One-to-One Computing in Michigan

A STATE PROFILE

PRELIMINARY REPORT
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Executive Summary

On March 19, 2004, Michigan State Superintendent Tom Watkins announced the award of 30 Freedom to Learn (FTL) grants to schools and districts across the state. The grants will provide nearly 12,000 students with an innovative, high-tech learning environment and put wireless laptop computers into their hands. Another 2,300 students are slated to join these ranks once their districts complete a readiness program. Professional development will be provided by multiple service providers through a $1.5 million grant to an Intermediate Service Agency.

State policy and funding for ubiquitous computing in Michigan was initiated by Speaker of the House, Rick Johnson. In 2002, the Learning Without Limits program (as it was then known) funded six demonstration sites and eight implementation sites to the tune of $7.5 million. The following year, influenced by the state of Maine and other high profile laptop initiatives, Michigan policy leaders announced Michigan's Freedom to Learn (FTL) program. The original intent was to provide middle and high school students - beginning with every sixth grader in the state - with a wireless, personal device. The program was designed *"to improve student achievement in core academic subjects by providing Michigan's students with access to 21st century learning tools."*

In August 2003, Michigan Governor Jennifer Granholm signed the state's education bill (Public Act 158 of 2003), approving $39.4 million in federal dollars and $22 million in state dollars to provide wireless technology to middle school students, especially those in the sixth grade.

1:1 in Michigan - Quick Facts:

Dates of Freedom to Learn Implementation:

- *2002 – 2003: Pilot Phase* (6th, 7th, and 8th grades)
- *2004 – 2006: Continuation of Demonstration Sites. Implementation of wireless laptop program*

Number of Schools:

- *Pilot Phase:* 15 school districts, intermediate school districts, independent schools, and consortia
- *Full Implementation:* Projected 12,000 to 17,000 6th graders statewide (approximately 10% of all 6th graders in the state)

Technology Used:

- *Pilot Phase:* Palm PDAs, Apple iBooks, Windows-based laptops, wireless networking
- *Full Implementation:* Hewlett Packard notebook computers, wireless networking

Actual Cost:

- *Pilot Phase:* $7,499,388
- *Full Implementation:* up to $17 million annually for 4 years

Due to a severe downturn in Michigan's economy, however, the program has since been scaled back significantly. In fact, all state funds were rescinded and, due to the limited response to the program by school districts, the state now expects to fund approximately 14,000 laptops for sixth graders, a number far smaller than the 132,000 originally envisioned. Despite a state public school enrollment that is about eight times the size of Maine's, Michigan's full one-to-one program currently reaches approximately 3,000 fewer students.

The Michigan Department of Education and Michigan Virtual University jointly administer the FTL program, with the assistance of a 32-member statewide advisory group from government, education, business, and industry.

Pilot Program:

Through a competitive grant process initiated by Speaker Rick Johnson in September 2002, Michigan's pilot program awarded a total of $7,499,388 for one-to-one computing in 15 school districts, intermediate school districts (ISDs), independent schools, and consortia across the state. These schools and districts fell into three categories: Demonstration (6), Showcase (1), and Program Application (8).

NOTE: The interviews conducted with Michigan schools for this report took place during the pilot phase of the program. As a result, participant responses represent experiences with the program at that early stage.

Expected Return on One-to-One Investment:

- Increased student achievement
- More empowered, thoughtful teachers
- More involved parents
- A leveled playing field
- 21st century skill development for a 21st century workforce

Each of the Demonstration sites is an Intermediate School District (or Educational Service Agency) responsible for numerous individual districts. Berrien County ISD and Eastern Upper Peninsula ISD, the two Demonstration sites represented here, serve dozens of school districts and thousands of students. Berrien County ISD, for example, is a consortium of 15 districts representing 22 buildings, more than 2600 students, and close to 280 teachers. Also highlighted here is the Capital Area Wireless Showcase site: Riddle Middle (Magnet) School in the Lansing Unified School District.

Unexpected Results:

- Teacher enthusiasm and retention are on the rise
- Parents are becoming more involved in student learning
- Students are caring for the technology
- Full implementation involves fewer students than initially projected

During the pilot phase, equipment selection was left up to participants, and in fact often varied on a site-by-site basis. According to one interviewee, this was the only way it would work ("*One vendor is not going to fly in Michigan*"), though the state has subsequently settled on a single vendor (Hewlett Packard) and a single technology (wireless laptops) for later stages of the FTL project. Initially, however, Demonstration sites polled their districts to find out which type of equipment was preferred.

In Berrien County ISD, PDAs (Palm) were largely favored over laptops, mainly because software for PDAs is usually free and cost was a factor. (Berrien County's grant was written for $2 million, but only $1.1 million was awarded). In the Eastern U.P. ISD, 8th grade students received handhelds equipped with wireless sleds, while 9th graders received laptops. At Riddle Middle School, Apple iBooks were selected, in part because the magnet school is dedicated to visual and performing arts, and Apple technology was determined to best suit those needs. Participants then negotiated with vendors and professional development providers.

"Freedom to Learn is not a technology initiative; it is an education *initiative."*

-- Freedom to Learn website, Program Goals

1. Why did educational policymakers in Michigan focus on ubiquitous computing?

The visionary behind Michigan's drive for ubiquitous computing was Speaker of the House Rick Johnson. The Speaker strongly believed that ubiquitous computing would positively impact academic achievement, equity of educational and economic opportunity for students, and economic viability for graduates and the state.

> *"In our fast-paced world, days like September 11th can change everything in an instant. Textbooks can become outdated before they are even delivered. With computers, the world becomes your classroom and every student has a seat in the front row. My plan allows kids to learn anytime, anywhere -- without limits."*
>
> -- Michigan Speaker of the House, Rick Johnson

Speaker Johnson's vision was to establish one-to-one computing in grades 6-12 within six years. *"I want Michigan to pioneer the use of technology in the classroom,"* he said. *"Our children deserve every tool that will help them succeed at home and in the workplace. It is the right thing to do and I am determined to get it done."*

Other state-level policymakers in Michigan identified four key factors that influenced their own thinking about one-to-one:

- The visible success of laptop programs in Henrico County, VA and the state of Maine
- The urgency for Michigan's economic diversification into high tech industries
- The need for digital equity to ensure the viability of Michigan's graduates in a global, high-tech economy
- The economic hardships endured by Michigan workers as manufacturing jobs go off-shore

> *"Part of Michigan's plan for economic growth includes focusing on things that matter to citizens, such as education. Businesses want people equipped with the skills necessary for the 21st century economy."*
>
> *"We must pave a third road to a powerhouse economy, because businesses need more than access to capital. They need a flow of human capital – a skilled workforce to give Michigan's businesses an edge when competition is fierce and margins are tight."*
>
> --Michigan Governor Jennifer Granholm, 2004 State of the State Address (online: http://www.ecs.org/html/statesTerritories/State_of_States2004.htm)

In the midst of the initial $7.5 million ubiquitous computing pilot program, a new Governor, Jennifer Granholm, was inaugurated in Michigan. From the start, Governor Granholm was supportive of the program, as evidenced by her signature on a budget bill in the summer of 2003 allocating significant state and federal funds to it. Unfortunately, she was forced to scale back the state's commitment to one-to-one when faced with a $900 million budget shortfall later that fall.

Advocacy and Justification:

It is largely due to the efforts of House Speaker Rick Johnson that the original $7.5 million ubiquitous computing pilot program was established and that 100% of the federal No Child Left Behind, Title II Part D, Enhancing Education Through Technology competitive funds (EETT) remain dedicated to this purpose. The EETT funds amount to $17 million annually for four years.

The Speaker's vision was heavily influenced by the apparent successes of laptop programs in Virginia's Henrico County Public Schools (HCPS) and by the statewide program in Maine. As in Maine, one of the primary drivers for the program in Michigan is quality of life and economic viability for the state's graduates. The need to extend Michigan's economic base beyond manufacturing and into high-tech industries, the need to reengage students in rigorous, relevant learning, and the need to prevent "brain drain" (graduates leaving the state for high-tech jobs elsewhere) are all cited as reasons the Speaker and other Michigan policymakers supported ubiquitous computing.

> The vision driving the Michigan ubiquitous computing initiatives was *"to improve student achievement in core academic subjects by providing Michigan's students with access to 21st Century learning tools."*
>
> -- Freedom to Learn

Newly elected Governor Granholm was and continues to be an advocate for and user of technology. The local media report her daily use of a laptop and her use of electronic "blue clickers" during community forums to gauge immediate audience response to priorities for state budget cuts. Unfortunately, the looming shortfall of nearly a billion dollars forced her to downsize the state's Freedom to Learn program, and in December of 2003 she rescinded the $22 million in state funds originally appropriated for that purpose.

Research, Policy Studies, and Advocacy Documents Used:

Highly visible, large-scale ubiquitous computing initiatives in Henrico County Public Schools and in the state of Maine, coupled with an executive briefing by Apple Computer, convinced the Michigan Speaker of the House to champion one-to-one in his own state. Once the concept was approved by the Legislature and the Governor, the Michigan Department of Education, Michigan Virtual University, and other stakeholders were tasked with the responsibility of transforming that vision into reality for schools. They reviewed research and best practices on effective uses of technology, but found more best practice than research on this topic.

The Learning Without Limits website posted prior to the 2002 $7.5 million pilot linked potential applicants to the many resources Michigan researchers identified. That website (now Freedom to Learn, http://wireless.mivu.org) has since been expanded to include lessons learned from the Michigan pilot sites and other research and best practices on one-to-one computing.

School and District Levels:

Pilot grant applicants also looked at other one-to-one environments (Maine, for example), but actually report finding more differences than similarities. All of the Demonstration sites shared their experiences, however (and of course served as pilots for later implementations of FTL). One source of research for the PDA sites (3 of the 5 Demonstration sites selected PDAs) – and especially professional development to make the program work – was Elliot Soloway and the University of Michigan's Center for Highly Interactive Computing in Education (including their

private sector partner, GoKnow). GoKnow, for example, later became partners in Berrien County's train-the-trainer model of implementation.

Impetus:

As the FTL program evolved from a single Legislator's vision to a concrete, practical program, specific goals emerged. The Michigan Department of Education and Michigan Virtual University jointly administer the program, with the assistance of a 32-member statewide advisory group from government, education, business, and industry. According to stakeholders, "*Freedom to Learn is not a technology initiative; it is an* education *initiative*." While it focuses on integrating technology into the curriculum, its main goals are to:

- Increase student achievement by developing engaging, relevant learning environments
- Empower teachers to teach and share ideas beyond the walls of their classrooms
- Provide parents with the tools to become more involved in student learning
- Close the digital divide
- Develop 21st century skills for a 21st century workforce.

An indirect goal is enhanced collaboration among stakeholders, inviting buy-in and consensus and generating "*support for other innovative programs, momentum for fundraising, and new learning opportunities for students and staff."*

Arguments Against One-to-One:

Statewide:

A contingent of educators in the state has been vocal in its opposition to the Michigan plan for ubiquitous computing, primarily due to differing cost calculations. To help districts determine the "hidden costs" of one-to-one as the state envisioned it, for example, Paul Soma, CFO of Traverse City Area Public Schools, developed a spreadsheet outlining the potential total cost of ownership (TCO) for ubiquitous computing. Noting that the Michigan plan was to provide $250 per student, per year, for four years to cover the cost of a wireless computer and some training, the TCO "calculator" was designed to demonstrate that the $25 match per computer required of districts by the state, when combined with the projected costs of professional development, operation, maintenance, technical assistance, insurance, and hardware replacement, would significantly exceed the money provided to districts for the program (see: http://www.tcaps.net/ or http://www.record-eagle.com/2003/oct/29laptop.htm for a related article in the local press). Unfortunately, this reality came at a time in Michigan when district budgets were already being squeezed due to a shortfall in the state budget, and it was compounded by federal requirements that 25% of all EETT funding (the source of Freedom to Learn funding) – in this case, $62.50 per student, per year – be dedicated to professional development.

As a result, many detractors in Michigan are not *against* one-to-one computing, per se; they're reluctant to support a program that they view as not fully funded and consequently not sustainable. This is evidenced by the relatively small number of applicants who applied for Freedom to Learn grants in March 2004. A state education agency representative reports that, as a result, those that did apply will receive professional development services not originally anticipated.

Others in the state were critical of the program for specifying laptops to the exclusion of handhelds and other devices. Dr. Elliot Soloway, a professor of science education at the University of Michigan who is internationally recognized for his work with handheld devices in schools, was critical of Michigan's plan for omitting devices he'd found useful with students in science education. Retrospectively, however, the initial Freedom to Learn Evaluation Report (released on January 14, 2004) found that the pilot sites using laptop computers or a combination of laptops and Personal Digital Assistants (PDAs) reported more support for the FTL program than those using exclusively PDAs.

School and District Levels:

School and district participants in Michigan identified the following three groups as initially opposed to one-to-one technology access:

- Teachers
- Parents
- Community Stakeholders

Teachers:

Though many teachers were "*on board*" in the one-to-one pilot programs, enthusiasm varied according to teacher experience with technology and willingness to try something new. In general, the two main concerns for teachers were classroom management and technology integration; in successful installations, teachers were sufficiently trained in both of these areas.

> *"Initially, we trained our teachers to apply the technology to a lesson plan they were already using. Once they saw how it worked for that, it really opened them up!"*
>
> -- Technology Coordinator, Riddle Middle School

Parents:

Parents also had questions as plans for the one-to-one initiative were presented to them. In general, these dealt primarily with inappropriate student use. These fears were addressed as they arose, partly through parent training. This was less of an issue in Berrien County ISD, where students in the pilot were never given access to the Internet aside from the websites their teachers selected and beamed to their PDAs.

> *"Parents needed to be active participants in this program. Once they saw what this could mean for their students, they became very supportive!"*
>
> -- Teacher, Riddle Middle School

Community Stakeholders:

Even in the early stages of the FTL program, there was resistance from unexpected corners of the state. Berrien County's own local newspaper, for example, hammered the ISD for applying for the pilot grant. The paper typified the predominant argument against the program, asserting multiple other needs of Michigan schools and the state in general (i.e., "*How can you spend this money when teachers are getting laid off?*"). As the program was expanded, initially through the use of state funds, these objections intensified.

As noted above, additional arguments against FTL centered on the selection of a single vendor for the statewide program. Michigan educators, and many parents, initially prepared themselves to reject the state mandate that they *"fall into line*." These objections have since died down significantly, in part because the state funds have been withdrawn in favor of federal dollars targeted to high-need schools.

Barriers to One-to-One in Michigan:

Interviews with key policy leaders and a review of the Freedom to Learn Evaluation Report, released in January of 2004, identified several barriers to the effective implementation of ubiquitous computing in Michigan:

- **Vision** – State, regional, and district leaders lack a common, unifying vision with regard to ubiquitous computing. Typical of many such innovations, the ultimate impact was not obvious prior to implementation. Often, the innovation (in this case ubiquitous computing) becomes a catalyst for changes and shifts in the organization. Indicative of this is the 2003 evaluation report finding that, *"there exists a general confusion about who the technology innovation leader is in the school."* While state leaders clearly believe this initiative is about learning rather than technology, nearly half of participating teachers and a quarter of participating principals believe that it is technology coordinators who provide the leadership for the initiative.

- **Organizational Barriers** – The effective use of one-to-one computing requires significant shifts in what, how, and when learning occurs. This requires serious school change grounded in emergent research on learning and cognition. While the state did not specifically provide leadership in this arena, they are providing technology leadership support through a Bill and Melinda Gates Foundation grant. However, the impact of the leadership initiative has not yet translated fully into practice.

- **Financial Barriers** – The model used by House Speaker Rick Johnson in establishing the Michigan program was Henrico County Public Schools, a district that used no new money to launch and sustain ubiquitous computing in its middle and high schools. Instead, HCPS redirects existing funds, currently dedicating 4% of their maintenance and operations budget to ubiquitous computing. Thus, while the Michigan FTL program provides funding for hardware, it leaves additional (but no less necessary) resources up to schools and districts. In fact, the Speaker fully expected that his initiative would spur districts across Michigan to emulate Henrico's reallocation of existing funds toward ubiquitous computing. But in financial hard times, with education facing significant budget cuts, this is difficult to do, even if district leaders are committed to the idea.

- **Professional Development** – Research finds that the most effective professional development is job-embedded, student-centered, collegial, ongoing, and metacognitive (see, for example, *Professional development and teachers' uses of technology*, at http://www.sri.com/policy/cep/mst/SRI_Professional_Development_Report_2002.pdf). While training will be provided by the vendor (Hewlett Packard) on the technology itself, the success of the FTL program will hinge on the alignment of professional development to the use of ubiquitous computing in addressing state learning standards and 21st century skills related to economic viability. As is noted elsewhere in this report, the state is now planning a substantial investment of funds for teacher professional development.

2. What trends are emerging in national, state, and local policies that impact ubiquitous computing in Michigan?

National Trends:

According to state policymakers in Michigan, there are five national trends that impact ubiquitous computing in the state:

- High-stakes accountability
- Lack of student access to technology
- Budget cuts in education
- Standards-based learning
- The role of highly-qualified teachers in the learning process

Michigan's ubiquitous computing initiative has been on a roller coaster ride since Speaker Rick Johnson proffered the idea in spring of 2003.

Buffeted by huge state budget deficits, sustainability issues, and funding available only for hardware, the scope of the project has been reduced from a statewide project potentially impacting every 6th grader student in Michigan (132,000 students), to impacting just under 14,000.

The good news is that this leaves the state with sufficient funds for the professional development, strategic planning, research, and change management activities it will take to implement the program effectively.

High-Stakes Accountability:

The Michigan Educational Assessment of Progress (MEAP) has been high-stakes in Michigan for a number of years. The urgency for continued progress required by the state and by NCLB focuses the outcome of ubiquitous computing squarely on academic achievement.

Student Access:

While Michigan students have home access to the Internet in record numbers, there continue to be tremendous gaps in the quality of that access across the state. Ubiquitous computing, when fully implemented on a 24-hour a day, 7-day a week scale, can help close that gap.

Budget Cuts:

A $900 million dollar shortfall in the Michigan state budget resulted in the downsizing of the Freedom to Learn program from the original scope of all 132,000 6th graders with laptops to 30 grants impacting 12,000 students, with the possibility of extending access to 2,300 additional students.

Standards:

All PreK-12 investments are aligned to standards, and ubiquitous computing is no exception. That translates into comprehensive, technology-based programs designed to advance student learning.

Qualified Teachers:

Many Michigan educators publicly criticized the Freedom to Learn program – not for its concept, but for the lack of funds necessary to ensure quality implementation and sustainability. In doing so, they acknowledged the critical role a highly qualified teacher plays in ensuring effective technology use that results in higher student achievement. Michigan's recent (March, 2004) announcement of Freedom to Learn grants included a $1.5 million grant for professional development, another clear recognition that the "qualified teacher" makes a difference.

Local Trends:

Pilot Programs:

Among the pilot installations studied, there is a sense that previous deployments of technology in Michigan have been a bit wasteful, as there was rarely an accompanying focus on how to use the technology effectively to improve teaching and learning. One former technology coordinator, for example, mentioned being "*embarrassed*" that he'd helped to train teachers to program, rather than to actually integrate technology in meaningful ways.

The Berrien County and Eastern U.P. Palm programs, because of their early emphasis on appropriate, accompanying professional development, are seen as different. It should be noted that, in Berrien County particularly, educators at the ISD level were responsible for this emphasis. When funding to that ISD, for example, was cut by almost 80%, district leaders "*refused to compromise on professional development,"* choosing instead to look for other ways to trim costs.

At Riddle Middle School, 7th and 8th grade students received their laptops in May of 2003 (1 and 1/2 months before school let out for the summer), but that worked out well. Everyone got used to the machines and the kinks were worked out so that they could "*start fresh*" in the 2003-04 school year. Now the program there includes 6th graders. Thanks to that initial "*trial period*," they now have far fewer concerns about when and how to use the laptops. In addition, there was a similar emphasis on technology integration, rather than on the technology itself. See the professional development section of this report for further detail.

Scope:

During the pilot phase, equipment selection was left up to participants, and in fact often varied on a site-by-site basis. According to one interviewee, this was the only way it would work ("*One vendor is not going to fly in Michigan*"), though the state has subsequently settled on a single vendor (Hewlett Packard) and a single technology (wireless laptops) for later stages of the project. Initially, however, Demonstration sites polled their districts to find out which type of equipment was preferred.

In Berrien County ISD, PDAs (Palm) were largely favored over laptops. In the Eastern U.P. ISD, 8th grade students received handhelds equipped with wireless sleds, while 9th graders received laptops. At Riddle Middle School, Apple iBooks were selected. Participants then negotiated with vendors and professional development providers.

Demonstration sites were required to provide participating students with access to technology 24 hours a day, 7 days a week. Lansing School District, the Showcase site, also allows students to take their laptops home, and the district provides home Internet access as well. In most cases,

parents have signed a statement of responsibility for the technology, and no other insurance is provided.

For the Demonstration sites, no home Internet access provided as part of this initiative. In fact, during this phase of the program, Berrien County ISD was not able to get their wireless networks up and running, so students there did not even have access to the Internet from school (beyond what they had with computer labs that preceded the program). Teachers, however, did have access, and (in the case of PDAs) were provided with software by which they could beam "approved" websites to their classes. According to the Director of Instructional Technology at Berrien ISD, this type of access is "*safer than the Internet on laptops, because teachers have more control."* This sort of management helped to sway the stakeholders in this ISD who were concerned with inappropriate student use, though it is not in line with research suggesting that fuller access may lead to more significant student learning gains.

3. What do Michigan's policymakers expect will be the outcome of the ubiquitous computing initiatives in their state? Are these expectations the same as or different from those of educators? How are they aligned to Michigan's overall education agenda?

Expectations:

Michigan policymakers expect that one-to-one computing will increase the engagement of Michigan students in learning, improve test scores, improve the quality and equity of educational opportunity for students across the state, and enhance the economic viability of students and the state as a whole. Through the FTL project, policymakers want to reduce brain drain, increase high-tech industry and entrepreneurship, and increase the level of academic achievement and years of higher education for Michigan citizens.

District-level educators in Michigan believe that the expectations of state policymakers are the same as theirs; however, they also suggest that their expectations differ from those of federal policymakers, who they see as far more focused on quantifiable metrics. State-level decision-makers have been given demonstrations and examples of student work that have been impressive; this helps them to realize that "*it can't all be measured on tests."*

Expectations of Michigan Policymakers	*Expectations of Michigan Educators*
➢ Increase student achievement by developing engaging, relevant learning environments ➢ Empower teachers to teach and share ideas beyond the walls of their classrooms ➢ Provide parents with the tools to become more involved in student learning ➢ Close the digital divide ➢ Develop 21st century skills for a 21st century workforce	➢ Improved student writing ➢ Increased student engagement, motivation, and attendance ➢ Changes in teaching and learning ➢ A leveled playing field for all stakeholders

Fit Within the Educational Agenda:

Significance:

Not unlike other states in the nation, Michigan is focused on meeting federal requirements for No Child Left Behind and state learning standards, as measured by the Michigan Educational Assessment of Progress (MEAP). Meanwhile, Governor Granholm is focused on transitioning Michigan into the New Economy through diversification of Michigan's economic base, expanding beyond manufacturing into high-tech business and industries. Her 2004 State of the State Address

focused on technology, science, and mathematics achievement at the higher education level, but was notable in its lack of mention of these same issues at the PreK-12 levels.

School Improvement:

Achieving and Succeeding, a brochure published by the Michigan Department of Education, stresses the importance of bringing relevance and everyday, practical meaning to Michigan's academic standards. It links learning across all academic areas to a high quality of life and to economic viability.

Recognizing the importance of systematic, ongoing school improvement to students' academic achievement, Michigan developed the MI-Plan, an online school improvement template. This approach streamlines a school's improvement planning and implementation process. Michigan's Center for Educational Performance and Information (CEPI) is responsible for collecting, managing, and reporting public school data throughout the state. CEPI and its partners, through MI-Plan, assist schools in bringing together critical planning components of people, resources, and data into a single environment to produce data-driven, research-based and goal-oriented decisions for improving student learning. This technique effectively models the use of an online technology tool to organize data, strategy, and resources to accomplish higher student performances.

Because ubiquitous computing is part of a larger school improvement trend across Michigan, it might be useful to include research and background on ubiquitous computing in MI-Plan to ensure consideration by schools in their improvement processes. As was the case even prior to the grant application process, all school improvement plans have technology integration as a major component.

Critical Factors:

School and district interviewees in Michigan identified the following as absolutely critical to the effective implementation of one-to-one programs:

- Good leadership, especially at the building level
- Quality, ongoing professional development
- Robust technical support, especially at the building level

> *"Good leadership can make or break the project."*
>
> -- Technology Integration Specialist, Eastern Upper Peninsula ISD

Certainly, Michigan's ISDs were largely responsible for encouraging their districts to participate as Demonstration sites, but there is a sense that state leadership played a role as well. Furthermore, according to the Director of Instructional Technology at Berrien County ISD, while district administrators were responsible for providing the right administrative atmosphere for the program (organizing teacher release/training time, etc.), they were not *the* most critical element. "*Most superintendents were not especially aware of what was going on with the program*."

Building administrator buy-in, on the other hand, has been extremely important to the success of one-to-one in Michigan at both the Demonstration and the Showcase sites, but this buy-in varies across districts. Thus far, the FTL program has been far more effective in schools where principals are highly involved (e.g., when they attend training sessions and meetings with questions and enthusiasm).

Upfront and ongoing professional development that includes sufficient time, resources, and support for developing teacher technology proficiency and effectively integrating technology into the curriculum is also critical to the success of one-to-one in Michigan. Furthermore, teachers need to feel supported on a just-in-time basis as they work to improve teaching and learning through appropriate uses of technology. It is critical that equipment and networks are well supported and functioning properly, particularly for reluctant teachers.

> "*Teachers slowly saw that it was not about the technology, but about improved teaching and learning.*"
>
> -- Director of Instructional Technology, Berrien County ISD

Assessment:

With the high-stakes accountability of PreK-12 schools aligned to MEAP scores, it will be important to link ubiquitous computing to improvements in those scores. At this time, the Freedom to Learn pilots have not yet had sufficient time or resources to establish such a link.

Nevertheless, the Center for Teaching and Learning at Michigan State University, in partnership with Michigan Virtual University, is conducting a multi-year, statewide evaluation of Freedom to Learn to:

- Assess the impact of FTL on students, teachers, administrators, parents, and the public
- Evaluate the implementation of FTL
- Gather baseline data about the implementation context for future deployments
- Develop a long-term evaluation strategy, including instruments to be used.

The group's 2003 Project Implementation Report focused on initial impact, anticipated impact, and reactions to the program. Results from this report, released in January of this year, are somewhat limited due to the short implementation period that preceded evaluation. Data collection, furthermore, took place after school had adjourned for the year and is mainly based on stakeholder surveys; overall response rates to these surveys average 42%, with response rates of some participant groups (such as students: 11%) being much lower. Many of the responses, though useful, are not generalizable on a statewide scale, due either to too few respondents to a given query or to distinctive demographic data that may prohibit generalization to other groups. It is assumed, however, that this initial report will serve as a starting point for more in-depth and rigorous evaluations of FTL in the future.

This 2003 report did, however, include perceptions of educators on the expected impact of the program. Interestingly, over 88% of teachers and 70% of principals and technology coordinators who participated in the data collection for that report expected student learning to improve, specifically in reading, writing, and mathematics. On the other hand, only 32% of those principals and 47% of technology coordinators believed the program would positively impact MEAP scores.

This discrepancy suggests that students are developing skills and knowledge through Freedom to Learn that are not captured on MEAP tests – an interesting topic for further exploration. In fact, given the focus of state policymakers on economic viability, Freedom to Learn evaluators would be wise to document the 21st century skill development that might account for the discrepancy, and to track the long-term progress of students with ubiquitous computing into the world of work.

School and District Level:

In addition to the state evaluation, some of the pilot sites have partnered with third party evaluators to assess the impacts of one-to-one on their schools and districts. Berrien County ISD, for example, contracted with Lakehouse Evaluation, Inc. to collect qualitative and quantitative data designed to assess the impact of one-to-one activities on intended program goals. This study, completed in July of 2003, used artifacts, online surveys, event documentation, and a confirming evidence approach to examine participant attitudes about changes in:

- Student learning
- Professional development
- Teaching and learning
- Program planning
- Program continuation

An Executive Summary of the results of this evaluation, though somewhat limited in its application outside of the ISD, is available online at http://www.remc11.k12.mi.us/lwl/.

Eastern U.P. ISD is conducting a post-project survey of administrators, teachers, and tech staff, as well as reviewing lesson logs and student artifacts (results are not yet available). Riddle Middle School has partnered with a local university to conduct an ongoing evaluation of their program as well. In all cases, it is expected that longer-term benefits will eventually be correlated (however loosely) to the ubiquitous computing environment (for example, that improved attendance as a result of one-to-one program will lead to better MEAP scores).

Rigorous evaluation designs, especially those that include comparison groups, would add to the credibility of evaluation findings.

Technology Literacy:

The January 2003 FTL evaluation report does not address technology literacy specifically, but it does track student technology use in terms of type and level of access. Not surprisingly, students are excited about the use of technology, with over 83% of students surveyed taking the devices home with them and using them after school. Survey respondents suggested that ubiquitous computing will have a positive, long-term impact on student learning, albeit not necessarily on MEAP scores. While access and use should lead to technology literacy, that particular item was not addressed in the initial evaluation.

No Child Left Behind:

As in Maine, at the local level federal requirements seem pretty irrelevant to the Michigan schools and districts interviewed. For the most part, they are looking far beyond the requirements of NCLB, and they seem to feel that the state is ahead of the feds as well. That said, schools and districts are still focused on the standard used for NCLB, the Michigan Educational Assessment of Progress (MEAP).

At the same time, the state officials recognize the importance of schools meeting the No Child Left Behind requirements for Adequate Yearly Progress (AYP). In fact, the Detroit Free Press recently published an article questioning the fact that numerous Michigan schools and districts receiving

prestigious state and national awards for excellence were not doing so well in meeting AYP. The paper reports: "*State Superintendent Tom Watkins said that this is one of the effects of the No Child Left Behind Act, the federal law that has ushered in sweeping accountability measures for public schools. There are 50 ways a school can fail to meet the federal rules, Watkins said, thus the contradictions."*

Representatives for Speaker Rick Johnson commented on the perfect fit between NCLB and ubiquitous computing: leaving no child behind means meeting every child's learning needs. What better way to do so than to provide students with individualized learning tools?

4. What funding mechanisms support ubiquitous computing in Michigan?

Funding:

The Freedom to Learn pilot program was funded at $7.5 million dollars using a combination of state and federal funds. While originally, in the summer of 2003, the state had targeted sufficient state and federal funds to provide every 6th grade student and their teachers with a laptop for the full implementation of the program, economic shortfalls caused them to revoke the allocation of the $22 million of state funds. State officials continue to target 100% of the federal No Child Left Behind Title II, Part D competitive funds to Freedom to Learn. State officials estimate that amount to be close to $17 million annually for four years. The federal government provided special dispensation for Michigan to hold year one EETT funds until the fall of 2004 rollout of the Freedom to Learn program.

Direct and Indirect Costs at the School and District Level:

In the pilot phase, participants were more responsible for determining how their grant money would be spent than will be the case with the rollout of the statewide Freedom to Learn program. As mentioned elsewhere in this report, FTL award amounts will be determined by the number of students designated for participation in the program and will include a local match. Furthermore, it is mandated that districts will contribute an amount equal to 25 percent of the grant awarded them for professional development.

Example – Funding the Pilot at Berrien County ISD:

In the pilot phase, Berrien County ISD wrote a grant application with the expectation of $2 million but received only $1.1 million, so many costs had to get cut out of the initial budget. The ISD bargained aggressively with vendors, sought free software, and partnered with local universities (Lake Michigan College and Andrews University) to obtain student interns for some of their teacher training. This was a productive strategy in many ways, though not in all cases. For example, the ISD learned they would have been better off going with Palm keyboards rather than the less expensive Belkin ones, as they ran into serious compatibility issues with some frequency. They also learned that beefing up technical support is necessary to sustain one-to-one access: none of the buildings in the ISD has a tech person (there's just the district and the ISD), and it would be better to have had the funds for ongoing, just-in-time support at the building level.

Sustainability:

Beyond the pilot phase of Freedom to Learn, award amounts are determined by the number of students designated for participation in the program ($250 per student participant, per year); the total budget also includes a local match of $25 per student. Furthermore, since the current funding for the full FTL program is 100% federal (Title II, Part D) money, districts are required to contribute an amount equal to 25 percent of the $250 grant ($62.50 per student participant) for professional development.

With rising costs, shrinking technology budgets, and Total Cost of Ownership issues yet to be addressed, there is still a question of the FTL program's sustainability. However, state officials recently commented that, given the low number of districts that responded to their Request for Proposals, the state anticipates reallocating remaining funds to more fully support grantees through high-quality professional development programs.

Furthermore, the following can be found under "Donor Opportunities" on the Freedom to Learn website (http://wireless.mivu.org/donoropp/), indicating one of the ways Michigan educators may attempt to enhance federal funding for the FTL program:

Example – Donations for Sustainability:

"Freedom to Learn is getting off to a great start with start-up funding from government sources.

"However, the program will need additional support to go beyond the pilot phase and expand the program to reach every child throughout Michigan. In partnership with Michigan Superintendent of Public Instruction Tom Watkins and Speaker of the House Rick Johnson, Michigan Virtual University is seeking additional financial support from many other resources.

"Invest in the future of Michigan's youth! There is a range of philanthropic options that will provide the perfect opportunity for you as an individual, as a community organization or as a company to support Freedom to Learn."

-- Freedom to Learn website, Donor Opportunities

5. What is the impact of ubiquitous computing on local school policies in Michigan?

Participants in the pilot phase of the Freedom to Learn program cited the following as outcomes of one-to-one program in Michigan:

- Student engagement is at an all time high
- Academic achievement (as measured by MEAP scores *and* more qualitative assessments) is on the rise
- Attendance is up
- The digital divide is closing
- Parents are becoming more involved in student learning
- Students are developing 21st century skills and are becoming better prepared to join a 21st century workforce
- Teachers are becoming more willing to connect resources outside of the classroom to lessons
- Students and teachers are interacting more
- Students are better organized
- There is more stakeholder support for technology overall

> *"Teachers are now talking the talk and walking the walk. I think this is going to make a real difference in our schools."*
>
> -- Teacher, Lakeshore Middle School (Berrien ISD)

Specific Subjects and School Populations:

Several of the Demonstration sites focused their pilot grant applications on improved writing across numerous academic subjects. At Riddle Middle School, student performance objectives included higher scores on state (MEAP) assessments in the areas of math and reading.

> *"The students are riveted now – even the ones who couldn't sit still!"*
>
> – Teacher, Riddle Middle School (Lansing School District)

Special education students were cited as particularly benefiting from the one-to-one program, as were lower income students. One trainer in Berrien County told a story of an autistic boy who'd always sat in the back of his classes, refusing to interact with other students. Once the Palms arrived, he began to collaborate and share his work. In just the one semester, he'd gone from earning straight F's to his lowest grade being a B-. At Riddle Middle School, teachers almost can't believe the change among students who usually *"can't sit still. They're riveted now!"*

Professional Development:

Across the Freedom to Learn program, there is a sense that professional development is a truly necessary ingredient for success. It helps bring reluctant teachers "*on board*," and it enables enthusiastic teachers to more fully explore the potential of one-to-one access.

Example – Professional Development at Riddle Middle School:

Teachers at Riddle participate in technology skills training/mentoring sessions with an experienced Lansing School District teacher who works with Apple computers and students daily. Additionally, Metiri Group consultants were brought in to introduce teachers and administrators to the skills needed for the 21st century, and to work with educators on research-based practice. Apple Computer followed up with 2 or 3 sessions of hands-on, practical training for teachers – including the development of lesson plans that could actually be used in the classroom – during teachers' planning time, and introduced teachers to applications like iMovie. Teachers specifically asked to see how they could use the technology to enhance their existing lessons and curriculum, and initial skepticism was overcome when they saw the technology *"in action*" in even one of their lessons. *"It really opened up for them."* Finally, *"with the laptops available all the time, teachers realized that the students could help them develop their lessons."*

Example – Professional Development at Berrien County ISD:

Beginning in January of 2003, Elliot Soloway's GoKnow trained Berrien County staff in the effective use of handheld computing devices. GoKnow also conducted 2 days of in-service training for all of the ISD's lead teachers and school technology support staff. While this was taking place, district leaders established training schedules for each of the participating school buildings, with ISD staff members individually responsible for 3-4 schools.

To enhance their efforts, Berrien County ISD also hired 10 student interns who were trained in the use of Palms, the software used on them, and trouble-shooting techniques. Each intern spends 10 hours per week assisting teachers and students in the school buildings, dealing with hardware and software problems, and leaving teachers free to teach.

State Level:

Michigan has provided state-supported professional development in the area of technology for over five years.

- **The Michigan Technology Implementation Project (MTIP)** provides statewide leadership for improving school technology implementation and integration through the coordinated efforts and expertise of many Michigan educational organizations.

- **The Michigan Teacher Network (MTN)** provides easy access to PK-12 education-related Web resources that have been carefully evaluated for quality, relevance, and effectiveness. MTN describes thousands of excellent resources that can be used with students in the classroom, with teachers for professional development, and by educators for planning and problem solving.

- **Teach to the Future!** Michigan Virtual University and MACUL (Michigan Association for Computer Users in Learning) have collaborated to offer eligible Michigan teachers the

opportunity to participate in the Intel® *Teach to the Future* program. During the free 40-hour hands-on workshop, teachers learn to integrate technology into their classrooms to measurably enhance higher-order thinking and creativity.

- **LEADing the Future.** Funded by a grant from the Bill and Melinda Gates Foundation and managed by the Michigan Virtual University, this program aims to train 80% of Michigan's superintendents and building principals to provide successful instructional, organizational and public leadership through the development of technology-related knowledge, attitudes and skills.

- **The Ameritech Technology Academy** targets high school educators to help them integrate technology into their curricula and instructional strategies. A train-the-trainer model, the program is currently training 500 building-level teams, which will then provide technology integration training to their individual school buildings.

Finally, in an effort to ensure high-quality implementation of the one-to-one computing grants, the state is funding professional development for Freedom to Learn at $1.5 million. A consortium of partner service providers will ensure that grantees are prepared to transform ubiquitous computing into 21st century learning and improved student performance.

Local Opinion: How Michigan Should Measure Success:

In Michigan, as in Maine, most schools, districts, and ISDs said that improved academic achievement was *a* consideration, but not *the most important* one. District-level educators suggest that their expectations of one-to-one are similar to those of state policymakers, but that they differ from those of federal decision-makers, who they see as too focused on quantifiable metrics. *"This disturbs me greatly,"* said one teacher.

District educators want to see more thought given to measuring intangibles like increased student engagement and the development of 21st century skills like critical thinking, problem solving, and research. Said one interviewee, "*No test can measure these gains…. The feds are missing the boat."* A teacher at Riddle Middle School went even further: "*Standardized tests are a philosophical issue that has little or nothing to do with the use of this technology."*

In terms of writing, for example, the state of Michigan still tests using paper and pencil. For students who have made strides using technology as a tool for writing, this form of evaluation may not accurately measure their gains. In essence, Michigan educators are looking for an assessment tool that mirrors the learning environment.

State Response:

Despite the fact that state leaders share local educators' concerns about assessment metrics for measuring the impact and effectiveness of ubiquitous computing, the MEAP will continue to be the primary measure in the state. The reality of budget shortfalls prevents new research and development in this area for now or in the near future.

6. What were the unintended consequences, negative and positive, of the laptop initiatives in Michigan?

The Good:

- Teacher enthusiasm and retention are on the rise
- Parents are becoming more involved in student learning
- Students are responsibly caring for the technology

> *"When that light bulb goes off, it's rejuvenating. Teachers are putting off their retirement!"*
>
> -- Teacher, Riddle Middle School

Teacher retention and enthusiasm:

Across the sites interviewed, teachers, administrators, and technology coordinators report astounding levels of enthusiasm for one-to-one from even formerly reluctant teachers. When the proper professional development (focused on both technology proficiency and integration) is coupled with administrator buy-in and sufficient levels of just-in-time technical support, teachers are free to explore the potential one-to-one offers the learning environment.

> *"Students can take the classroom home, where parents can actively participate!"*
>
> -- Director of Instructional Technology, Berrien County ISD

Parent Involvement:

Teachers and administrators across participating sites report that communication with families has improved, and that parents seem to be taking more of an interest in student learning.

Student responsibility:

Despite the thinking behind some of the opposition to one-to-one initiatives, Michigan students do not appear to be having a tough time adapting to their new learning environments. Still, most of the administrators and educators interviewed expressed surprise at the responsibility and care participating students had for the technology.

> "*Another big surprise was how easily the kids took to the technology."*
>
> -- Teacher, Sault City Schools (Eastern U.P. ISD)

The Unknown:

- Full implementation, to date, involves significantly fewer students than initially projected

In August 2003, Michigan's Governor signed into law Public Act 158, approving $39.4 million in federal dollars and $22 million in state dollars to provide wireless technology to middle school students statewide. The scope of Michigan's planned implementation would have made Freedom to Learn the largest one-to-one rollout in the nation.

Due to a severe downturn in Michigan's economy, however, the program has been scaled back significantly. In fact, all state funds were rescinded and, due to the limited response to the program by school districts, the state now expects to fund between 12,000 to 17,000 6th graders statewide (approximately 10% of all 6th graders in the state), a number far smaller than the 132,000 (some say 160,000) originally envisioned. Despite a statewide public school enrollment that is about eight times the size of Maine's, Michigan's full one-to-one program currently reaches approximately 3,000 fewer students.

It is unknown at this time whether additional districts will qualify and choose to apply for one-to-one funding through FTL. According to Bruce Montgomery, FTL program director, the state is encouraging "*every district that is interested to apply*" whether they meet federal criteria or not. "*If state budgeting changes over the coming months or other funding becomes available, we'll at least have the paperwork in and be able to consider other districts.*" In fact, Montgomery believes that the initial phases of the program alone will eventually reach 44,000 students, indeed making Michigan's program the largest in the country (see: Mike Wendland, "Scaled-down laptop plan still leads schools in the U.S." Detroit Free Press, March 1, 2004. Accessed online at: http://www.freep.com/money/tech/mwend1_20040301.html).

7. What are the next steps for Michigan?

Next Steps:

As of the writing of this report, the state of Michigan has just announced the first round of Freedom to Learn awards. Their next steps will be to launch and sustain a quality program that, in time, successfully turns its attention to the multiple purposes of the one-to-one. With limited resources, the state will soon require hard data regarding its return on investment.

Advice to Other Educators:

State level interviewees in Michigan offered the following "words of wisdom" to others contemplating one-to-one programs:

""I want Michigan to pioneer the use of technology in the classroom. Our children deserve every tool that will help them succeed at home and in the workplace. It is the right thing to do…"
Speaker of the House, Rick Johnson

"Pay attention to ubiquitous computing as a method of recruitment and retention of teachers. They, like the students, will be drawn into this high tech environment."

"Think content. The state and the nation should be investing in research and development of high-quality, high-tech digital content that takes full advantage of digital learning."

Local Level:

On the ground level in Michigan, advice to other educators was:

"Don't skimp on ongoing, continuous, and well-supported professional development."

"There needs to be buy-in from the building administrator!"

"Do the training before the technology gets there."

"This is the kind of thing that will start your heart and feed your soul."

"Do it."

"Look deeper for positive impacts…. Like a pencil, technology is just a tool!"

"I can't imagine rolling this out without wireless."

"Good leadership can make or break the project."

"This sort of initiative immediately satisfies multiple kinds of learning."

"With the laptops available all the time, teachers realized that the students could help them develop their lessons."