and communicated electronically, they used tools like the timer and they accessed the project information via Moodle in the iPads and designed their models using iPocket draw. Students determined what they would use to power the car so that it could jump the canal successfully.

To be successful in the challenge of jumping the canal students had to be critical thinkers and use creativity. iPads where able to provide multiple tools and functionality to support this project.
Increased Student Productivity and Extend and Expand Learning beyond the School Day

Oklahoma State University has formally released its internal findings on their iPad pilot conducted during the Fall of 2011. Their report outlines increased productivity, and how the iPad crosses between academic and personal barriers. One of our Grade 8 students, Madison wrote: “The iPad is helping me to learn better and more independently, in all subjects. The teachers are letting the students work by themselves, and spend less time speaking in front of the class which saves a lot of class time. Since the arrival of the iPads into the eighth grade, learning has become easier for me.”

Millis Teachers reported that using the iPads in conjunction with the Learning Management System helps to increase the pace of the course. The Oklahoma study attributed the increased pace of their students to the mobile functionality of the device which allowed students to work in any environment, the change to the classroom environment, and the ability of all students to have complete access to the same technology, creating an equal and level playing field.” We feel this analysis sums up exactly what we are seeing here in Millis with our grade 8 pilot. Students given access to the technology have the resources at hand to better control their own learning and to be more productive. The various APPs that were provided to the students on the iPad for taking notes, keeping a calendar, looking up definitions, word processing, spreadsheet, data analysis and creating presentations all contributed to students being more productive at home and in school which had an overall positive effect on the academic environment and teaching and learning. Students reported that the ability to do school work any time, anywhere on the iPad helped them to get their homework in on time. Students reported doing their homework on the ride to and from sports and on the playing field.

http://macdailynews.com/2011/05/03/osu-study-finds-apples-powerful-ipad-decreases-expenses-increases-productivity/

Increase Access to Online Academic Resources, Multimedia and Technology Tools

Clearly the iPad’s most powerful feature is the ability for students and teachers to access, create and present content in a multimedia manner. This is especially important to education as it addresses all types of learners and learning styles: auditory, visual and kinesthetic. Our teachers realized during this short pilot that the iPad allows students instant access to their information in chosen formats which reduces the amount of downtime in class. The iPad has given students a wider range of possibilities for expressing themselves. Now not every student in a class must write a paper. They can compose music, animate a character or create a video production instead. Students during the pilot could access various online content through Discovery Education Streaming, TED Talks, Quest, Study Island and more. We are investigating new online resources that support mobile devices including Brain Pop, World Book Online and various online content providers.
One drawback of the iPad during the pilot was that it is unable to access Flash based web applications. While this prevented teachers and students from utilizing some web resources that they had used in the past from various content providers, we were in many cases able to find alternative sources of the content that utilized the newer HTML 5 technologies on the iPad. Many of the providers that we are currently using told us that they were in the process of switching from Flash to HTML5 in the near future. We do recognize that there are many great flash based websites that have been used in the past that may never be updated, however we feel that new resources built for iPad devices will be available that will be made to take advantage of the iPad technology. Millis teachers reported that having the ability of every student to access academic resources on the iPad in class stimulated lively discussions and just in time conversations of current topics.

The iPad was also used extensively by teachers to instantly assess the students understanding or for review. Poll Everywhere, Survey Monkey as well as the APP eClicker where used to do quick formative assessments before, during and at the end of lessons to check for understanding. Students were able to access Study Island for MCAS review in Math and Science.

**Promote Self-Directed Learning and Personalized Learning**

Helping students to be life-long learners and leaders is part of the mission statement of the Millis Public Schools. Providing students with the knowledge and skills they need to engage in transformative, relevant learning experiences is how we connect with students individually. To be successful we must focus on learning, engagement, creativity, project/inquiry based learning, critical thinking and problem solving. We believe this cannot be done today without the use of technology-based resources and tools. Mobile devices like the iPad are personal devices that help students in their personal, academic and work life. iPads can be tailored to the students needs and interests. As one of our students Kylie wrote:

“The iPads are probably the most helpful learning device we’ve used all year and not only for academics but also for responsibility. Everyone seems to be benefiting from them. Using the iPad has helped me learn math, science, social studies, English and Spanish. There are so many different APPs and websites for each subject that it would be hard not to get good use out of them. Now that we have the iPads, I can’t remember much of what it was like without them and I don’t know how we managed without them either.”

Matt wrote:

“The iPads are helping in every class and the teachers are teaching very differently. We do different types of work, like online research and practice websites. I am able to get my work done faster and it usually comes out better than when I didn’t have the iPad. It is a major help in class.”

For Kylie and Matt and many of the other Grade 8 students for this pilot, the iPad quickly became an integral part of their academic life. Seventy-five percent of the students in the pilot felt that they learned
better with the iPad. One hundred percent of the grade 8 teachers felt that overall student engagement was increased and the iPads helped them to change the way they were teaching from delivering content to facilitating learning. We have witnessed that students who have a personal mobile device like the iPad helps them to be more self-directed and in control of their own learning.

Part of the iPad pilot implementation also included preparing students to be our partner in this pilot and to help us to identify how we can use the iPads to help them to learn better. We asked students to help us to identify ways that we could help them to keep their iPads safe and secure. Through that process we realized we needed to provide all students with locks for their lockers and that we needed to keep the building open at night when athletes returned home from sporting events because the bus was not a safe place to keep the iPads. We also asked students to help us to identify APPs and websites that could be used to support their learning in the classroom. Many of the APPs that have been incorporated into our classrooms came from student suggestions. The students stepped up to the challenge and really did become very responsible overall when it came to taking care of the iPads and providing us feedback on how they could be used more effectively. Having students take ownership of their own learning empowers them to be more self-directed.

**Assessment**

In a recent New York Times article, *In Classroom of Future, Stagnant Scores; New York Times, Sept. 3, 2011*, Matt Richtel writes about an Arizona district that has invested heavily in technology without seeing much improvement in their standardized test scores. There may be various reasons for this but an obvious one is that the skills that are tested on standardized tests, especially those that are exclusively multiple choice, are not necessarily the higher level skills that students develop in one-to-one learning environments; skills that are essential in the current global “innovation” economy, according to business leaders, such as creative problem solving, accessing and analyzing information, heightened cultural awareness, networking to tap into global expertise, and applying skills and knowledge to real-world situations.

Even though these higher level skills are not measured by most standardized tests, the MCAS is better than most at assessing critical thinking skills due to the open response questions that require students to do multi-step problem solving in mathematics and science and analyze literature and expository writing. Also, the long compositions required in grades 4, 7 and 10 assess students’ abilities to organize cogent essays and analyze the works of various authors, often having to compare pieces of literature and synthesize that with their own analysis.

MCAS scores at the Gr. 8 level this past year, after 6 months of the iPad pilot, rose considerably over the previous year. In Mathematics, 15% more students scored in the top two categories (Advanced and Proficient) than in 2010 and in English 5% more did. The largest gain was in Science where 18% more of the
students scored in the highest two categories. Comparisons between different classes do not conclusively provided evidence of growth since the two cohorts can be significantly different in a small school setting like Millis. Growth data will be released by the Department of Elementary and Secondary Education later in September. However, in Mathematics 3% more 8th grade students scored in the top two categories than they did the previous year when they were 7th graders. In English there was a drop of 1% fewer students in the top category compared to their scores the year before. No comparison is available for Science since it is only tested in grades 5, 8 and 10.

Massachusetts is also one of the states working in collaboration across the U.S. to revamp assessment systems to be more similar to the PISA exam, an international exam that includes measures of problem solving and more real-world application of skills and knowledge. We believe that the students that have access to one-to-one computing devices during the school day and at home will score higher on these types of assessments. Moreover, qualitative evidence is strong that students who have access to one-to-one computing environments are more successful in ways that cannot be captured by multiple choice tests.

Conclusions

Overall the first generation iPad has exceeded our expectations for how useful the device has been in helping teachers transform their classrooms and teach more effectively. Students felt also that they could do their school work faster and with better end products with the iPads. We found iPads to be much more than a network access device. With powerful APPs, students are able to Communicate, Collaborate, Analyze, and Create with iPads as well as tailor the device for their own personal learning needs. Since the introduction of the original iPad the iPad II now has significantly improved features that include two high resolution video cameras for film making and video conferencing. The iPad II can also now be plugged directly into a projector making it much easier for teachers to demonstrate from the iPads in class. We feel that the iPad is an excellent one-to-one solution for the Millis Public schools to support our Personalized Learning Initiative.
Resources
Technology and Assessment Study Collaborative of Boston College,
http://www.bc.edu/research/intasc/researchprojects/researchprojects.shtml


Mobile One-to-One with iPads Steering Committee

• Nancy Gustafson, Superintendent of the Millis Public Schools
• Grace Magley, Director of Educational Technology
• Susan Donelan, Director of Pupil Personnel Services
• Joan Lynn, Director of Curriculum, Assessment and Professional Development
• Andrew Zitoli, Principal of the Millis Middle School
• Robert Mullaney, Principal of the Millis High Schools
• Mary Ellen D’Espinosa, Grade 8 Algebra Teacher
• Sharon Monaghan, Grade 8 English Language Arts Teacher
• David Digiammerino, Middle School Technology Teacher
• Mathew Joseph, Community Member
• Mark Messias, Community Member
• Janine Shultz, Community Member
• Steven Catalano, School Committee Member, Community Member
• Sean Doherty, School Committee Member, Community Member
APPENDIXES
Demographic Statistics:

Students in Grade 8: 109
Female Students in Grade 8: 46
Male Students in Grade 8: 63
Choice Students in Grade 8: 7
Special Need (IEP) Students in Grade 8: 16

Attendance Statistics:

Attendance Statistics Term 1: Average Daily Attendance: 96%
Attendance Statistics Term 2: Average Daily Attendance: 95%
Attendance Statistics Term 3: Average Daily Attendance: 96%

Damage/Repair Statistics:

For the period of March 10th - June 22nd.

Students taking iPads back and forth to school: 107/109
Students forgetting iPads at home on average per week: 1-2
Acceptable Use Violations: (2 updates, 2 language, 2 loan): 6 violations / 5 students
iPad Breakage: (Skateboard accident- broken screen) 1 unit / $250 for repair
Detentions for Violations: 1