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Is a Laptop Initiative in Your Future?

by Howard Pitler, Kathleen Flynn, and Barbara Gaddy

Many of us have relatives who immigrated to this country. These immigrants have worked hard to learn and adopt the language, customs, and attitudes of their new country. Still, no matter how hard they have tried to learn and acclimate, they still retain an accent, no matter how slight, from the culture of their childhood. So it is with technology. Most adults are immigrants to the digital world who work hard to learn, understand, and use the new technologies. As digital immigrants (Prensky, 2001), we try to program our camera phones, learn the newest computer operating systems, and set the clocks on our VCRs. Our goal is to master the skills necessary to successfully use technology as a tool in our lives. Our skill-based lens on technology leads us to view technology as a tool for learning.

Students, particularly younger students, are digital natives (Prensky, 2001). From birth, and for some even before birth, these students have lived in a digital world. Many in this generation will not own a telephone that is connected to a wall by a wire. They do not

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know what a record or even a cassette tape is; instead, they carry an entire music collection in an MP3 player in their pocket. Many are connected to the Internet 24 hours, 7 days a week. Digital natives expect their world of information, music, and personal contacts to be

with them at all times, whether at school, at home, or in the park. They do not see these technologies as mere tools for learning but, rather, as basic elements of their environment. This is a paradigm that is entirely different from that of the digital immigrant's tool-based view. Education leaders and policymakers must consider this growing paradigm difference carefully as they plan for the future.

How does this different paradigm affect schools and schooling? One example is certainly the rise in one-to-one computing, an environment in which all students and teachers have full-time use of a wireless computer, both in school and at home. While some might view one-to-one initiatives as a blip in the evolution of technology and even call into question the sanity of those schools and states that invest huge sums of capital, both human and monetary, in such ideas, others look at the mounting research and see an opportunity to reshape the very nature of instruction and learning.

The Impact on Student Achievement

Although one-to-one computing sounds like a good idea, what is the evidence that providing a computer for every child influences learning? One program worth tracking is Maine's Learning Technology Initiative (MLTI), which provides each student and teacher in grades 7–12 with a laptop and wireless network access. Professional development and technical assistance also are available for teachers. A study of the program's effectiveness found "credible evidence that MLTI as a total program may be effective in raising test scores...and is worthy of further study" (Muir, Knezek, & Christensen, 2004, p. 1). Silvernail and Lane (2004) surveyed Maine ninth-grade students who had used laptops in seventh and eighth grade but no longer had school-provided laptops in ninth grade. Results of the study indicated that many ninth graders felt that "the quantity and quality of their school work had declined once they no longer had laptops" (p. 26).

Another state initiative providing students with greater access to computers is Enhancing Missouri's Instructional Networked Teaching Strategies (eMINTS). Initiated in Missouri and expanded nationwide in early 2004, this large-scale endeavor is intended to support educators "as they integrate multimedia technology into inquiry-based, student-centered, interdisciplinary collaborative teaching practices that result in improved student performance, increased parent involvement and enriched instructional effectiveness" (eMINTS, 2004b). Among other resources, teachers in eMINTS classes are provided with a computer for every two students and high-speed Internet access, along with extensive professional development and ongoing support in integrating multimedia technology into teaching practice. A number of research studies reveal positive results (see www.emints.org/evaluation). A study for the 2002–2003 school year, for example, found that participating eMINTS students earned, on average, higher Missouri Assessment Program scores in mathematics and social studies than students in comparison groups (eMINTS National Center, 2004a).

One-to-one initiatives also are underway at the district level. In Henrico County, Virginia, for example, the district began a one-to-one laptop initiative in 2001. At that time, 78 percent of the district's schools were fully state accredited, meaning that at least 70 percent of students had passed the Virginia Standards of Learning test. By spring 2003, every regular school in the district was fully accredited.

In a Canadian district-wide initiative launched in 2002 in British Columbia's School District 60 (Peace River North), sixth- and seventh-grade students were provided access to laptops in order to improve academic achievement, particularly in written expression. The initiative, dubbed the Wireless Writing Project, involved one-to-one wireless technology access for students, along with teacher professional development and systematic monitoring of program impacts. A number of positive results have been documented. For example, a 2002–2003 study involving a pre-post writing assessment found that the percentage of students who produced writing samples that met or exceeded writing performance standards for their grade rose from 70 percent in fall 2002 to 92 percent the following spring (Jeroski, 2003).

Other Benefits

Some preliminary data suggest that one-to-one programs are positively influencing students' learning, a leading goal of the states and districts that have implemented or are implementing ubiquitous computing. Although policymakers, education leaders, and teachers alike are committed to improving student achievement, there are other motivations for embedding technology in the education process.

For states that are struggling economically, one-to-one computing programs are being viewed as a way to restore and maintain economic viability. In Michigan, for example, policymakers see ubiquitous computing as a strategy for diversifying the state's industries in a tight economy (Lemke & Martin, 2004a). Similarly, Maine's governor has promoted the Maine Learning Technology Initiative as one way to help ensure the state's economic viability (Lemke & Martin, 2003). Providing "digital equity" is another motivation for implementing state and district one-to-one computing programs. These programs can level the playing field for students by providing all students with access to the technological equipment they must know how to use in today's workplace.

Policymakers and educators also should take note of the changes in the learning environment that can be facilitated by one-to-one initiatives. In the study of British Columbia's School District 60 Wireless Writing Project, for example, Jeroski (2003) observed that teachers often became facilitators, rather than directors, of students' learning and that students took on increased responsibility for their own learning. Positive impacts also were found in terms of teachers' instructional practices and students' attitudes, motivation, work habits, and engagement in learning.

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Improvements in instructional practice and the overall environment of schooling have been found to be associated with Maine's laptop initiative. In a survey of Maine middle school teachers (Silvernail & Lane, 2004), over 70 percent agreed or strongly agreed that they were better able to create instructional materials that met the state's standards. Over 85 percent of teachers agreed or strongly agreed that the one-to-one initiative had helped them "access more up-to-date information" and "explore content in greater depth" with students (p. 14). Similarly, over 70 percent of students surveyed agreed or strongly agreed that laptops had made school more interesting, helped them complete their work more quickly, and improved the quality of their work.

John Lunt (2004), technology coordinator for Maine's Freeport Middle School, notes that a number of benefits have ensued from the school's wireless initiative, which built on the faculty's already strong team approach to teaching. Increased collaboration, lower absenteeism, and renewed excitement for learning are among the pay-offs of the initiative, which, Lunt says, has led to a "significant transformation" of the teaching and learning process (p. 19).

Professional Development: A Critical Component

The need for professional development related to new technologies is well documented. What is becoming increasingly clear is the need for a specific kind of professional development. It is imperative to change teachers' practices. Therefore, skills training, although important, can no longer be the sole focus of learning opportunities for teachers.

As a requirement of the Missouri-based eMINTS program, for example, teachers participate in a structured two-year professional development program involving training sessions as well as mentoring and classroom visits by instructional specialists. The focus of this comprehensive staff development effort goes beyond skills training. Teachers learn new teaching strategies using multimedia and learn how to "optimize their local curriculum through inquiry-based teaching practices" that are aligned with academic standards (eMINTS, 2004b).

The EDC Center for Professional Development evaluated the eMINTS professional development training and its impact on student achievement over a two-year period. A report of the study's findings (Kleiman, 2004) notes:

The results are very clear: Students of eMINTS teachers who regularly applied the eMINTS instructional practices scored higher than students with teachers who do not apply these practices...the recommended practices of the eMINTS program do have significant impact on student learning when they are implemented by the teachers. (p. 6)

The importance of professional development also is well recognized in Virginia's Henrico County Public Schools. Mark Edwards, former superintendent of schools, saw professional development as crucial to the success of the district's one-to-one computing initiative: "At the heart of our laptop program is a firm commitment to teacher training. Embracing the concept of a learning community means giving teachers the skills and tools they need to be effective" (Laptops for Learning, 2004, p. 8). Technology staff development in the district is offered in a wide variety of ways, including curriculum writing workshops, site-based institutes, training CDs and videotapes, mentors, and full-time technical support.

What can we learn from these initiatives? In both cases, technology is a catalyst for change, professional development is applied in a long-term and collaborative manner, and the goal is to change the learning environment itself. This mirrors the lens of the digital native — creating an environment for learning — rather than the digital immigrant's view of technology as a tool for learning.

Funding One-to-One Initiatives

One-to-one computing does not come cheaply. In fact, it requires a significant financial investment, one that policymakers often are reluctant to make. State budget shortfalls are widespread, and education dollars are already stretched tight as states struggle to comply with the requirements of the No Child Left Behind Act. However, as states and districts see the

need for students to acquire the skills necessary for a 21st century workplace, they increasingly are seeking the means to fund one-to-one programs.

Maine's governor, for example, proposed using a one-time \$50-million-dollar budget surplus (derived from a tobacco lawsuit settlement) to establish an endowment that would fund an ongoing one-to-one computing program. Despite some opposition, the positive results of the program have won over early detractors. In fact, "efforts to cut it in the face of two consecutive tight budget years were turned back handily" (Public Policy Institute of New York State, 2003, p. 7). In addition, the program's success has attracted additional dollars from outside sources.

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Virginia's Henrico County public school system has shown that a one-to-one computing program can be successfully established even without a budget windfall. Laptops were provided to 28,000 students,

and their teachers, in eight high schools and eleven middle schools through the district's Technology and Learning Initiative. The district has designated between four to five percent of its budget to the program over 10 years (Lemke & Martin, 2004b). The county negotiated a low rate for home Internet access, and parents pay a low annual insurance fee to cover loss, theft, and damage.

Other districts have found financial solutions through state and federal grant programs. For example, dozens of districts have received funding from the U.S. Department of Education's Technology Innovation Challenge Grants (see <http://www.ed.gov>).

Michigan policymakers, impressed by the Maine and Henrico County programs, sought to implement a statewide one-to-one program. In 2003, the governor approved the expenditure of more than \$39 million in federal and state funding to provide wireless technology for middle school students. These plans had to be curtailed, however, due to a downturn in the state's economy. Instead, the state will provide laptop computers to about 10 percent of its sixth graders (Lemke & Martin, 2004a).

While funding is a major barrier in the minds of many policymakers, a survey of key decision makers in K–12 public schools released by the Consortium for School Networking (2004) stresses the importance of "visionary leadership":

This is a window of opportunity for schools. Professional development is seen as the key to transforming teaching and learning. . . as well as to using the data captured by technology to make better educational decisions. The good news is that school budgets may not be the biggest barrier to implementing comprehensive professional development. Instead, visionary leadership and community and parental support . . . seem to drive change in the most technology-intensive schools. All schools can use the lessons learned from high-tech districts to build public support and participation in technology decision-making. (p. 2)

In light of these and other survey results, the report recommends that schools “move from automating administrative practices to transforming teaching and learning, invest in technology leadership, create new professional development initiatives, [and] recruit the active support of parents and the community” (p. 2).

The Promise of One-to-One Computing

One-to-one laptop initiatives are approaching the “tipping point” — the point where the exception becomes the rule and a new technology becomes commonplace. Research is beginning to yield empirical evidence that such initiatives are improving student achievement. Policymakers and school leaders should consider evaluating ways to fund one-to-one laptop initiatives in their schools as part of their plans for the future. While some will look through the lens of the digital immigrant and wonder, How can we afford this?, the digital native will come along and wonder, How could they not have funded this?

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