

Appendix A

Review of State and National Laptop Initiatives



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This appendix profiles the experiences of several dozen schools with laptop initiatives. The schools included represent a mix of approaches, goals, and outcomes. While most of the initiatives are considered successes by their respective schools, even the successful initiatives can provide “lessons learned” to help guide the planning of those who would like to introduce laptops into the classroom. Many of these lessons were used in the development of the guiding principles outlined at the beginning of this report. The information in this appendix was gleaned from articles included in the References Appendix, the schools’ own websites, and the contributions of Task Force members.

Florida Schools:

- Broward County, North Broward Preparatory
- Hernando County, Moton Elementary School
- Jefferson County, Howard Middle School
- Manatee County
- Miami-Dade County, Carrollton School of the Sacred Heart
- Miami-Dade County, Palmer Trinity School
- Monroe County, Key Largo School
- Orange County, Ocoee Middle School
- Palm Beach County, Pine Crest
- Pinellas County, Clearview Avenue Elementary School

Schools outside of Florida:

- British Columbia, Peace River North
- California, Evergreen Valley High School
- California, Gunderson High School
- California, San Lorenzo Unified School District
- California, South Gate Middle School
- California, Urban School of San Francisco

- Kansas, Smoky Valley High School
- Illinois, Schaumburg
- Kentucky, Jefferson County
- Maine
- Michigan, Malcolm X Academy
- Minnesota, Oak-Land Junior High
- New Hampshire
- New Jersey, Summit High school
- North Carolina, Green County
- Ohio, Cincinnati Country Day School
- Oklahoma, Frontier School District in Red Rocks
- Pennsylvania, Greater Latrobe School District
- Pennsylvania, Irving Elementary School
- Pennsylvania, Quaker Valley School District
- South Carolina, Beaufort County
- Tennessee, St. Paul Christian Academy
- Texas, Ursuline Academy of Dallas
- Vermont, Sharon Academy
- Virginia, Henrico County

Florida Schools

Broward County, North Broward Preparatory

In the fall of 1998, all of the students in the middle and high school grades of this private, college prep school were provided with “StudyPro” laptop computers from NetSchool Corporation. By the following year it became apparent to both students and teachers that the limited capacity of the StudyPro laptops was not meeting the needs of North Broward Prep. The StudyPro was not capable of running the many programs demanded by the curriculum. A full-featured wireless laptop computer with CD-ROM was needed. So, for the 2000–2001 school year every high school student was required to have a full-featured, wireless laptop computer. This requirement was expanded to middle school students in 2002–2003 and to lower school students in 2003–2004. In the current school year, CD-ROM and on-line texts have replaced heavy, printed textbooks. Headmaster Michael Rossi notes, “Laptops are considerably lighter and students are much more engaged. With a computer, the textbook comes alive.” Rossi says that it is a challenge to train teachers to keep up with their students. The school has hired two trainers to work exclusively with faculty. Says Rossi, “A teacher who wants to work here knows the expectation is that they are computer literate. You walk around and see kids connected to the Internet all over campus.”

“Making the trade” The Miami Herald, July 27, 2003

Hernando County, Moton Elementary School

Although not a true 1:1 school, Morton Elementary achieves 1:1 computing in scheduled classrooms through the deployment of mobile laptop labs. The school’s technology coordinator, Carla Schutte, has advice that is pertinent to 1:1 initiatives. “These days, no matter what profession they [the students] go into, the knowledge and use of technology as tools is essential. It’s the difference between doing something by hand versus doing something with a machine. The tool helps get the job (done) better and faster.” Schutte believes that the most difficult obstacle was getting the teachers comfortable with the technology. “Anything new is going to meet some resistance. Computers were foreign to veteran teachers.” Schutte began a program where she trained selected teachers to be trainers of the remaining faculty, a method that she has found successful. On the other hand, Schutte has found little trouble getting the students to use the technology. “It’s so much a part of their lives these days, they think nothing of working on a keyboard. When it comes to explaining things to them, they seem to get it right away.” Schutte believes the cost of technology is money well spent. “I don’t think you can put a price tag on the benefits these kinds of things ultimately will bring to children in the future. In societies that put a premium on technology in education, these aren’t special projects, they are the norm. We need to continue to do more not less when it comes to technology. Some day our kids will thank us for doing it.”

“Into the world of wireless” St. Petersburg Times, October 2, 2003

Jefferson County, Howard Middle School

Each of the 450 students in Howard Middle School has been issued a laptop computer. The school serves grades five through eight. While individual teachers and students have experienced some successes with the laptops, overall this initiative provides more lessons learned for other schools that will be starting laptop programs. Initially, the laptops had little tool-based software that the teachers were made aware of. (Most teachers were not even aware that the laptops contained a word processor.) Instead, students were expected to utilize a number of web-based content and testing providers. The drill-and-practice exercises did little to raise student interest or achievement. Rather than reforming educational practices in the school, the laptops tended to reinforce existing, traditional methods of teaching. The lack of appropriate inservice training and the isolation of the school (Howard is the only middle school in the county) meant that teachers had very little direction aside from the vendor presentations supplied by the web-based content and testing service providers.

Lessons learned:

- Laptop computers should include appropriate tool-based software and teachers should be given sufficient inservice training to utilize it effectively with their students.
- When the predominant teaching style in a school is “instructionist,” extensive professional development is required to model ways of integrating project based learning into the curriculum.
- Several laptop initiatives give their teachers laptop computers a semester or even a full year before their students so that the teachers can get comfortable with the capabilities of the computer and explore ways of integrating it into their curriculum. This practice could have eased the transition for the Howard faculty, many of whom stated that they had limited experience with computers and were very uncomfortable using them in the classroom.
- Given the isolation of the district, the opportunity for key faculty members to visit other districts with successful laptop initiatives could have contributed greatly to the faculty’s vision for integrating laptops into the curriculum.

“The 21st-century classroom” Tallahassee Democrat, October 18, 2003

Manatee County

Manatee County School District began their laptop initiative as a pilot program in 22 classrooms involving four elementary schools and one high school. Funds were generated through Enhancing Education Through Technology (EETT) grant monies to provide technology-savvy teachers with the tools they needed to get the program rolling.

“Using the laptops forces the teachers to teach differently. It enables us to develop lesson plans that advance higher level learning skills and project based learning. The ‘drill and skill’ method just doesn’t work for students anymore,” remarked Kim McAfee, one of the teachers involved in the pilot program.

In 2003, after the success of the pilot, 2.2 million dollars was allocated to expand the program to include two high schools, one middle school and four elementary schools. The elementary schools’ distributed laptops to all students in 5th grade. Bayshore High School was selected to become the first school in

Manatee County to issue laptops to every teacher and students. Two additional elementary schools are participating on a limited basis.

Frequent parent night gatherings are critical to the program and keep the community informed. “Tech Time,” a locally produced community access show, broadcasts iMovies and other student created projects to homes in the area. Parents and teachers note students are spending less time watching television and more time with sharing with their parents what they have learned using their laptops. Absences by students with laptops have declined by almost 40%.

Tina Barrios, Supervisor of Instructional Technology for the Manatee School District, feels confident that the district is giving students and teachers what the need most: better access to information.

Miami-Dade County, Carrollton School of the Sacred Heart

All 400 students in grades 5–12 carry their own laptops as a part of the Anytime, Anywhere Learning program. The school website states, “The dynamics which characterize today’s age of information and communication dictate that lifelong learning must become the dominant paradigm for education. A desire to learn now and in the future must guide every classroom. The administration and faculty at Carrollton School considers technology to be a valuable tool to support and increase students’ desire to learn, enhance instruction and increase productivity and efficiency.”

Miami-Dade County, Palmer Trinity School

Palmer Trinity School is an independent, college preparatory, coeducational Episcopal day school with 600 students in grades six through twelve. The school’s Wireless Laptop Computer Program enables students to connect anywhere on campus, including outside areas. Palmer Trinity has a very successful support program and has posted a number of tutorials covering basic tasks and programs on its website. The school credits its success with laptops to “the positive, supportive climate at Palmer Trinity [which] encourages both students and teachers to experiment with new technology. Administrators and teachers are not afraid to forge new ground, this flexible attitude has made it possible to operate on the ‘cutting edge’ of school technology.”

Monroe County, Key Largo School

Project Connect is a three-year Laptop Pilot Project that is serving as a model for a district goal of a laptop for every student in grades 6–12. Currently 120 seventh grade students use wireless computers daily, which were issued to them as 6th grade students. Parents were required to participate in an evening training and sign a contract prior to their students receiving the computer. Students take the laptops home and provide their ISP to continue their assignments “anytime.”

Teachers have developed project-based learning lessons, collaborative projects, which integrate the curriculum and the laptops, and assignments that extend learning with laptops beyond the school day. Courses developed with Blackboard enhance and enrich the curriculum. All students have district email accounts and communication between teachers, parents and students is paramount to the success of the program. Teachers and students use web-based programs in class to develop authentic and for-

mal assessment, create and deliver multimedia presentations and utilize Internet resources for research, collaboration and real world tasks. The second year's evaluation will be complete in June 2004, with a final evaluation when the students have had the laptops for grades 6, 7, 8.

In year three, the 2004–05 school year, a wireless canopy will provide students with wireless access to their homes. The initial design phase is underway, with installation and implementation planned to begin at the start of the 2004–05 school year.

Orange County, Ocoee Middle School

According to a school profile on the Microsoft Education website, Tablet PCs have transformed the learning experience at Ocoee Middle School. Principal Katherine Clark says, "I truly believe that they will have the greatest impact on education since we first brought computers into the classroom." The project is a joint effort of Microsoft; Holt, Rinehart and Winston; and HP designed to measure how well students learn using a Tablet PC and a web-based curriculum. When participating seventh grade students enter their classroom, they use their Tablet PCs to log onto a server where they find their assignments, worksheets, and quizzes. The teacher accesses and corrects their assignments via the same server.

Palm Beach County, Pine Crest School (Boca Raton)

Pine Crest is a private school in Boca Raton. All seventh graders are required to carry their own wireless laptop to school. Seventh-graders must sign up for a one-day mandatory laptop training course.

Costs: Pine Crest School parents must purchase the laptops for their children. The school is an authorized reseller for Gateway, IBM, and Dell laptops. Non-warranty repair provided by the school is charged at \$50/hour. Student laptops must be dropped off at the school for configuration prior to the start of the school year. If they are dropped off before July, there is no fee for this service. Laptops dropped off in July incur a \$100 "technology services fee." After July the fee rises to \$250.

Pinellas County, Clearview Avenue Elementary School

During the 2001–2002 school year, the Florida Center for Instructional Technology worked closely with Clearview Avenue Elementary School to supply laptop computers and training assistance to selected classrooms as a part of an action research project to better understand issues related to the integration of technology in the elementary classroom. While much analysis remains to be done on the data collected, researchers have noted that there appears to be a relationship between teaching style and the success of the laptop implementation measured in terms of student and teacher satisfaction, quality and variety of usages, and seamlessness of integration.

Teachers who tended toward constructivism reported greater satisfaction with using the laptops and related digital devices. They exhibited a greater fluency and flexibility of integration approaches, often repurposing software in unexpected ways such as using a spreadsheet program to draw floorplans. Their students took ownership and pride in their computers and learned to be problem-solvers when technical

difficulties arose. Student collaboration increased. All told, students in the constructivist-oriented classrooms used the laptops more than students in the traditional classrooms. Perhaps more telling, when asked at the end of the year to reflect on their experiences, the students enthusiastically recounted the projects they had created on their laptops without referring to the computers themselves—the technology had become a transparent tool to them within a single school year.

The experience was markedly different in the more traditional classrooms. The computers were used significantly less and teachers and students expressed less satisfaction with them than did their peers in the other classrooms. Any apparent glitch would bring the entire classroom to a halt. Rather than responding as problem-solvers, students having a problem would take their hands away from the laptop and request help from the teacher. The more traditionalist teachers were often observed touching the students' trackpads—an activity almost never observed in the more constructivist classrooms. When asked to reflect at the end of the year, these students dwelt on the technology and the difficulties they had rather than on the projects they had done.

While this implementation was limited in scope and much analysis remains to be done, it does suggest that a school consider carefully the teaching styles of its faculty when implementing a laptop program and designing the professional development to support it. It stands to reason that teachers who have been accustomed to playing the sage-on-a-stage may need additional assistance adjusting to their students having a device that empowers them to take more responsibility for their education and opens additional avenues of knowledge to them. Perhaps it's no accident that laptop implementations are often tied to school reform efforts.

Schools outside of Florida

British Columbia, Peace River North

This initiative in northern British Columbia is very instructive because it was designed as a systematic action research project. Although the initiative is called the “Wireless Writing Project,” the results go well beyond an examination of student writing performance. The project was implemented in five classrooms of sixth and seventh grade students using Apple iBooks.

The results after one year are extremely positive. The percentage of students whose writing met expectations of the BC Performance Standard increased from 70% on the pretest to 92%. The percentage whose writing exceeded expectations rose from 0% to 18%.

Perceptions of writing improvement also surged. The teachers indicated that they strongly believed that the laptops had made an extensive or substantial contribution to student improvement. Over 93% of the parents believed that the laptops were responsible for the improvement in student writing. The degree of improvement was seen as extensive or substantial by 70%. Ninety percent of the students reported that the laptops had improved their writing “a lot” or “quite a bit.”

The use of the iBooks was similarly positive. Using a five-point scale, all five teachers involved in the project answered with a 5 to the questions “How important is it to you to have iBooks next year?” and “How important do you think it is for schools to provide iBooks for students in grades 6/7?” When asked

“How much does your child like having an iBook?” 92% answered either “extensively” or “a great deal; substantially.” In response to additional questions parents overwhelmingly indicated support for continuing the program and expanding up upward into the high school grades. Students indicated that is was important for them to have an iBook the following year and, like their parents, they thought it was important to extend the program through high school. Nearly all (97%) of the students indicated that finding information with the iBook helped them to improve their work “quite a bit” or “a lot.”

Perception of technology skills was extremely high. All five teachers gave their highest rating (5) when asked to describe the impact of the project on student technology skills. All of the parents indicated that their children’s technology skills had improved; 92% identifying the improvement as “extensive” or “substantial.” Half of the parents reported that their children were able to help other family members with their computers either “extensively” or “substantially.” Over 68% of the students reported that they are able to help others with their computers “quite a bit” or “a lot.”

Finally, the research showed noteworthy improvements in student attitude, motivation, and work habits. Teachers reported students taking an increased responsibility for their learning specifically in the areas of organizing and keeping track of their work, on-task behavior, and taking responsibility for their own work. Nearly 90% of the parents indicated an improvement in their children’s attitude in response to the laptop initiative. Three quarters of the students indicated that their attitude toward school had improved “a lot” or “quite a lot” due to having an iBook.

Outcomes: Dr. Jeroski noted the following additional insights related to the one-to-one implementation.

- “Students report strong ownership and a sense of responsibility to ‘their’ computer; that is supported by extremely low incidence of any kind of damage. Students are clearly very careful when handling their laptops.”
- “Students describe how important it is to have their ‘own’ computer that they can access whenever they need it at school or at home. They are able to personalize their operating environment to suit their learning styles.”
- “Teachers who are accustomed to a lab or cart system for sharing computers among classes, notice a dramatic decrease in the amount of ‘maintenance’ or ‘startup’ time required each time they want to use the computers.”
- “Because students are able to take their iBooks home, parents have increased access to their day-to-day school work, as well as major assignments.”
- “One-to-one assignment allows for serendipitous and spontaneous use of the iBooks as opportunities naturally arise.”

Sharon Jeroski, “Wireless Writing Project, Research Report Phase II” Horizon Research & Evaluation, Inc., 2003.

“Studies validate laptop programs in U.S., Canada” eSchool News Online, February 6, 2004

California, Evergreen Valley High School

All 1500 students in this Silicon Valley high school carry their own laptop computers. In its second year, the size of the program has skyrocketed as the student body increased from 850 in the first year to over 1500 currently. In the first year of the program, students were permitted to take the laptops home with them. With increased enrollment in the second year, coupled with a higher than expected breakage rate and insurance increases, the school no longer allows the laptops to be taken home. School officials were also concerned that they could not control the types of activities students could use the laptops for when they were away from the school.

Evan Hansen "Public schools: Why Johnny can't blog" CNET News, November 12, 2003

California, Gunderson High School

All students in this San Jose high school have been issued Apple iBook computers. They and their parents picked them up before school started. In the first two months of the program the school has reported one broken laptop and one stolen on the light rail transit system. The biggest problem has been insufficient infrastructure to connect so many laptops to the Internet. District officials say that problem will soon be solved.

The school will measure the success of the program against three goals: increased test scores, improved attendance, and a decline in behavior referrals. The program will be expanded to the feeder middle school for Gunderson next year and to fourth and fifth-graders at a local elementary school the following year. The \$6,000,000 project was funded through a Federal bond program.

Larry Slonaker, "Gunderson High's laptops: Educational blessing or expensive distraction?" Mercury News, October 15, 2003

California, San Lorenzo Unified School District

According to a school profile on the Microsoft Education website, the district's Dell laptops enable "students to achieve higher levels of learning, while providing teachers and administrators the tools they need to manage and enhance the curriculum." The district has also seen an increase of parental involvement, attributed to the laptop initiative. Two local libraries are installing wireless access points for students who do not have Internet access at home.

Four Intel master teachers in the district have provided Intel Teach to the Future training to more than 150 teachers. Teachers are trained to create "standards-based, thematic, project-based units of study." Teacher lessons are then posted on the district website.

Educational Technology Director, Georgeann Hardy says "Our eLearning laptop teachers have made a strong commitment to using project-based learning strategies which engage our students in their learning and prepare them with 21st century skills to be ready for future education and employment. The bonus is that parents and community are also involved and are supporting our students!"

California, South Gate Middle School

According to a school profile on the Apple Education website, South Gate's 4400 students are "excited, engaged, and happy to be there." One of the largest secondary schools in the country, South Gate is located in a crowded urban area and serves an almost exclusively Latino/Hispanic student population 90% of whom qualify for free or reduced lunch.

South Gate's year-round schedule means that three teachers share two classrooms. This created numerous problems regarding the care and maintenance of the desktop computers that were in each of the more than 100 classrooms according to Instructional Technology Coordinator Robert Craven. "You end up with three teachers sharing two rooms, which means the teachers must move everything to another room every eight or sixteen weeks. If the outgoing teacher wasn't keeping things up, the desktop computers could be inoperable or vandalized, or have other problems. This was a huge issue for us. With over 100 classrooms on campus, making sure all of the systems were running was becoming really difficult."

Now South Gate utilizes a fleet of mobile iBook carts which the teachers typically check out for a week at a time. On Fridays, AirPort Base stations and printers are set up in the classrooms that will be using the mobile labs the following week. The carts of laptops are rolled into the classrooms each morning and returned at the end of the school day.

Some of the tech support is provided by the students themselves. Craven explains, "We're really lucky that we get a lot of sixth- through eighth-graders who are very talented technically. They do everything from cutting CAT-5 cables, to setting up the AirPort Base Stations, to taking hard drives out and replacing motherboards. The students also serve as peer tutors in the classes, giving other students assistance with the iBooks and their technology-based lessons. We generally have about 30 to 40 students helping out during the year ... the level of self-esteem this gives them is just off the charts."

Students confirm Craven's assessment. Says one eighth-grader, "I really enjoy being a technology worker, because I feel privileged to be trusted with the computers and with the knowledge I need to fix them. I also like knowing there are some things I know more about than my teachers! Working here helps build skills for the future. Now that I'm gaining those skills, I won't have to stay at home."

Another eighth-grader agrees, "As a service worker, I've learned something new every day that can help me have a good career. I've gained confidence from having the responsibility for all the equipment, and having students and teachers count on me. It's a good feeling to help teachers with computers, and to get noticed in a large school."

South Gate's professional development model has been successful. Each teacher receives an initial two days of training before they can use the mobile labs. Additional training is scheduled throughout the year following a plan worked out between the school and Apple Professional Development. The school also has a Teacher Integration Mentor Program run by a number of tech-savvy teachers. Craven claims that even teachers accustomed to the traditional classroom model have begun to integrate the available technology.

Sixth-grade humanities teacher Mike Albert praises the use of laptop computers in the classroom. "With the iBooks, students can find a lot more information than they can with traditional sources, a lot faster. They can also evaluate those sources, using much higher-order thinking. Using the iBooks actually helps them synthesize their information, instead of just reporting it. Also, presentation skills are one

of California's state standards, yet they often get short shrift. Having the chance to present something, defend it, and convince others is tremendous preparation for life after the classroom."

Lessons learned. South Gate has shared some advice for other schools about technology use:

- "Pay attention to your hardware and software usage. If your technology tools are sitting idle, it's time to reevaluate their usefulness."
- "Even if you don't have a dedicated computer lab, you can still use technology in the classroom—consider a mobile computer lab."
- "Solicit input from and provide an ongoing forum for your teachers who are 'on the front lines.'"
- "Technology is constantly changing. Ensure continuous training for all faculty."
- "When doing your cost estimates, don't forget to factor in after-purchase maintenance. A less-expensive system may be far more costly to repair and service, doubling or tripling its initial price."
- "Actively involving your students in the upkeep of your computers increases their self-esteem, creates positive role models, and encourages everyone to take better care of the systems."

California, Urban School of San Francisco

At the Urban School of San Francisco, all students in grades nine through eleven and the 35 faculty members use laptop computers. Technology Director, Howard Levin claims, "With technology, the nature of collaboration dramatically increases. The sharing of info has skyrocketed—with the blessing of the teachers, students share notes, and they work together on research projects. Also, the level of confidence students have in technology has increased, especially among girls. Students are developing confidence in using all sorts of technology, such as digital cameras, not just computers." Levin also notes that originally, the English department was most resistant to the move toward technology. However, after implementation, they are among the strongest supporters. "They've discovered that computers offer the tools to expand the students' abilities to comment and critique each other's work, as well as to comment and critique literature."

"Apple succeeds in 1:1 educational computing solutions" MacCentral, October 30, 2003

Illinois, Schaumburg

Based on the results of a pilot implementation of iBooks in nine classrooms during the 2002–2003 school year, the district is providing iBooks to all 5,200 of its fourth, fifth, and sixth graders. Nearly 3,500 laptops were distributed during the 2003–2004 school year. The final 1,700 are scheduled for distribution in fall of 2004. District superintendent, Lynne Rauch, believes standardized test scores will increase. "The amount of writing a student can do typing on the laptop compared to handwriting is amazing. You become a good writer the more you write."

Costs: The total cost of the program is \$6,600,000. This includes the hardware, wireless Internet access for classrooms, and 21 video cameras.

“Schaumburg schools buying thousands of laptops for kids” Chicago Sun-Times, September 8, 2003

Kansas, Smoky Valley High School

The Smoky Valley High School has just taken delivery of 340 laptop computers. The laptops were distributed to teachers in January and a pilot program with students will be run during the spring 2004 semester. The remainder of the laptops will be distributed in August. The \$450,000 cost of the program is partially offset by a savings of \$93,000—the amount the district had planned to spend replacing 75–80 desktop computers. It is anticipated that students will be charged an annual \$50 rental fee. The initiative will accommodate parents who are unable to pay the fee. Principal Fred Van Ranken justifies the expense in the face of budget cuts based on the expectation that the laptops will decrease the drop-out rate, attract new students, teach students 21st century skills, and have the potential for allowing elective online courses. “We can’t lack vision in the midst of these budget cuts. We still have to help our students be successful in society.”

Kentucky, Jefferson County

In fall of 2004, more than 3,200 iBooks will be distributed to students and teachers at two middle schools and two high schools in Jefferson County, Kentucky. All four schools are underperforming and have low percentages of students with access to a computer at home. School officials anticipate three outcomes: students will spend more time on learning, students will have equal access to technology, and students will become better prepared for a world in which computer skills are indispensable.

Costs: The total cost of the program is \$5,000,000 divided over four years. The price of the laptops will be \$4,500,000. The other \$500,000 will be used to purchase online materials, a part-time technician, and other materials. About \$450,000 annually will come from district funds. The remainder will come from state and federal funding. Parents will be charged \$51 annually for insurance. Principals at each of the four schools are prepared to work out a payment plan or subsidies for parents who cannot afford the insurance fee.

“Laptops approved for four schools” The Courier-Journal, January 13, 2004

Maine

The state of Maine in the year 2002, under the vision of former Governor Angus King embarked on an initiative to provide all middle school students and teachers in the state of Maine with laptop computers. The Maine Learning Technology Initiative (MLTI) was designed to “transform Maine into the premier state for utilizing technology.” The initial phase of the MLTI has provided all 7th and 8th grade students and their teachers with laptop computers, technical assistance, and professional development for integrating technology in the curriculum.

This statewide initiative contracted with the Maine Education Policy Research Institute (MEPRI) to conduct the Phase One evaluation of MLTI. MEPRI is a research institute funded jointly by the Maine State Legislature and the University of Maine System to conduct policy research for the legislatures and various studies for state agencies such as the Maine Department of Education and Maine State Board of Education. It was the role MEPRI to evaluate and research the MLTI process as it impacted the process of teaching and learning in the state of Maine.

Evaluation evidence indicates:

- Teachers are using the laptop computers in a variety of methods, such as developing instructional materials, conducting research for instructional purposes, and communicating with colleagues.
- Students have reported using the laptops most frequently for finding information, organizing information, and taking class notes.
- The majority of teachers surveyed reported that the laptops assisted them to more effectively meet their curriculum goals, and individualize their curriculum to meet particular student needs.
- The majority of teachers reported that the utilization of the laptop computers has assisted them to better meet Maine's statewide learning standards.
- 4 out of 5 teachers surveyed reported that students are more engaged in their learning, more actively involved in their own learning, and produce better quality work.

Michigan, Malcolm X Academy

Students in this Detroit inner city, African American school have made dramatic academic progress. Seventh graders who participated in the laptop program in sixth grade now score much higher on state standards for writing and reading than the state average. An impressive 83% met or exceeded state writing standards (compared to the state average of 63%) and 63% met or exceeded state reading standards (compared to the state average of 49%).

Teacher Jeffery Robinson notes that “collaborative, project-based learning activities, in conjunction with the digital tools inherent in the Apple iBook computers, have created a whole new level of engagement with our students.”

Minnesota, Mounds Park Academy

According to a school profile on the Apple Education website, the curriculum at Mounds Park Academy “has received a radical, wireless-enabled upgrade that has empowered teachers and students to work anywhere within the school.” All 300 students and faculty in the upper school use Apple iBooks. The teachers received their laptops in the spring of 2000, with the students receiving theirs in the fall of 2001. School administrators initially considered laptops to ease the heavy demand on the school's computer lab. After visiting other laptop schools, Bob Kreischer, the school's founder, realized that the laptops would also introduce innovative practices to the school and extend the school day into the home as students took their laptops home.

The school's technology coordinator, Theresa Offerman, notes that the students “always have all of their ‘stuff’ with them, they're more organized, and they're not losing their assignments. Using the wireless iBooks has really changed the way everyone here thinks, as we're no longer confined to any one room or place.”

Outcomes:

- Teachers note that the quality of student research has improved.
- Students are devoting more time to their projects.
- Communication between parents and teachers has been enhanced.

Minnesota, Oak-Land Junior High

Oak-Land Junior High has used carts of laptop computers for the past five years. In the fall of 2003, life science classes began using 1:1 laptops. Teacher Todd Rau reports, “The classroom has become much more student driven, with small groups exploring issues and reporting back to class.” Rau has also noted that attendance is up, discipline problems are down, and the students have a new-found excitement to learn.

“Classroom laptops a real life trial for new program” Lake Elmo Leader, November 14, 2003

New Hampshire

All seventh-graders at six New Hampshire schools received iBook laptops in January 2004 in a program modeled after the Maine laptop initiative. The initiative is sponsored by the New Hampshire Technology Promoting Student Excellence project, a private, non-profit organization dedicated to expanding learning opportunities and erasing the digital divide for New Hampshire students. Governor Benson states that participating students “are the pioneers of a new educational world. They will be more equipped and better prepared for any challenge that lies ahead, and their participation will help produce one of the most educated workforces in the country.”

“Governor Benson launches laptop program” (<http://www.state.nh.us/>)

New Jersey, Summit High School

Summit High School serves a culturally and economically diverse student population of 700. Nearly forty different languages are spoken at home by students and their families.

Thanks to the Mayor’s Partnership for Technology, all 700 Summit students carry their own laptop computers. The Mayor’s Partnership for Technology is a public/private collaboration of educators, residents, corporate, municipal and foundation interests, all committed to supporting and investing in innovative education models in the public schools. Its success demonstrates how a public/private partnership can assist with technology funding when school resources are inadequate.

Supporters of the initiative also point to the intensive professional development as a contributor to the success of the program. Initially, faculty were provided with an comprehensive three-day workshop in the use of the laptop and technology integration. Additionally, a cadre of experienced teachers attended ACOT training. This group now provides mentoring to their peers.

Outcomes:

- Teachers' attitudes and beliefs about the importance of technology as a tool for teaching and learning have moved along a continuum from awareness to application and integration.
- Students and teachers have learned and demonstrated effective use of presentation software.
- Classes benefit from shared information and the use of non-traditional sources.

North Carolina, Green County

Green County is distributing about 1,700 iBooks to its students beginning in the fall of 2003. Every middle and high school student is scheduled to receive a laptop. Middle school principal Jeff Parris believes that computers at home and in the classroom have become a necessity for today's school children. Parents must pay a \$40 insurance fee for their children to be able to take the laptop home.

"Green County students get laptops," The Free Press, October 15, 2003

Ohio, Cincinnati Country Day School

According to a school profile on the Microsoft Education website, the Toshiba laptops students use in grades five through twelve have transformed the Cincinnati Country Day School. Many teachers have gone beyond the simple posting of syllabi and assignments, and have created interactive websites for their students. Parents are expected to upgrade their children's laptops every three years.

Professional development at CCDS focuses on one department at a time. All teachers of a particular subject are given substitutes for the day so that they can learn new ways of integrating the technology into their curriculum. The teachers themselves decide what topics are to be covered and who should be invited in as a guest trainer.

CCDS uses a series of four questions to evaluate new technology strategies:

- Is it something that can be done without the technology or is it a refinement or improvement of what we've done before?
- Is it something that fully engages the student in the learning activity or just another way to "deliver" instruction?
- Was it a true learning experience for the teacher as well as the students?
- How "invisible" was the use of the technology from the students' point of view? Did the activity bring the students' attention to the technology or to the content/curricular goals?

Oklahoma, Frontier School District in Red Rocks

Frontier School District serves a population where over half of the students are Native American and two-thirds qualify for free or reduced lunch. A two-pronged approach to technology integration has resulted in dramatic student achievement. First, all students in grades 7–12 were issued laptops and two distance learning classrooms were installed in the high school where students could take courses not offered by Frontier. Secondly, all teachers receive one-half day of professional development per week.

The professional development takes place on Fridays, when students are sent home after a half day of school. Superintendent Steve Shiever states, “For technology to be successful, you must have training. It allows us to keep instruction current, and that really pays off for the students.”

Each semester seniors learn three to five new programs as they complete an interdisciplinary “Senior Projects” course.

Outcomes:

- High School principal Randy Robinson claims that the technology has resulted in students pushing themselves and adopting a “can do” attitude.
- School officials note that the school’s wireless network helps to level the playing field for students with no Internet access at home. On weekends, the school parking lot is filled with students tapping into the school network to complete homework assignments.
- The number of graduates attending college or vocational/technical schools has doubled.
- Many college-bound graduates find that they can convert their computer skills into good-paying campus jobs to help offset tuition costs.

“District profile” District Administration Magazine, April 2002

Pennsylvania, Greater Latrobe Junior High School

At Greater Latrobe Junior High School, every student and teacher has a laptop computer. The junior high has 1050 students in grades 7–9. The laptops are StudyPros, developed by NetSchools. Each computer runs MS Windows 95, Works for Windows, a browser, and a math-graphing program. The laptops connect to the school network via an infrared system installed in the ceiling of every classroom. NetSchools examined the textbooks adopted by the school and developed webpages with thousands of Internet links to appropriate sites based on district and state standards. Each laptop is capable of storing up to 500 webpages for off-line viewing.

Seventh grade students receive 12 weeks of training during school year. Teachers receive ongoing training about two days a week. Students are expected to recharge their laptops for eight hours at home each evening. They also are responsible for uploading their work to the school server each morning when they arrive at school. One teacher is assigned to work in the laptop repair area each period.

Costs. Each laptop cost \$1300. The total cost for the project was \$2,100,000. This included building infrastructure/wiring, server, management software, state standards correlation, onsite trainer, tech support, and a laser printer in every classroom. The school estimated that it would have cost \$1,700,000 to install the “old model” of technology including 6 desktop computers and a printer in each classroom and three computer labs—one for each grade level. The \$400,000 difference between the two approaches equals approximately \$350 per student to give each student and teacher a laptop computer.

Outcomes:

- Increased test scores. In 1997 and 1998, 70% of the school's ninth-graders met the district's own writing tests. By 1999 after implementation of the laptop program, 81% of the ninth-graders met it.
- Teachers report that they would not go back to the way they operated their classrooms before laptops. "It's a teacher's dream." "It helps me to get them [the students] from Point A to Point B." "The technology isn't driving us. We are driving the technology."

Lessons Learned:

- The support of the principal and the school board is essential.
- The technology must work and be reliable.
- The district must provide accountability to the public.

"Laptops for all at junior high" Pittsburgh Post-Gazette, September 24, 2000

Pennsylvania, Irving Elementary School

According to a school profile on the Apple Education website, the "McAuliffe Heights" program at Irving Elementary School has resulted in a marked increase in student research and collaboration, high student enthusiasm, and innovations in sharing and collaborating among the staff. Each of the 250 students and every teacher received laptop computer. Principal Pat Labriola notes that Irving Elementary always had computer labs, but that students could use them for only 30 minutes a day. "We viewed the one-to-one laptop initiative as the next logical step in our technology integration." The "McAuliffe Heights" program, named after astronaut Christa McAuliffe, was the result of a think-tank of local educators, administrators, and community leaders brought together to improve education in the low socio-economic district.

Pennsylvania, Quaker Valley School District

The Quaker Valley Digital School District project was far from successful by many measures, but several important lessons can be learned from a reading of the RAND Corporation evaluation of the district in December 2003.

The implementation involved giving laptops to every student in grades three through twelve. Home Internet connections were also provided by the district. The home connections provided by the school were little used as the school district serves a fairly affluent area where a full 85% of the student homes were connected prior to the laptop initiative.

While the usual positive outcomes were reported (increased motivation and engagement, improved collaboration and communication skills, and the availability of new materials for lessons), the lessons learned are more instructive. In general, the implementation seems to have consisted primarily of distributing laptops with little accountability from teachers or students for their use, inadequate technical support, and insufficient professional development regarding technology integration.

The authors of the RAND report note that teachers were held accountable for using the technology to perform administrative tasks, but they were not held accountable for integrating the technology into their teaching. Therefore, all teachers used the administrative tools even if they found them to be more time consuming than previous methods, but the use of the laptops as an instructional tool varied greatly depending on the interests and inclinations of the teacher. The lack of accountability extended to the students as well. Students were able to mistreat their laptops and then turn them in for repair without facing any consequences or receiving additional instruction on the care of their computer. The repair rate for laptops, particularly at the middle school level, was astronomical whereas other iBook initiatives report very few repair needs. Additionally, students were not even held accountable for bringing their laptops to class. Sixth grade teachers report that fewer than half of their students would show up with their laptops on days when they were asked to bring them.

The damage to the laptops through student neglect and mistreatment overwhelmed the technical staff, many units were sent out for repairs, and some repair duties fell to teachers.

The professional development offered to teachers consisted mainly of using software or district administrative tools. Some of the software training was on programs that were not subsequently adopted by the district. Technology integration training was not a part of the formal training. However, some teachers did take it upon themselves to plan technology integration lessons and present them on a voluntary basis to other faculty.

Lessons Learned:

- Professional development must emphasize integration of the laptops into curriculum.
- Teachers and students both must be held accountable for laptop use.
- Adequate technical support must be made available.

Kerri A Kerr, John F. Pane, and Heather Barney, "Technical Report, Quaker Valley Digital School District, Early Effects and Plans of future Evaluation" RAND Corporation, 2003

South Carolina, Beaufort County

According to a school profile on the Microsoft Education website, 306 sixth graders in Beaufort County use laptop computers to increase "student options, student motivation, and student ownership over the learning process."

Beaufort Superintendent Herman Gaither says, "Laptop learning represents the transition from traditional learning to an approach that can carry students and teachers well into the next century. It takes students beyond the classroom, beyond the library, beyond anyplace the teachers have taken them before."

The biggest obstacle to implementation was financial. Voters had just recently passed a bond issue and were unlikely to do so again. An alternative source of funding was required. With the encouragement of the school district, a group of business and community leaders formed a laptop foundation to help underwrite the effort. The foundation leased the laptops and, in turn, leased them to parents of district students. Administrators believe the family contributions to the project are in part responsible for the care students have taken of their laptops.

Costs: The cost to the Foundation to lease a laptop for one month was \$57. The Foundation was able to raise \$22 toward that cost, so the base monthly charge to parents was \$35 for the laptop rental. Students who qualified for reduced price lunches qualified for an additional \$10 subsidy, bringing the monthly lease down to \$25. For students qualifying for free lunches, the lease was further reduced to \$10 per month.

Tennessee, St. Paul Christian Academy

In 2001, St. Paul Christian gave each of their teachers and students in grades one through six a laptop computer. The school also purchased a printer for each family with students attending the school. A wireless network was installed and teachers were trained on the use of the laptop. Head of school, Kenneth Cheeseman, noted that formerly it was difficult for teachers to make technology a part of learning. He referred to the problems of designing lesson plans for students to use a limited number of desktop computers in the classroom as a “deal-breaker” for technology use. “If we could make technology as seamless as ‘Take out your notebook’ ... then we’d have a chance to have some authentic integration.”

Costs: The 2001 cost of the laptops was \$1,400 each, or \$700,000 for the entire project. Parents must sign an agreement to take financial responsibility for the laptops.

“School gives students laptops to integrate technology into life” The Tennessean, October 21, 2001

Texas, Ursuline Academy of Dallas

According to a school profile on the Microsoft Education website, technology is a pervasive part of the school culture at Ursuline Academy.

“Our mission is to produce citizens literate in the medium of our times—and the tool of our times is the computer,” says Principal Shaun Underhill. “We’re seeing students being much more creative than they had been in the past with the same assignments. Because the notebook PCs make it easier to do the work, students can spend more time thinking about what they’re doing. Revisions are easier so they can experiment with more alternatives. Students are really thinking more and better. They’re really communicating.”

Teacher Dina Benson says, “What I see with the laptops is amazing. Girls who’ve struggled with pen and paper are blooming with our laptop projects. It shows me—and them—that they understand the concepts and are learning. They just need to learn in a different way, and the laptops allow that. Nothing motivates like success, and you can’t pay for the type of motivation I’m seeing in the classroom. I wouldn’t have traded this year for anything.”

Teacher inservice training for the laptop initiative has been especially successful. The faculty had nine months to prepare for the entering laptop class. The regular teacher-training program was expanded with the addition of 2 to 3 classes per week. The trainings were offered from 4 to 6:00 p.m. and gave teachers the opportunity to pick and choose topics that interested them. The classes covered technology integration and changes in the classroom as a result of the technology. They also provided a forum for teachers to exchange views, problems, and solutions.

Costs: In addition to the school's \$6,400 tuition, each parent was charged \$2,600 for the laptop program of which \$2,200 paid for the machine and \$400 was retained by the school to cover insurance, loaner laptops, and additional software. Twenty of the 211 entering freshmen received assistance with the laptop fee from a variety of sources. No machine was entirely free because school officials believed that some family contribution was necessary to instill a sense of ownership and responsibility.

Vermont, Sharon Academy

According to a school profile on the Microsoft Education website, the Tablet PC enhances learning and creativity in the middle school classroom at Sharon Academy in central Vermont. Michael Livingston, Assistant Head of the school, says, "There's no question that technology increasingly plays a role in education for all of us. The Tablet PC has become a very popular item here." Teacher Ed Koren notes, "The Tablet PC accents and influences the quality of the work that the students are able to do." Humanities teacher Curtis Koren says, "These are the best computers we have. We've just been having a great time with them. Everyone has an application."

Virginia, Henrico County

Henrico County Public Schools in Richmond, Virginia, deployed a total of 25,000 wireless capable laptops to students and faculty in the district's middle and high schools. High school students and staff received laptops during 2001–02 school year, middle school students and staff in 2002–03, and plans are being made for all elementary students and staff to receive laptops by the end of the 2004 school year. Teachers were given laptops a full year before full deployment increasing their ease of use and confidence in the technology. The school system is currently working on providing low cost Internet access to any student who does not have sufficient home access.

"We wanted fewer lectures and more engaged, active learning using dynamic, current content," explained Mark A. Edwards, Superintendent. "We believe, and now we can demonstrate, that providing universal access to laptops at the middle and high school level connects students to their school work in powerful new ways. This 24-7 access facilitates the kind of hands-on, creative environment where students learn best."

Virginia's Standards of Learning tests support Edward's claims. Scores in Standards of Learning tests showed improvement in 9 of 11 fields, including increases of 14 points in World History and 20 points in US History. High school accreditation increased from 63 to 75% in the districts schools and the number of graduates continuing their education rose 2.5%. A dropout rate of 1.52% is the lowest in the history of the school district.

Henrico County's firm commitment to professional development gave teachers the skills and tools to be effective. Staff development included curriculum writing workshops, summer institutes, site-based institutes, a full time trainer in each high school and middle school, and training CDs and videotapes.

Edwards feels the following principles are instrumental to the success of a laptop program:

- Think big
- Find a business partner
- Sweat the details—network capability is a key issue
- Listen to and train the teachers
- Enlist the broadest possible support—administration, principals, teachers, students, PTA, business and community leaders
- Reach out to parents—provide parent resource centers and offer parent training