Education Commission of the States

The Progress of Education Reform 2006

Technology in Education

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What's Inside

- The impact of one-to-one computing on teaching and learning
- Lessons learned from large-scale student-laptop programs
- Just over the horizon, "digital learning spaces"

States, Districts Beginning to Tap the Potential of Technology-Enhanced Learning

A small but growing number of states – and dozens of school districts across the nation – are supporting programs that provide laptop computers and wireless Internet access to all students and teachers in particular grades or particular schools. Such initiatives aim to enhance educational achievement and opportunity by:

- Transforming classrooms into more engaging, collaborative and productive learning environments in which instruction can be customized to students' specific needs, interests and learning styles
- Improving students' preparation for living, working and learning in a rapidly changing, information-driven world
- Reducing the "digital divide" between students who have access to technology at home and those who don't.

In launching Maine's pioneering student laptop program in 2002, then-Governor Angus King said: "In my 30 years of working on economic development issues, no idea has as much potential for leapfrogging 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."

In Maine, all 7th and 8th graders – and a growing proportion of high school students – now have laptops and wireless Internet access. "One-to-one computing" initiatives (in which each student has his/her own personal computer in the classroom) also are under way or being piloted in Connecticut, the District of Columbia, Indiana, Massachusetts, Michigan, New Hampshire, New Mexico, Texas and Vermont – as well as districts ranging from Broward County in Florida, the nation's sixth-largest school system, to tiny Denali Borough School District in Alaska.

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For policymakers, educators and others interested in learning more about the one-to-one computing movement, this issue of *The Progress of Education Reform* spotlights three particularly useful resources:

- A detailed review of the challenges faced by states and districts implementing laptop programs, and of lessons learned to date in five critical areas: planning, training and professional development, hardware and software, managing change, and program monitoring and evaluation
- A recently published study of the use and impact of one-to-one computing in the Henrico County School District in Virginia, where all students and teachers in grades 6-12 have laptops with wireless Internet connectivity
- A report by the Consortium for School Networking examining how new and emerging technologies could reshape teaching and learning in K-12 schools over the next five years.

Lessons Learned About Providing Laptops for All Students

(Northeast and the Islands Regional Technology in Education Consortium, 2004, http://www.neirtec.org/laptop)

Drawing on various sources – program evaluations, articles, reports and interviews with policymakers – this 14-page paper summarizes the lessons learned to date from state- and district-supported laptop initiatives.

Authors Andrew Zucker and Alejandra Bonifaz begin with a brief review of the issues, challenges and setbacks that states and districts implementing laptop programs have grappled with, ranging from unexpected costs and technical difficulties to controversy over students being allowed to take laptops home.

The success of such initiatives, the authors conclude, hinges on policymakers giving close, sustained attention to – and making strategic investments in – five critical areas: planning, training and professional development, hardware and software, managing change, and program monitoring and evaluation.

The paper provides a look at various policy options, funding approaches and implementation strategies in each of the five areas, as well as links to additional sources of information.

A Study of One-to-One Computer Use in Mathematics and Science Instruction at the Secondary Level in Henrico County Public Schools

(SRI International and Education Development Center Inc., February 2005, http://ubiqcomputing.org/FinalReport.pdf)

In 2002, Henrico County Public Schools, in suburban Richmond, Virginia, became the largest district in the nation to implement one-to-one computing in its middle and high schools. In addition to distributing laptop computers to more than 25,000 students and teachers, the district established wireless local area networks, invested in new hardware and software, and provided a range of training and professional development opportunities for teachers.

This National Science Foundation study – which involved extensive classroom observation, interviews and surveys, case studies and data analysis – focused on the overall impact of the laptop initiative on students, teachers and families, and its particular impact on math and science instruction in the district's high schools.

The study found computers being used extensively by Henrico County students and teachers – in various settings and for multiple purposes, and in all subjects, ranging from physical education to foreign languages. Zeroing in on high school science and math classrooms, the study team found students routinely using computers for note-taking, research, homework assignments, test preparation, and for storing, organizing and retrieving information. Taking advantage of a variety of software packages and online resources, science students could participate in a "virtual dissection," track a hurricane or an asteroid, choose from among hundreds of "virtiual field trips" and WebQuests (online learning tools), design and analyze experiments, and create Web sites, iMovies and slide shows. Math students were making regular use of graphing calculators, spreadsheets, drawing programs and a variety of analytical tools and online resources.

Students, teachers, administrators and parents alike, the study found, saw one-to-one computing as having "positively influenced teaching and learning," including:

- Improvements in teacher productivity, student-teacher interaction and communication between parents and teachers
- Easier access by teachers and students to up-to-date instructional content
- A more dynamic and engaging classroom environment. Students reported feeling better organized and motivated, more technologically proficient and increasingly adept at self-directed learning.

The report concludes with a look at the factors that have contributed to the initiative's success – chief among them, the strong and steady support of students, families and teachers – and those that have served to impede progress. It also identifies emerging issues and challenges, such as managing the transition from textbooks to electronic learning, and developing better tools for measuring the impact of one-to-computing on student achievement.

Other Resources

Nine states are in the final year of a federally funded $15 million research project designed to identify, develop and share better ways of assessing the impact of technology on student achievement. States are using their grants, for example, to evaluate and improve the effectiveness of teacher technology training and professional development (Iowa), middle school laptop computer programs (Texas), virtual foreign language courses (West Virginia) and project-based learning (Arkansas). All nine states – the others are Maine, North Carolina, Pennsylvania, Tennessee and Wisconsin – are working with partners, including universities, school districts and research firms.

Additional information on the research project is available at http://www.ed.gov/news/pressreleases/2003/11/11102003.html.

The following Web sites are useful sources of information about technology-mediated learning, one-to-one computing in schools and the progress of state- and district-supported laptop initiatives.

Ubiquitous Computing Evaluation Initiative
http://ubiqcomputing.org/

Learning With Laptops
http://www.learningwithlaptops.org/

Learning Point Associates
http://www.learningpt.org/page.php?pageID=81

Center for Applied Research in Educational Technology
http://caret.iste.org/

Digital Learning Spaces 2010

(Consortium for School Networking, September 2005. An executive summary is available at http://www.cosn.org/resources/emerging_technologies/learningspaces.cfm, along with information on ordering a copy of the full report.)

New and emerging technologies have the potential to transform public education on a grand scale within five years, according to this report by the Consortium for School Networking. Just over the horizon, it says, are "technology-intensive learning environments" supported by:

- Broadband, wide-arc networks capable of handling data, voice and video traffic
- Local area networks with wired and wireless connectivity at every site
- Extensive use of laptops, portable devices, digital accessories, software and Web services that facilitate both customized and shared learning.

What will emerge, the report says, is a new model of education in which students do a substantial amount of work outside the school building – online, in the "outdoor classroom," and in peer-to-peer or small-group networks – and can be grouped according to their areas of interest, regardless of their age, grade level or geographic location, to pursue topics that cut across disciplines. It's also a model that reshapes and expands the role of the teacher – from being the sole source of information to being a guide, mentor and coach in the learning process.

The report addresses how education policymakers can begin building the public vision and add capacity to create "richer, more customized learning spaces for students and teachers by the end of the decade," and includes specific recommendations on connectivity systems and hardware.

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