These days, the air in the Lilla G. Frederick Pilot Middle School, a public school in the Grove Hall neighborhood of Boston, is charged with excitement. A low-level whirr of conversation and an overall sense of purpose and industry pervade the building’s atmosphere. Inside classrooms, students pore intently over their work or cluster in groups, gesturing and interrupting one another, as they brainstorm over shared projects. Teachers are likely to be found standing in the middle of their students as they all examine an image together, or else crouched down next to one or two children, coaching and guiding them in individuated instruction.

The reason for the buzz and the intensity?

Every student and teacher in the school now has a laptop computer; every student and teacher is using state-of-the-art digital tools, media software, and 24/7 online access to chart new pathways in learning. For low-income, urban children who are more accustomed to being left behind or overlooked by society, getting their own up-to-date MacBooks, along with technology support for themselves and their families, makes school an engaging place, a place of opportunity, promise, and hope.

The Frederick is part of a revolution in education, arguably the most substantive model of change in the history of school reform. With laptops, students take charge of their own schoolwork, create and practice original material through a variety of expressive media, and explore subjects independently, at their own level and speed. Or, in the straightforward words of Iniko, a Frederick 7th-grader, “It is really, really fun!”

The Frederick Wireless Learning Initiative, funded by a $1.1 million appropriation from the state legislature and supplemented through private supporters, was launched in the 2006-07 school year to investigate the potential of a one-to-one technology program (a laptop for every student and every teacher) to transform teaching and learning. It is the first one-to-one laptop school in Massachusetts in a low-income, urban, inner-city setting and one of the first in the nation. It is part of a revolution in education, arguably the most substantive model of change in the history of school reform. With laptops, students take charge of their own schoolwork, create and practice original material through a variety of expressive media, and explore subjects independently, at their own level and speed. Or, in the straightforward words of Iniko, a Frederick 7th-grader, “It is really, really fun!”

The Frederick School is focusing on 21st century skills to re-invent education and instruction because the old models have not served its students well. Many Frederick students enter middle school unprepared for grade-level work. The neighborhood has some of the lowest levels of educational attainment and highest crime and poverty rates in the city. Known to police as a crime “hot spot,” the Grove Hall neighborhood has 26 active gangs. Eighty-eight percent of students are classified as low-income by state standards, one of the highest rates of any Boston middle school. The student body, 58% African-American, 37% Latino, and 5% other identifications, is comprised of the same children who too frequently end up on the low side of the nation’s racial/ethnic school achievement gap.

The one-to-one laptop program demonstrates how innovative integration of 21st century technologies into every aspect of teaching and learning can drive students—including low-income students, students struggling in school, students reading several years below grade level, and students who are failing—to engage in school, to thrive, to do better, and to succeed. By carefully designing its one-to-one laptop program to align with high level teaching strategies and high expectations of all students, the Frederick is using new technology literacy to achieve three important pedagogical goals: improved student engagement, increased use of differentiated instruction as a means for addressing students’ diverse needs, and strengthened communications and involvement among students, teachers, parents, and community members. Most incoming Frederick students do not have computers and/or high-speed Internet access at home, yet they now leave middle school more prepared for the intellectual and career demands of the 21st century.

The Inside View

Students and families encounter an environment that models engagement, individuation, creativity, and collaboration from the minute they enter the Frederick school lobby. A flat-screen television streams slides of students working together followed by images of the products of their team work. Music plays in the background, beckoning students...
into this learning space. A bright banner proclaims the school’s expectations: “The Frederick School ~ Connecting, Learning, Achieving.”

Inside Aja Jackson’s eighth-grade classroom, children in groups of two and three cluster around their laptops, planning the digital story on gun violence that they are going to research, outline, create, and publish. Ms. Jackson is leaning over one group, directing them to a web link where they can preview and critique two or three digital stories produced by other eighth-graders before they write their own. Another group is brainstorming what types of images will engage the viewer emotionally in the topic. The classroom is full of children thinking, listening, questioning, and talking. The buzz here is typical of how learning looks and sounds at the Frederick: seldom silent, but seldom loud. The staff is relaxed, the building is calm, the students generally are focused on their work. A low hum pervades the hallways and classrooms. It is what teachers and administrators dream of: the charged undercurrent of students and teachers engaged, energetically and collaboratively, in learning.

Increasing Student Engagement

Up on the third floor, in the Frederick’s Academy Three, sixth-grade ELA students are busily engaged in their “Do Nows” – work they begin immediately upon entering class. The assignment is posted on the teacher’s website and students know exactly how to navigate to the website. They complete the work and then send it to the teacher’s drop box. Later, students spend time blogging on topics of importance. They research, outline, edit, write, re-write, and publish pieces of work. The seventh-grade science class leaves the building, laptops stowed in their soft-sided bags, to test water quality at different sites in the community and then record the data on their laptops. Another day they visit businesses, residences, and corners around the neighborhood to test the public wireless signal, working with city engineers to bring free wireless Internet access to Grove Hall. Eighth graders are learning geometry by designing three-dimensional models of houses on a CAD (computer-aided design) program. A different group of students is researching local ordinances on the Web, using a survey program to conduct a poll, designing a spreadsheet to analyze the results, collecting signatures on a petition, analyzing media coverage, and writing letters to the editor. In history class they are researching, storyboard, writing, acting, and filming a history re-enactment or an original screenplay. Teachers are continuing to develop a variety of innovative strategies to teach differently, more creatively, more to the heart of what motivates students, through the use of technology. Whatever the students are doing, what is most notable is that they are engaged.

The full integration of technology creates continual opportunities for students to create original material and to share it with diverse audiences. By changing students from consumers of information (e.g., textbook readers) into creators of information (e.g., bloggers, video makers, creators of public access PowerPoint or multimedia presentations), the laptops open up new worlds of possibilities for students to discover their voices, learn how to express their ideas effectively, and discover that what they say matters. Turning on the laptops seems to turn the students on to learning.

Indicators of Effectiveness: There is no question that the Frederick’s focus on 21st century skills has led to increased student engagement. The number of discipline referrals at the Frederick dropped from 500 in 2003-2004 to just under 100 in 2008-2009, a sure indicator that students are engaged with their schoolwork instead of misbehaving. Student attendance at the school has increased by 2%, to 92.8%, exceeding the Boston Public Schools’ district-wide average. When student attendance is already above 90%, it is very unusual to see such a large additional increase. The school’s transience rate is down to 9.1%, among the lowest of all the middle schools in the district. All these numbers suggest high levels of student engagement, as well as student and family satisfaction. As our student, Iniko, explains, “School is more interesting with laptops.”

Massachusetts State Representative Marie St. Fleur, the legislator who sponsored the bill allocating money for the one-to-one laptop program, states, “The Frederick Wireless Learning Initiative
tells the children that we trust them—not only with this piece of equipment, but that we trust them to take charge of their education.” The most striking statistic to come out of the Frederick Wireless Learning Initiative shows how the laptop program communicates to students that they are respected and trusted: in three years, students have not vandalized, misplaced, or stolen a single computer.

Making Differentiated Instruction a Standard Practice
Student skill levels vary greatly within classrooms at all schools. This is especially true at the Frederick, where 30% of students in each classroom are on Special Education Plans. The inclusion model challenges teachers to sufficiently differentiate learning opportunities so that each student can learn in his or her own way. The digital platform helps to make this goal achievable.

Differentiation happens in a variety of ways at the Frederick. Students with physical disabilities use speech-to-text programs to create written pieces of work. Students with dyslexia use text-to-speech programs in order to “read to learn.” Often students discover hidden talents through the vehicle of the computer. One Frederick student, a child with autism, has become a prolific and lyrical songwriter and composer using the Macintosh software program Garage Band. Students who struggle to produce strong written work can use the text-to-speech function in Microsoft Word to “hear” their writing, which assists them in improving their writing and editing skills.

Integration of technology into the classroom introduces numerous vehicles for differentiation of instruction. Teachers use software and/or web-based tools, such as Study Island, ReadAbout, Achieve 3000, FASTMath, and Rosetta Stone, so that children can learn at their own pace. Students stay on task because the work is presented in a manner that matches their skill level. Because each child is engaged in an individual exercise calibrated to his/her own learning level and pace, the teacher is freed up to circulate through the room, spending less time lecturing at the students and more class time interacting with children in small groups or providing one-on-one feedback. Since the laptops arrived and Frederick teachers learned how to change their teaching, students and teachers experience more give-and-take as co-learners and more in-depth exploration of ideas. Conversations and instruction are more authentic, more specific, more focused, keyed to students’ specific questions, learning challenges, and areas of inquiry. Jaylen, a Frederick student, explains, “You feel closer to your teachers because you have something to talk about.” The software programs monitor student progress with every keystroke, allowing teachers to check student progress and refine assignments in real-time. Taking advantage of these tools, Frederick teachers can individualize each student’s assignments.

*Indicators of Effectiveness:* As of 2007, one third of Frederick students were two or more years below grade level in reading, including about 50 non-readers and 20-25 students reading below the third grade level. In 2008-09, Frederick students gained an average of 2.0 grade levels, according to SRI reading assessments. This major accomplishment shows that the Frederick is headed in the right direction.

Improving Teacher Communication and Parent Involvement
Teacher Collaboration: The laptops also have changed how teachers work with each other. Teachers are less isolated and more invested in collaborating and learning from each other. Staff members use a shared Google Calendar for scheduling and planning, trade dilemmas and ideas through a “social network” function that is a part of the schoolwide ClassDrive software, and use the ClassDrive “Chat” function to get in-the-moment information from another teacher or from the main office.

As an example of teachers’ meetings, one group of teachers collaborated regularly last year to design a peer evaluation process. Teachers typically had their laptops open and used Google Applications for Education to co-create, comment, and be proactive in refining the peer evaluation document as it was being written. One staff member’s computer was hooked up to an LCD projector and an image of her screen was projected on the wall so she could record the discussion and edits for all to see. Colleagues analyzed, argued, processed, and refined. Later, the dynamic document was shared electronically with other teacher teams by selecting the “share” checkbox in the Google Docs application. In this way, every teacher had the opportunity to participate in the creation of the document. This encouraged every teacher to own responsibility for implementing the final process.

Family Engagement: Due to the high crime rate and ongoing gang threats in the neighborhood, Frederick students would not be safe carrying laptop computers to and from school. The laptops stay in the school building at night. This makes the Frederick unique among one-to-one laptop schools. Wanting to create 24/7 digital access to learning, the school turned this challenge into a special opportunity for students and families. In 2006 the Frederick adapted Boston Mayor Thomas Menino’s award-winning Technology Goes Home (TGH) program as an innovative extension to the laptop program. Families (a parent-child duo or other adult-child pair) attend 25 hours of after-school and Saturday computer classes at the Frederick.
Upon graduation, the family takes home a new netbook, specially imaged to fit the needs of the families and to match the computer interface that students are using in school, for a nominal fee. The program is run in collaboration with the new Boston Municipal Wireless, which is being piloted in Grove Hall, giving families wireless Internet access as part of their take-home kit once they graduate from Technology Goes Home.

**Indicators of Effectiveness:** In just three years, 500 of our nearly 650 families have gone through the program. By the end of 2010, virtually all Frederick families will be connected. Through TGH, the Frederick engages families in learning. This is especially significant in a school community where nearly 60% of students have fewer than 25 books in their homes. At this school serving students from a very low-income neighborhood, including many families with single parents, immigrant parents, non-English-speaking parents, and parents holding down multiple jobs—demographics that typically correlate with low parent turnout—parent events have been known to draw up to 1,000 attendees. Family engagement leads to student engagement, which leads to student success. Parents now access their children’s grades on-line. They communicate far more frequently with teachers and report a stronger sense of connection to the teachers and administrators. Overall, parents are more engaged in their child’s school experience due to our easy accessibility and the TGH program.

As time goes on, the home connection continues to generate novel opportunities for the 24/7 learning goal that drives the Frederick Wireless Learning Initiative. Students regularly use web-based learning programs at home in the evening, on the weekend, and over the holidays. Sometimes, parents or guardians sit down at the computer with their children, so that the student can show what s/he has accomplished in school or teach the adults in the family some new computer skills. In addition to netbook use at home, students also use laptops for extended learning (e.g., digital recordings, music-making, graphic design, writing) in the Frederick’s before and after-school programs. On any given morning, for example, a mixed group of parents, students, community members, and staff gathers in the Frederick’s Family Room to learn world languages. Each participant chooses a language and works at his/her own pace, using the individualized instruction available through Rosetta Stone language instruction software.

**Acknowledging the Challenges**

The process of creating the Frederick One-to-One Laptop Initiative was not without challenges. As a pilot project supported by Representative Marie St. Fleur in the Massachusetts Legislature, the program has always been under intense public scrutiny. As the only large, urban middle school to roll out a one-to-one laptop program for a community of low-income, minority families living in a distressed neighborhood, the Frederick has felt the pressure of paving the way for future one-to-one rollouts.

This program requires careful planning, adequate technology support, and easy-to-follow, consistently administered procedures. The challenges for comprehensive planning were (and remain) about time, money, and expertise. Working with Project Manager Matt Mervis, Educational Technology Consultant, and with the support of the Boston Public Schools, Frederick staff spent more than a full year researching, creating, learning, and processing before rolling out the laptop program. It was important that teachers from across the school participated along with school administrators as leaders in this process, to ensure that the entire staff owned responsibility for the program and its success. The school established systems to safeguard the equipment and a system of accountability for children and adults, both of which are clearly defined and well documented. The Wireless Learning Initiative is a continual learning process, as the Frederick is breaking new ground every step of the way.

The biggest challenge from the start has been to address teachers’ fears about the significant changes in practice that the program requires and to ensure they receive adequate ongoing support. Given the range of teachers – from those who are young and confident with personal computing, but lack skills in integrating technology into instruction, to experienced teachers who face a steep learning curve with new Web 2.0 tools and technologies - differentiation has been key in our approach to providing professional support. Additionally, the Frederick implemented several important professional development structures:
• Implementation Team for Technology: This team meets weekly to vet all technology decisions in the building and also serves as the first line of support for teachers struggling with a technology or technology-related issue; pairs of teachers from this team provide support to groups of about 20 staff.
• Office Hours: Teachers can get individual support from the school’s Technology Director during his open “office hours.”
• Best Practices Toolkits: A dozen Frederick teachers emerged as pioneers and leaders in developing innovative ways to use new technologies in the classroom. The Frederick is documenting their approaches by creating comprehensive Best Practices Toolkits, which are available to teachers from our school website. The Toolkits show video of our teachers and our students working successfully in classrooms and provide narrative, documents, and resources to help teachers replicate this work in their own classrooms. We are now launching a plan for the use and distribution of the Toolkits for professional development and educators from around the state have been accessing the videos as a learning tool.
• Bagels and Laptops: At the Frederick’s well-attended weekly voluntary Friday morning professional development program, a teacher with particular skill, knowledge, or experience with a software program presents to a group of colleagues. Bagels, pastries, fruit, and coffee are provided.

When our 2008 MCAS results showed that more than half of Frederick students still are not proficient in grade-level material, critics questioned the school’s emphasis on technology. However, educators and families in the school—who have witnessed first-hand the transformation in students’ attitudes, the increased amount of hands-on, student-driven learning, the 24/7 student and family pursuit of learning, and the shift to more creative, more involved, more directed instruction—believe that a year or two with computers will not erase the effects of years of students coming to middle school unprepared and of the stresses that poverty and trauma place on Frederick students. In the short term, the school points to the indicators of effectiveness—new levels of student, teacher, and family engagement and improved attendance, retention, and behavior. Although MCAS scores overall remain low, they are improving. More Frederick students are doing better in school than they were prior to the arrival of laptops. In terms of ultimate impact, it will take another five years to begin to see the long-term effects of the one-to-one project.

Fulfilling A Vision of Student Success
Through all the successes, struggles, and setbacks, the school remains confident that this is the right path. In 2008, the school received the Verizon Tech Savvy award for its implementation of Technology Goes Home. In March 2009, the Frederick was designated an “Apple Distinguished School” by Apple Computer. Most important, the Wireless Learning Initiative has united the Frederick School and the surrounding community. Every staff member can testify to the charged atmosphere in the building on the day in September when the computers are distributed to the students. There is no mistaking that this buzz of energy and enthusiasm, harnessed for learning, is a significant departure from business-as-usual in urban education. The surge in students’ confidence when they offer an authentic presentation to members of the community is palpable. Students become more attentive and engaged and more responsible for their own learning. The work is hard, but the outcome is worthy of the effort. Frederick students will move forward with the skills needed to successfully learn, earn, work, play, participate, and lead in the civic life of the 21st century.

Debra Socia is the founding Principal of the Lilla G. Frederick Pilot Middle School, which opened its doors in 2003. A long-time teacher and administrator, she previously worked as a Dean of Curriculum and Programs, a Curriculum Coordinator, a Project Director for the Coalition of Essential Schools, and a middle school mathematics teacher. She can be reached at dsocia@lgfnet.org.

For more information about the Lilla G. Frederick Pilot Middle School and the Frederick Wireless Internet Initiative, visit: http://www.lgfnet.org/

For more information about Teacher Created Tutorials and Video Tool Boxes: http://vimeo.com/channels/lgf http://www.survival.lgfnet.org/software-tutorials

To read the Boston College Research Study on the Frederick School’s 1:1 Laptop Pilot Program (Dec 2006-Dec 2009): http://www.bc.edu/researchprojects/fwle/frederick.shtml

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