

# Lessons Learned from 1-to-1 Laptop Initiatives: Reflections on Critical Components

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**Abstract:** One to one computing initiatives raise questions for those considering incorporating the innovation into school-based approaches to new millennium learning. Early laptop programs entailed significant technological challenges and sometimes seemed to be more about marketing than education. Although the suitability of laptops for classroom applications has improved, the real issue continues to be not one of providing specific technologies but one of ensuring that learners and teachers can access and transform information as required. This panel will bring together educators who represent a variety of perspectives on one to one laptop initiatives, including those from Maine, Texas, and Kansas in the USA, and from Queensland and New South Wales in Australia. The panel presentations will conclude with a discussion of observations from handheld initiatives and a long-term view of 1-to-1 initiatives. These diverse views are offered to add richness to the debate over 1-to-1 computing in schools.

## Introduction

More and more jurisdictions are exploring and implementing ubiquitous learning environments. The Ubiquitous Computing Evaluation Consortium ([http://ubiqcomputing.org/ubiq\\_initiatives.html](http://ubiqcomputing.org/ubiq_initiatives.html)) identifies at least 14 large-scale learning with laptop and 16 district initiatives. Other jurisdictions are implementing handheld initiatives. MIT has announced a \$100 laptop intended to bring technology to the world's poor countries, but will be piloted in Massachusetts. Such initiatives have enormous implications for both inservice and preservice teacher education. This panel will bring together educators who represent a variety of perspectives on one to one technology initiatives, including those from Maine, Texas, and Kansas in the USA, and from Queensland and New South Wales in Australia. The panel presentations will conclude with a discussion of observations from handheld initiatives and a long-term view of 1-to-1 initiatives. These diverse views are offered to add richness to the debate over 1-to-1 computing in schools.

## Maine's Learning with Laptop Project

The Maine Learning Technology Initiative is the first statewide learning with laptop initiative. It started as the idea of former Governor Angus King. MLTI targeted every seventh and eighth grade student and teacher in the state of Maine: 241 schools, 33,000 students, and 3000 teachers are involved. The vendor provides initial training for teachers, wireless infrastructure for schools, and laptops with software. The equipment are standard 12" iBooks with

CD-ROM drives. Software includes iMovie, iPhoto, AppleWorks, web browsers, and an email client.

Maine started its formal planning in late summer of 2001. By winter of 2002, nine Exploration Sites were selected, one in each of the nine superintendent's regions throughout the state. The Exploration Sites served both as pilot sites, testing the hardware and software solution, and as demonstration sites, places for the rest of Maine's teachers to visit and see what their immediate futures looked like. The Exploration Sites were up and running by March 2002. All seventh grade teachers got their iBooks in late spring 2002, and multiple sessions of 2-day training were offered across the state. Seventh grade students got their computers in the fall of 2002. The following year, schools received enough additional machines so that every seventh and eighth grade teacher and student now has a wireless laptop. MLTI has worked hard to avoid being simply a hardware distribution program. It has worked hard to be an educational initiative focused on teaching and learning. Professional development has been a major focus of state efforts.

Since the program's inception, Maine has seen increased engagement, reduced behavior referrals, and increased community support (Muir, Knezek & Christensen, 2004). In a special project training Math teachers to use online virtual manipulatives with their students, we have seen both an increase in math achievement of students and an increase in Math teachers' understanding of the math they are teaching. Further, as a large project, we have been able to observe the differences between successful schools and those who are challenged by their laptops. We have identified two critical elements (teacher practice and leadership) and four supporting but necessary elements (professional development, technology access and support, partnerships, and funding) of successful programs (Muir 2005).

The MLTI web portal for educators is MaineLearns. <http://www.mainelearns.org/>

A variety of articles and links about MLTI can be found here. <http://www.mcmel.org/MLLS/mlti/index.html>

## **Irving ISD (TX) Laptop Program**

Irving Independent School District provides laptop computers to all of its 8,000+ high school students. The program began with the creation of the Academy High School five years ago as a unique school that emphasizes technology and careers. The program was so successful that the School Board approved implementing laptops at the other three comprehensive high schools in the district, phasing in ninth and tenth grades the second year and eleventh and twelfth grades the third year. This is the fifth year of the laptop program in the Irving school district and now we also have a vertical team involved in the Technology Immersion Pilot (TIP) Grant that includes DeZavala Middle School and Lively Elementary School. This pilot grant will allow the district to be part of a larger study to investigate the impact of one-to-one computing on student achievement.

Through the development of the district's long range plan for technology, all stakeholders were included in the planning process. A bond committee was also formed to plan for future technology needs. Through two bond propositions passed by the community, the district was able to fund the technology for this project. US Federal Government Title II, PartD funds were used to fund partial salaries of instructional technology specialists at the high schools to support this project. Extra hours were budgeted for campus technicians to work during the summer to re-image and repair laptops.

During the initial phase of the program with the Academy High School, all of their teachers had five days of training regarding the laptops. Since then, all teachers have had a least three initial days of training with follow-up provided by their campus instructional technology specialist (ITS). The district provides ongoing professional development at the campus and district level throughout the school year. Each summer, the district hosts a technology conference called "TEKSology" to show teachers how to integrate the state standards (Texas Essential Knowledge and Skills) and technology into their teaching. We have also created a learning community that we call "Job Alike" training where we bring together teachers of like content areas to share ideas and best practices in this study group format. They will be developing curriculum and lesson plans this year to share with other teachers at their respective grade levels and content areas.

The initial goal for the program was to give high school students a chance to build their technology skills before going on to college or into the work force. But the outcomes have been far more reaching than originally anticipated.

From our recent program evaluation (see [www.iittl.unt.edu/irving](http://www.iittl.unt.edu/irving)), it was noted that the program has benefited teachers tremendously as a professional development opportunity. Students and teachers have become more proficient in their technology skills as a result of the program. Teachers are changing their classroom instructional practices as a part of the initiative. Students are taking their laptops home and training other members of their family as well. We will continue to measure the impact on student achievement as a result of this program and the TIP grant vertical team with a focus on improving literacy skills.

You can find more information about the Irving ISD laptop program at our website [www.irvingisd.net/one2one](http://www.irvingisd.net/one2one) or about our national One to One Symposium at [www.irvingisd.net/symposium](http://www.irvingisd.net/symposium)

## **Cross Cultural Comparisons of One to One Laptop Initiatives**

One to one laptop initiatives raise questions for those considering incorporating the innovation into school-based approaches to new millennium learning. Questions raised are common across the educational cultures of Kansas and Australia. The impact of these initiatives on teaching and learning roles, approaches, and expectations stresses the importance of a student centered, constructivist approach to learning where engagement, ownership, authenticity of experiences, and redefining roles is predominant and exciting.

The Methodist Ladies College (MLC) in Sydney Australia is an exclusive private school catering to girls from Kindergarten to Year 12. MLC is a school of broad ranging opportunity and diversity. MLC boasts an enviable record of providing the best learning environment for girls by meeting the needs of the individual and supporting each girl's potential to make a positive contribution to our society. The school reflects the warmth and vitality of many cultures. It is representative of modern Australia, celebrating difference, valuing each person as an individual.

The school has adopted a strategy to produce an approach to learning which will maximize the growth for every student as a whole person within the MLC School community, and to provide measurable gains (growth) intellectually, creatively, socially and emotionally as well as spiritually for every MLC school student. As part of MLC's commitment to the Transforming Learning Program all girls from Year 5 onwards have their own laptop computers; fast access to the internet, and the MLC School secure intranet; airport wireless which means girls can be online, anywhere, any time; the use of internet sites and links as direct teaching resources and instant information; the provision of student and staff email for communication to teachers and other student groups; the use of the servers to collect and hand in material; specialist training in and access to high end applications such as iMovie and PhotoShop; and the MLC School public website connects students and parents to an external site for information about events and the latest news. Information technology at MLC School is supported by an Apple Macintosh Platform and MLC is an Apple Distinguished School.

Adopting the slogan "Wholeness, integrity, community, excellence, innovation." MLC is committed to being a school that acknowledges, respects and retains the best of its traditions. It sets its face firmly towards the future. Twenty-first century learners need a new learning model to help them learn about learning. This model operates from engagement and offers learners great flexibility in means. Broadly speaking, students need to be able to learn in teams, collaboratively, as a class, a section, a whole community or alone. Learners need to share learning experiences with their chronological peers and intellectual, physical, creative, emotional and spiritual peers, regardless of age. Learning experiences need to occur with their own teachers, other experts, students from other schools, other countries, on campus and off campus, in the city, in the country, interstate and overseas (even if only via computer). Students need to work within subject disciplines, across subject disciplines and on real and rich tasks, be they teacher directed, teacher supported/self-directed or totally self-directed. Engagement is being recognized as a critical factor in student achievement. So is teacher rapport and responsiveness. So is self-direction. As part of the transforming learning project MLC has adopted a series of workshops designed for the whole school community.

On the other side of the globe, Sedgwick High School in Kansas, a small rural state high school, has created a laptop project described by the director of the project in this way:

If you give a kid an iBook . . . Does it really make a difference? Do students really *want* to come to school? Do teachers teach differently?? Are students excited about learning? Does it help to instill the love of life-long learning? Does discipline go down? Do test scores and attendance go up? (Niles, 2003)

This school holds the view that its students are not the digital immigrants to the new technology world as most adults are, but the first generation of the new world. Consequently, the view in the school is that they are exploring a new frontier of educational change while preparing students for the world they will live in, not the world of the past that no longer exists. All juniors and seniors in this school rent a laptop for the entire year. Niles, the technology director of the district summarized it by saying, “We wanted to put technology in the hands of our students, 24 hours a day, seven days a week.” As a result of this project, the learning and educational culture of the school changed dramatically for the whole school community. The answer to all of the questions Niles had asked above was an emphatic “YES!” She also added that the project had “changed the way students interact with each other and with their teachers. The use of technology changed the entire culture. Learning is non-stop. The technology helps us better meet the needs of each child.”

The funds used to purchase the computers came from end of year funds after careful prioritizing. Student assistance in this program was essential and this small school district recruited student leadership, expertise, and enthusiasm to deploy and maintain the technology. A parallel project supported this endeavor. In-House Training is a vocationally funded course approved by the State of Kansas and eligible for federal funds. In-house training students are known as the SWAT Team (SWAT is an acronym that stands for Students Willing to Assist with Technology). The SWAT team unpacked, configured, tested and supported each computer during the deployment – a full school community event.

Both of these projects shared similar returns in terms of growth in student learning and enthusiasm. Each originated in a different way, was supported in different ways, was established, maintained and configured in different ways, even became integral to different school cultures, pedagogies, and beliefs. Each was aimed however, at a very clear view of the future that was desired for their school populations and moved them steadily towards achieving that future.

## **A Long Term View of One to One**

Eight years ago I wrote a review in which I questioned what I described as the “laptop orthodoxy” (Albion, 1999), by which I meant the prevailing climate of enthusiasm for laptop programs, including predictions that every student having a laptop computer would be the norm in the near future. In my view, laptop programs in schools were being promoted as an answer but many of those promoting them appeared not to be asking questions so much as following a trend.

Studies at that time were claiming benefits for laptop programs that seemed very similar to those reported previously for programs using desktop computers at ratios considerably less generous than one-to-one (Dwyer, 1994) but without demonstrating benefits specific to the use of laptops. Laptop technology at the time presented significant challenges for classroom use, including relative cost for equivalent capability, limited battery life, connectivity to networks, maintenance requirements, and ergonomic issues related to the weight to be carried by students and posture during use. When these challenges were coupled with limited reported use (typically no more than 25% of the school day) and rapidly increasing home ownership of computers, it was difficult to find convincing reasons for preferring laptops over desktop computers for many educational applications.

There was clear evidence of educational benefits associated with the use of computers in laptop school projects but relatively little of it demonstrated a clear advantage for laptops over desktops. Much of the most enthusiastic promotion of laptop programs could be interpreted as marketing, both from suppliers of equipment and from schools looking to build their image as being at the leading edge of education. In Australia, most of the early laptop programs were in private schools, which attract students with parents prepared to pay for the benefits of “better” education. Laptop programs initially offered a competitive advantage in attracting students. Occasionally the claims made defied rational explanation, as in the case of one school that offered an optional laptop program with the claim that students who did not participate would not thereby be disadvantaged. They seemed not to notice that their claim implied that there was no educational benefit to the laptop program.

Since that time, the relative cost of laptops has decreased at the same time as their capability has increased, battery life has been extended to more easily cover a typical school day, and wireless networking has become inexpensive

and fast. Most of the key challenges associated with the hardware have been overcome, though maintenance and ergonomics may still present issues. New laptop programs continue to emerge in schools and there is an increased focus on their connection to pedagogy (Rablin & Mack, 2005) rather than marketing of the hardware or school. At the same time there is increasing interest in the educational potential of smaller mobile devices including handheld computers (Fillmore et al., 2005) and mobile phones (Hartnell-Young, 2005), and in the potential of web-based applications (Bull & Ferster, 2005). In the view of some, laptops “can be thought of as a transition between the desktop and smaller devices” (Hartnell-Young, 2005, p. 18).

My 1999 review concluded that “the educational need is not to have a computer in the hands of every student but for students to be able to access appropriate processing power, software and data as required” (Albion, 1999, p. 9). That general position, that what matters is not possession of specific hardware but that learners and teachers are able to access and transform information as required, remains valid in 2006. “It’s not about laptops, it’s about empowerment!” (Owen et al., 2005, p. 12). Realistically, laptops were, and are, likely to form part of any comprehensive approach to computing in schools because they offer combinations of mobility and capability that are required for particular applications. There are other applications that do not require mobility or extensive computing capability and can be accomplished as effectively and at lower cost using desktops, handhelds or web applications.

Weiser (1991) used “ubiquitous computing” to describe a future in which computers would be as common, and hence “invisible,” as electric motors with a typical room containing multiple networked computing devices. Instead of a personal computer moving with the user, the user would move within a computing environment with multiple access modes. The combination of widely available desktop computers, mobile computing devices, wireless networking and Web 2.0 applications is rapidly making this the reality (Bull & Ferster, 2005). Rather than one-to-one computing in which each user carries a single all-purpose computing device, increasingly learners and teachers will use different devices as appropriate to access and transform information which is stored on a network that is available to them regardless of whether they are in class, at home or elsewhere.

Although there have been many developments in both the technology and pedagogy of one-to-one computing programs, I remain skeptical about claims that they are a necessary and inevitable development for all classrooms. The underlying issue remains one of ensuring that learners and teachers have the technology they require to access and transform information. One-to-one computing will form part of the solution but it will seldom, if ever, provide a complete solution.

## **Observations on Teachers’ Adoption of 1:1 Handhelds**

ACOT concluded that it took 3-5 years for teachers to successfully adopt computing technology (desktops and laptops) in their classrooms. The findings from some 1:1 laptop implementations underway for 1-2 years bear out that statistic: little or no impact is yet being observed on student achievement. We (Norris & Soloway) are seeing a very different picture emerge from the 1:1 handheld implementations: teachers are taking only 1.5 -2.5 years to become comfortable and effective in using 1:1 handhelds in their classrooms. While that observation is not based on statistical evidence, we are beginning to see statistical evidence of improved student achievement when 1:1 handhelds are used in those classrooms where teachers have used the handhelds a relatively short amount of time.

We suggest that there are several reasons why teachers find it easier to adopt handhelds:

- Teachers can use their existing curriculum: In the past, technologists have oftentimes said to teachers: “In order to use computer technology, you will have to change what you teach and how you teach.” In contrast, we argue that teachers can start using handhelds with their existing curriculum, thereby making the transition to 1:1 handhelds much easier. For example, initially we see teachers using handhelds as they would paper and pencil. However, in short order we see the teachers using the handhelds as ePaper and ePencil – taking advantage of the dynamic and multiple media affordances of the handhelds.
- Handhelds are task-appropriate: How much of Microsoft Word does a sixth grade or even a twelfth grade student need to use to write a report on the water cycle, say? With current desktop and laptop computers, we are swimming in complexity, overwhelmed by excess functionality – all of which can and will go wrong causing all

manner of headaches in the classroom. In contrast, software running on handhelds tends to be appropriate to the educational tasks that students must undertake. Simple, simple, simple is the design guideline for good handheld-based educational software. As such, the learning curve for using handhelds is significantly reduced, and the ease of use of handheld-based software enables early successes in the classroom and thus encourages teachers to explore how to further take advantage of the handhelds.

- Teachers see success from convergent learning: Teachers have long known that if children can employ multiple, dynamic media in expressing themselves, learning is facilitated. However, paper and pencil technology provides limited multiple, dynamic media support, while desktop and laptop technology has a steep learning curve and overwhelming alternatives. Handhelds, with task-appropriate software, enable children to engage in convergent learning – where the children use multiple, linked representations – employing multiple, dynamic media – to develop a deep understanding of the content under expression.

Teachers today are pulled in myriad ways. Using technology cannot be yet another burden – if technology is a burden, teachers simply won't allow it in their classrooms. Handhelds, when suitably equipped with task-appropriate software, are easier to learn to use and easier to use, than their bigger cousins. And, teachers are seeing, early on, students having success in using handhelds in learning. Quite candidly, our observations are informal. However, they do provide a prima facie case that handhelds are classroom friendly and thus 1:1 handhelds warrant further, more in-depth study.

## Conclusion

These various perspectives on 1-to-1 computing should encourage lively debate on what schools can and should do. What works best? What are the critical components to an initiative? Should schools select laptops, handhelds, or other devices? How do different initiatives compare and contrast? How do you balance the hardware and software needs with the pedagogical needs? There are no quick answers to these questions, but gathering the diverse experiences of different initiatives should head educators in the right direction.

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