One-to-One Computing Evaluation Consortium

POLICY BRIEF

Starting School Laptop Programs: Lessons Learned[1]

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A growing number of states are purchasing laptop computers for all students and teachers. Maine has been a pioneer, providing 34,000 computers and wireless Internet access to all students in grades 7 and 8. About a third of Maine's high schools also provided laptops to their students in the 2004–2005 school year. Indiana supported an early one-to-one program. Michigan, New Hampshire, New Mexico, Texas, and Vermont are also experimenting with state-supported laptop initiatives, as are many individual school districts throughout the United States, including Henrico County, Virginia, the largest district-funded laptop program in the United States, with more than 23,000 computers.

The former Governor of Maine, Angus King, said about the laptop program he initiated:

"For more than 100 years, Maine has always been in the bottom third of states—in prosperity, income, education, and opportunity for our kids. In my 30 years of working on Maine economic issues, no idea has had as much potential for leapfrogging the other states and putting Maine in a position of national leadership as this one—giving our students portable, Internet-ready computers as a basic tool for learning."

Policymakers' goals for laptop programs include increasing economic competitiveness, reducing the inequity in access to computers and information between students from wealthy and poor families, raising student achievement through specific interventions (such as improving students' understanding of algebra through the use of education software), and transforming the quality of instruction.

[1] This brief draws especially on two sources: *Lessons learned about providing laptops to all students*, by Alejandre Bonifaz and Andrew Zucker, and *Research: What it says about 1-to-1 learning*, by William Penuel. See References at the end for full citations.

The limited number of rigorous research studies on one-to-one laptop programs report positive findings. This fact, backed by the generally positive evaluations of such programs as those in Maine and Henrico County, suggests that one-to-one computing is well worth considering. Fortunately, there *is* a lot of information available to help policymakers who are starting a laptop program to avoid potential pitfalls.

Most importantly, no one component is sufficient for a successful program; instead, a comprehensive or systemic approach is needed. Bette Manchester, who oversees the Maine Learning Technology Initiative, has said, "There needs to be a leadership team that looks at things through three different lenses: the lens of curriculum and content; the lens of the culture of the building; and the lens of technical needs."

The following lessons, drawn from articles and reports about current and past programs, are intended to increase information sharing across laptop programs and help leaders and stakeholders build on existing knowledge.

PLANNING

Planning may take a year or more, but is an essential first step.

Align the laptop program with key goals

What are the school system's primary goals and what will be needed to achieve them? For example, which goals for students are most important—increased motivation, better writing skills, test preparation, technology proficiency, broader access to Advanced Placement courses, more critical thinking and reasoning, or any of many others? To meet the goals, it may be important to license appropriate software or websites, provide focused teacher professional development, select new curricula, or develop new assessments. For example, in response to needs identified by the state department of education, Maine chose to implement a professional development program to help rural middle schools improve the teaching of mathematics using the laptops.

Align technology policies with the goals. For instance, if students are expected to do homework using the Internet, or enroll in online courses outside school hours, then it may be important to allow students to take computers home and also to help some families by offering them a low-cost way of connecting to the Internet.

Build strong leadership at all levels

Strong leadership is needed from the classroom and the school levels to the district and the state. Technical needs alone ought not drive the program; instead, educational goals and purposes must be at the forefront. According to preliminary results of an evaluation, "the ongoing success of one-to-one in Indiana is dependent upon the support and involvement of building-level leaders." Similar findings apply in other programs.

Think about funding for the long term

Teachers' and administrators' knowledge, attitudes, and skills are critical to the success of a laptop program. Therefore, make a long-term commitment to ongoing training, as well as to technical support. Funds should be set aside in the operating budget. Successful programs use multiple sources of funding, including appropriate state and federal programs.

Develop solid partnerships inside and outside the school system

Partnerships establish a solid foundation for the project. Take into account stakeholders' level of interest in the one-to-one initiative and demonstrate success early. Texas, for example, began its program in a small number of pilot sites. Similarly, in

Maine, former Governor King said, "[it] was critical because it gave us a test site that we could point to." Also investigate business partnerships and collaborations with evaluators at an early stage.

Plan logistical details carefully

Laptop initiatives are often delayed or disrupted by small details rather than by major problems. Computers need to be protected, arrangements need to be made for charging batteries, systems must be in place for distributing the laptops and for daily management, and Internet filters and other control mechanisms should be in place. The director of the Buddy project in Indiana, Nancy Miller, said, "Think long-term. Ensure impact by ensuring that the mundane aspects of the project (maintenance, upgrades, insurance, replacement of equipment) are planned and supported."

TRAINING & PROFESSIONAL DEVELOPMENT

Training and professional development of staff are fundamental components of a successful laptop program and should be part of the program from the start.

Provide training and professional development mainly on curriculum integration, not only on technical skills

Teachers participating in one-to-one projects agree that in order to make the transition to ubiquitous computing, they need not only help developing new technical skills, but also assistance integrating technology into the curriculum. Effective training builds on existing knowledge, attitudes, and skills. Knowing at an early stage the different technical proficiencies that teachers and administrators have, and their attitudes toward technology integration, can help in developing a professional development plan that is sustained, rigorous, and effective in

addressing their needs. At the same time, technology coordinators need staff development about school change processes that support the key goals of the laptop program.

Use a variety of training and professional development formats, and understand that teachers and administrators value both formal professional development events, such as workshops during the school year or summer, and informal opportunities to learn from their colleagues. It may be useful to partner with local universities, education organizations, or other institutions. "The key is to plan as best you can but to remain flexible," the past superintendent of Henrico County, Mark Edwards, points out.

Train parents on basic technical skills and inform them about the code of conduct and rules involved

The value of parental involvement cannot be overemphasized. From the outset, Maine expected parents to attend a 90-minute training before the laptops were allowed to go home. Similarly, in Henrico County, parents of every middle school student are required to attend a 90-minute training session before picking up the computers. These sessions provide technical information about the laptop computers as well as an explanation of the code of conduct established for their use and care. Training sessions should be accessible to parents; Henrico offered the training several times throughout the day, accommodating parents' schedules.

HARDWARE & SOFTWARE

The effective use of laptops depends on the availability of suitable digital resources, as well as reliable hardware and a robust network.

Provide needed digital content and tools

In order for teachers to integrate technology in the curriculum, and for students to use technology, they need access to the necessary software, online databases, and proprietary websites. Schools and districts should not only take care of licensing procedures to make the necessary tools available to teachers but should also provide sufficient guidance or training on using the tools. Many laptop programs also provide opportunities for their teachers, often working in teams, to develop lesson plans, websites, online courses, electronic documents, or other curriculum resources.

Prior to purchasing laptops, determine the key productivity tools needed and establish a standard software package to be used for word processing, spreadsheets, presentations, and so on. Standardization will reduce compatibility problems, training issues, and costs. Determine whether email and chat features will be available to students and, if so, how they will be managed.

Consider purchasing display devices (such as projectors), because students and teachers will sometimes want to be able to look at a single screen as a group. In Henrico County, for example, each classroom has a combined TV and computer monitor. Alternatively, classrooms may share the devices.

Maintain the network infrastructure

Experience shows that a critical factor for the effective implementation of one-to-one computing is the existence and maintenance of a high-quality network infrastructure. Schools may require network infrastructure modifications, which can be costly and time-consuming. If these issues are addressed at the onset, significant time and trouble may be saved later. Setting up the necessary infrastructure is not sufficient; it is also necessary to maintain it. Good technical support staff is critical.

Make technology support available onsite and also offsite, as needed

Teachers across programs often mention the lack of sufficient onsite technical support. Some schools contract one or more full-time onsite technical assistants. Several sites use student technology support teams, which consist of technology-savvy students who help teachers and classmates with troubleshooting and technical questions during the school day. Developing clear procedures for shipping and repairing laptops offsite, when needed, as well as maintaining a strong partnership with offsite institutions can help make this process more efficient.

MANAGING CHANGE

Allow sufficient time for change and make it gradual

Stakeholders need time not only to learn about and become comfortable with new technology, but also to understand the change process and its implications for their daily activities. In Henrico County, for example, the middle school teachers received their laptops a full year before the students, and that time provided the teachers with a high degree of confidence in their ability to use the computers.

Technology integration will be more successful when students are given sufficient time beforehand to become familiar with basic computer skills, like keyboarding.

Expect change to be gradual. For example, students at different grade levels often receive laptops in different years. Over the long term, as computers are used more routinely, changes are likely to take place not only in instruction but also in assessment systems (e.g., online testing), instructional materials (e.g., closer ties between textbooks and digital materials, including software),

management systems (including data-driven decision-making), and communications with parents (e.g., the use of password-protected websites where parents can view their children's grades and assignments).

Provide models to teachers

Teaching with laptops requires new skills. Through professional development, model lessons, coaching, videos, and other approaches, teachers need to gain a vision of ways for students to learn with laptops.

Foster and maintain stakeholder participation and ongoing communication

When all stakeholders (teachers, administrators, students, parents, technicians, local media, etc.) are well informed about the project and collaborate with one another, emerging problems are more easily identified and can be addressed at an early stage. Use various approaches to reach out to the broad community. Newsletters, community gatherings, formal/informal presentations, parent nights, and consultations with community leaders can all be helpful. Don't forget the local newspaper or other media.

Indiana organizes events where students act as mentors to parents, siblings, and the broader community. Other laptop programs also involve students in various ways.

MONITORING & EVALUATION

To meet the challenges of implementing a laptop program, to learn more about its impacts, and to inform ongoing debates about the value of these initiatives, ongoing monitoring and evaluation are needed.

Make monitoring ongoing

Some challenges may be foreseen and addressed during the planning stage, while others emerge during implementation.

Ongoing monitoring helps identify obstacles at an early stage; for example, Henrico County found it helpful to use focus groups of teachers and students on a regular basis to identify and systematically address unforeseen problems that occurred during implementation of their one-to-one program.

Conduct research or evaluation studies

Because laptop programs are new (e.g., Maine's 7th graders received their laptops in 2002), and technologies are changing, there is still much to be learned. Some useful evaluative studies of laptop initiatives have been conducted (see http://ubiqcomputing.org, and the references in this document, for more information). However, there is still a paucity of information about impacts on student learning in many subject areas, cost issues, and other important topics.

An article by the author (Zucker, 2004) provides an evaluation framework and an agenda for studying one-to-one programs. Some needed studies are inexpensive and could be done in-house. In other cases, external grants from federal, state, or private sources may be available for research.

Authors of a book about evaluating educational technology in schools (Means & Haertel, 2004) suggest that there are a small number of important evaluation principles that will help guide future work:

- Look for critical influences at multiple levels of the education system: There are many influences on teachers' and students' uses of technology. Study those influences that are most important in the local context (state or district policies, school leadership, demographics of schools, teachers' training and expertise, etc.). Don't try to do it all.

- Focus on the priorities for instruction, and measure those: If student achievement is being studied, focus on areas that are high priorities in the laptop program. Even then, the evaluation field is likely to require the development of more high-quality assessments of student learning—for example, to measure students' higher order thinking, problem solving, and technology proficiency.

- Look for ways to evaluate the long-term costs and benefits of the technology infrastructure: Both costs and benefits are difficult to quantify, but understanding them is important. Little has been written about the costs of laptop programs, and about the relationship of those costs to the benefits.

- Let the research question drive the choice of method: There are too many interesting questions about laptop programs to study them all. Depending on the research questions, surveys, case studies, experiments, or other methods may be appropriate. No one methodology is best for answering all questions.

CONCLUSIONS

As computers and wireless networks become more robust, seamless, and affordable each year, more states and districts are providing all students with a computing device. These programs are complex and challenging. States and districts that are beginning to implement one-to-one computing could benefit from the many lessons that others have learned through experience. Among the most important of those lessons is to focus on the desired goals. According to Bette Manchester, the laptop initiative in Maine "is not about the technology; it is about the students' learning and about capacity building in the schools."

This review of lessons learned about laptop programs shows that they fall into five key areas. Policymakers should pay careful attention to planning, training and professional development, hardware and software, managing change, and program monitoring and evaluation. Addressing these issues from the outset will help schools achieve the laptop program's goals while minimizing unexpected problems.

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