Netbooks and Open Source Software in One-to-One Programs

by Mark Warschauer, University of California, Irvine

Paper presented at the Annual Meeting of the American Educational Research Association, Denver, Colorado, May 2010

More than a decade of research on one-to-one laptop programs in K-12 schools has demonstrated their educational benefits, including heightened student engagement, greater access to and use of diverse sources of information, improved student writing, and development of technological proficiency and 21st century learning skills (Warschauer, 2006; Zucker & Light, 2009). Yet, in spite of these benefits, the growth of such programs has been slow, largely due to their cost (Greaves & Hayes, 2008).

This study examined the use of potentially more affordable low-cost netbooks and open source software in three school districts, one each in Alabama, Colorado, and California. The multi-site case study gathered data through classroom observations; interviews with teachers, students, parents, and administrators; and collection of district, school, teachers, and student documents and student records. Analysis of the first round of observations and interviews indicates that there was not so much a "netbook effect" but rather a "model effect," with the results achieved based largely on the underlying reform model pursued (see Table 1).

The Maine Model

School districts in Littleton, Colorado and Saugus, California, implemented what I refer to as the "Maine model" of school laptop programs, based on the highly popular statewide laptop program implemented in Maine beginning in 2002 (see Warschauer, 2006). In both Littleton and Saugus, as in Maine, the netbook programs were implemented in the service of clear curricular and pedagogical goals. Decisions about hardware and software were made within the context of district, school, and student needs—with each district selecting a Linux-based Asus EEE pc after reviewing multiple netbooks, and a package of principally open source software. As in Maine, both Littleton and Saugus programs were based on balanced attention to curriculum development, infrastructural development, technical support, hardware and software maintenance, and teachers' professional development. The laptops programs are being phased in over time, starting with pilot programs in one grade level that are carefully evaluated. As in Maine, laptops are owned by schools and the starting grade of the program is decided based on curricular and programmatic needs.

Interviews and observations indicate that both the Saugus and Littleton districts are achieving most of the same benefits noted in Maine—which include improved integration of technology in instruction; greater quantity and improved quality of writing; more teacher and peer feedback on student work; more differentiated and individualized learning opportunities; wider opportunities to access, critique, and

deploy information from a wide variety of sources; and deeper exploration of topics through in-depth research—though at a substantially lower cost. Laptops are used extensively on a daily basis by most students in both districts, and students, administrators, and teachers—including teachers that were wary at first—are enthusiastic about the programs. Technical problems are relatively few, and the small, low-cost netbooks and open source software are viewed as an excellent match for students.

The OLPC Model

In contrast, the Birmingham City Schools in Alabama has carried out what can be called the OLPC model, based on the principles of the US non-profit One Laptop per Child Association, originally developed for laptop programs in developing countries. In line with OLPC principles, learning was viewed as stemming from young children's ownership of a radical new children's machine, rather than through a systematic pedagogical or curricular reform. The OLPC's XO laptop was distributed to all children in grades 1 to 5, after only a 6-week pilot program in one school, and little funding was devoted for teacher training, curricular development, Internet access, technical support or maintenance. As a result, only a minority of teachers attempt to make use of the laptops at school, and many of the students' laptops no longer function. Less than half of students even bring working laptops to school. Students enjoy using the laptops at home, but, without their integration into an educational program, there is little evidence of substantive social or educational benefit achieved from home use. Since the children themselves own the laptops, fully one-third of the program's inventory disappears every year due to children's graduation from elementary school or moving out of the district, thus placing more economic burden on the program. The large amount of money spent on the program is widely seen as having achieved not much more than a "costly lesson" (Crowe, 2009).

Conclusion

Netbooks and open source software are a terrific tool for school laptop programs, but only if implemented in the service of a well-designed instructional program.

Table 1: Maine Model vs. OLPC Model

	Maine Model	OLPC Model
Model of Educational Improvement	Viewed as embedded in curricular and pedagogical reform	Viewed as embedded in revolutionary hardware and software
Hardware and Software Chosen	Based on match with context and needs	One size fits all (xo laptop)
Funding Allocation	Balanced for hardware, software, infrastructure, maintenance, teacher training	Largely for hardware and software
Teacher Training	Substantial	Minimal
Phase-in	Staged implementation with pilot programs and evaluation	All-at-once implementation with little piloting or evaluation
Laptop Ownership	School ownership	Child ownership
Age of Child Entry into Program	As appropriate per program goals	Kindergarten or first grade

Acknowledgments

This research was carried out with the support of the Haynes Foundation and Google.

References

Crowe, C. (2009, November 26). A costly lesson: A look at Birmingham's curious commitment to the XO laptop. *Black & White*. Retrieved from http://www.bwcitypaper.com/Articles-i-2009-11-26-232786.113121_A_Costly_Lesson.html

Greaves, T. W., & Hayes, J. (2008). *American's digital schools 2008: The six trends to watch.* Encinitas, CA: Greaves Group and Hayes Connection.

Warschauer, M. (2006). *Laptops and literacy: Learning in the wireless classroom.* New York: Teachers College Press.

Zucker, A. A., & Light, D. (2009). Laptop programs for students. *Science*, *323*(5910), 82-85. doi:10.1126/science.1167705

Postscript: After the above paper was presented, results of a National Science Foundation study in Birmingham were released, which confirmed that the XO laptops are little used in schools there. Results are discussed in this article, which also reports that the Mayor who launched the OLPC program in Birmingham is now in prison for corruption and that the current Mayor has eliminated funding from the

program from this year's budget. Meanwhile, the program in Littleton has been lauded nationally and is expanding to additional grade levels, and the Saugus program's customized version of Linux for educational netbook programs is being used by many school districts across the U.S. In other countries, the success of educational laptop programs, whether using XOs or other computers, appears to depend in part on how much they adopt at least some aspects of the above-described Maine implementation model.