Laptops Unleashed
A High School Experience

By Howard Levin

Subject: Ubiquitous computing

Grade Level: 9–12 (Ages 14–18)

Audience: Administrators, technology coordinators, technology integration specialists, technology facilitators, teacher educators, library media specialists, teachers

Technology: Laptops

Standards: *NETS•S* 1–3 (http://www.iste.org/standards/)

Supplement: http://www.iste.org/LL

A s students in Dan's freshman World History class trickle in, they pull from their backpacks wireless Apple iBooks that are covered with stickers evoking pop culture favorites. Some are preparing to take notes while others put final touches on last night's homework before e-mailing their work. A few others check the online course calendar or access readings stored in the course conference. Dan arrives, opens his PowerBook, and quickly connects to the LCD projector. "Who will share last night's journal entry on Marx's critique of capitalism?" he asks while opening the class e-mail drop box, preparing to display student writing for all to see. This scenario, where computer use is inseparable from everyday teaching and learning, is an example of what's possible when all students and teachers have their own school-provided laptop for use at home and at school.

Thousands of schools across the nation have adopted 1:1 student laptop programs during the past 10 years. These programs were initially sparked by Microsoft's Anytime, Anywhere Learning collaboration with Toshiba, Compaq, Acer, Dell, and Gateway. Apple has now jumped in with several enormous initiatives such as all 26,000 middle and high school students in Henrico County, Virginia, and all 36,000 middle school students in Maine.

This article focuses on the Urban School of San Francisco, a small independent high school of 252 students located in the historic Haight-Ashbury neighborhood. Our school mission—"to ignite a passion for learning"—helps explain our school's

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distinctive laptop program where we strive to integrate laptop use throughout the curriculum. Our program provides a good model for other schools considering a laptop program. My hope is that this article will inspire others to explore new opportunities that arise with a fully integrated laptop program.

Laptop Rationale

The primary goal for our student laptop program is to fully integrate computer use throughout the curriculum to enhance communication, collaboration, organization, and production (writing and project creation). Because students and teachers are issued their own personal laptops (Apple iBooks for students and Powerbooks for teachers), they can use them spontaneously throughout the school day. This deemphasizes the specialization of computer technology as use becomes seamless, ubiquitous, and normal. Because we do not offer any computer lab–based courses, all computer skills acquisition occurs within the context of the academic curriculum. Computer use is integrated throughout the curriculum to enhance active, student-centered learning, including expansion of computer skills.

A central priority of our student laptop program is to achieve equity of access. Now all students, regardless of income or family background, have access to identical equipment and software. Early concerns about the lack of choice have melted away as we experience the benefits of identical machines. Now teachers can confidently assign work requiring comput-

er use both at home and at school.

We developed a lengthy list of rationales for adopting our 1:1 laptop program that are beyond the scope of this article. See "The Urban School Laptop Program" listed in the Resources section on p. 11 for more on this and references to recent research supporting the efficacy of school laptop programs. (*Editor's Note:* You can also check out the online supplement for a detailed discussion of the program's implementation and policies.)

No Skills Classes

Most school laptop programs generally involve dedicated coursework in computer skills where students attend a term-long course learning specific applications. At Urban, however, we consciously strive to avoid direct skills instruction. Beyond an initial one-day laptop orientation session, students by and large learn what they need to from a combination of self-exploration and peer support. In a recent survey completed by our freshman and sophomore students, when asked who they would most likely approach for tech support help, 87% indicated "self help" and 96% listed "classmate or friend." Only 60% responded that they would likely ask "tech support staff." Of course, teachers provide directions and guidance, especially with content-specific math and science software, but this all happens within the context of the immediate needs of the daily curriculum.

I recently sat in during a class where the teacher was introducing the use of audio files using e-mail. The teacher guided the students, step

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by step, through the process, which took 30 minutes of class time. After class, we debriefed and I pointed out that the students really did not need any of this guided instruction. "Just send them the initial e-mail message and explain your expectation—they will figure out how to do the tech aspects." Sure enough, all the students in the next class accomplished the tasks with only a fraction of instruction. They learn to explore, experiment, and use many of the functions with little or no guidance. More importantly, they collaborate with each other to figure it out—either live or online after class.

A Day in a Laptop School

Although it's tempting to focus on the more unusual and cutting-edge uses of technology, it's the everyday "baseline" uses that are the more powerful and transformative examples of laptop use. This is an important component of Urban's integrated approach. Wireless laptop access to course conferences, class notes, bulletin boards, and public forums all enhance communication and organization for teachers and students alike.

Electronic Course Conferences. Teachers use online resources to help students stay organized. Nearly all our teachers now post information online for student access, primarily through online course conferences. A *conference* is a term used by our FirstClass communications software to describe common folders of shared information for each class. Teachers subscribe all their students by entering the class roster, resulting in a course conference appearing within each student's e-mail environment. Anything placed in the conference is available to all

through e-mail. We find this to be a far simpler and more reliable way to share information than storing in traditional file server directories, mainly because students access their e-mail constantly.

Conferences have a wide variety of uses, but the most common is for teachers to post instructions, Internet links, worksheets, syllabi, and daily assignments. Every time students open their e-mail, they immediately see their course conferences and are alerted to new information. Teachers post information once, and students never lose online information.

For example, I recently polled students on methods of organizing their assignments, in part to develop models to help students shed their "organizational paraphernalia"— multiple binders, notepads, blank paper, and all sorts of other items helping to weigh down packs. "I don't use anything," one freshman student said. He explained that everything he needs—assignments, directions, calendars, due dates—are posted in his course conferences to which he has access anytime.

Taking further advantage of course conferences, some teachers have setup shared folders where students collaborate on small group projects. Of course, teachers have been doing this for years in some schools using school fileservers to store and share student work. However, in the past, this work had to be completed during class time. Teachers had to reserve the computer lab or even the mobile laptop lab so that students could access the fileserver. Now that all students have laptops, they can research, write, post, and access their group's information at any time, anywhere. This type of access has encouraged more collaborative projects.

Class Notes. Some teachers have taken advantage of shared class notes to emphasize the importance of proper note taking in class. A student is assigned to take notes and then post within the course conference for all to access at home. The added responsibility shouldered by rotating daily "note-takers" pushes students to do their best listening and recording, knowing the rest of the class is relying on their attention to detail. Some students who struggle with multitasking (listening, taking notes, and participating) can instead focus on aurally and orally attending during the class time. There is no paper to copy and distribute, and the notes are instantaneously available to all, including the teacher, who then has the opportunity to make corrections to ensure clarity of information.

Bulletin Board. One unanticipated and exciting result of constant access to online information has been the burgeoning use of the bulletin board, which contains dozens of weekly notices about lost items, school schedule changes, employment and volunteer opportunities, and, of course, school events. Anyone within the school can post to the bulletin board, and because our dean of students moderates the content, it generally remains void of meaningless chatter. In fact, on the rare occasion when a student posts jokes, other students jump in to chastise the offender for frivolous use. The students value the open source of information and therefore work together to protect this online portion of the school community.

Public Forums. Public Forums at Urban are issue-specific and ongoing interactive dialogues moderated by a teacher or designated student. These dialogues are carried out through our FirstClass e-mail system. Some current forum topics include discussion about the war in Iraq, the Israeli-Palestinian conflict, the minimum

1:1 laptops change the dynamics of classrooms.

wage in San Francisco, student feedback on a new school schedule, and a general "Speak-Up!" forum on any issues of concern. Because everyone has a laptop with constant wireless access, the Public Forums have helped tie our already small community even closer together.

Curriculum-Based Laptop Use

Sound Files in Foreign Language. Foreign language teachers at Urban have found a simple way to extend listening and speaking beyond the classroom by taking advantage of central storage and the built-in microphones on all laptops. Teachers now record and send voice homework directions and speaking prompts directly through e-mail. Students can then reply verbally, recording their response directly within the speech capabilities of FirstClass. Teachers appreciate the opportunity of providing personalized one-on-one support and also use this as an assessment tool of students' natural speech and pronunciation. Student voice files are retained to help track progress throughout the term. Teacher-created voice files are archived for future use. Teachers are creating what is essentially a growing and customized language lab—completely accessible using the student laptops. "Language practice is no longer a silent undertaking," says teacher Steve Speier.

PBL in History. Students in some history classes are using their laptops to contribute in meaningful ways to a broader community outside of school, something I call *authentic doing.* The idea is to challenge students to cross the boundary of learner to contributor by creating and publishing work for use by others. For example, history teacher Dan Matz taught an unusual elective course in which students studied the recent mayoral race in San Francisco. The goal was the production and publication of an online election guide for voters citywide.

Students researched current social and economic issues important to the mayor's race using Internet-based sources. They even hosted an all-school forum and debate attended by most of the major mayoral candidates, who were attracted in part to the public nature of the class project. "Laptops have been central to the elections class, with teams working on issues and building their Web content collaboratively," says Dan. Working in small production groups, they shared their work in common folders on the school's wireless network, proofed each other's work on a protected Web site, and eventually published their site to the general public prior to the election. Students used their laptops for all aspects of research, writing, and production. Students were motivated to publish their best work, and many went beyond the basic expecta-

tions by using Macromedia Dreamweaver, learning some HTML coding, and volunteering for a campaign. A couple of students even appeared on a morning radio show to give commentary on election day. The public and practical nature of their work, made possible by technology, resulted in a more engaging experience.

Another example of an authentic doing project heavily using laptop technology resulted in the production of an award-winning public Web site containing oral histories of Bay Area Holocaust survivors. See "Making History Come Alive," *L&L,* November 2003, for a comprehensive look at this project that relies on laptops for research and information sharing, as well as video editing, and Web site production.

Integrated Programming in Math. The integration of tech skills predates our laptop program by many years, as exemplified by the integration of basic programming concepts within mathematics classes that all our students take. The math department uses a program developed at University of California at Berkeley called Boxer, a graphical and computational interface, similar to Logo, but more powerful with increased features and a broader scope. Teaching programming in the past has met with mixed success, primarily because of a lack of available lab time. The first breakthrough happened four years ago when teachers were able to use Boxer at home because of our faculty laptop program. They gained confidence and motivation from their own dramatic increase in access. The same has happened for students. "Boxer has became more attractive to more kids, and there is more of a sense of mastery," notes Henri Picciotto, math department chair. Now that students have constant access to Boxer and other mathematical software such as Fathom Dynamic Statistics and Cabri

Geometry II, students and teachers enjoy a double bonus: the tools are available for continued practice at home as homework, and more class time is now available to focus on teaching and reinforcing concepts.

Simulations and Graphing in Science. Students in science enjoy the same benefits of increased access to specialized software. For example, students use Interactive Physics to visualize and practice problem simulations so important to reinforcing complex mathematical relationships. Now students have constant access to the program, therefore they run and analyze various simulations as homework. More advanced students are challenged to design their own simulations, and in doing so, can control an infinite array of conditions and tools to create a scenario reflecting current studies. Students become quite creative and develop a deeper understanding of concepts—all made possible through much greater access to the tools. This same advantage is played out with several other software tools used in science including DataStudio, used to collect and chart data using probes and sensors. Motivated students and teachers appreciate the spontaneity the laptop provides for continual work outside the classroom. This represents a paradigm shift in thinking about science labs always being finite locations with limited access. Now many of the lab tools are available anytime.

Science classes also take advantage of Microsoft Excel to graph and analyze data. Prior to our laptop program, teachers could show students such tools for use on lab reports, but students often complained that their home computer didn't have the appropriate software. Now everyone

Laptops enable learning outside the classroom.

has the tools. "The likelihood that I will seamlessly choose to do a mini-lesson with technology has increased tremendously without the hassle of signing out computers or feeling that once I have them, we should continue using them," says science teacher Algis Sodonis. "Often, I can teach the students an Excel skill in class in 15 minutes and have them continue the work at home."

Virtual Literature Circles and Extension in English. English teachers for several years have experimented with "silent discussions" where students write about an aspect of literature using an e-mail-based conference. Now, with the laptop program in full swing, they've refined this by assigning small groups to discuss topics in e-conferences more akin to an asynchronous chat room. In these small virtual literature circles, groups of three or four students record and develop their thinking about discrete parts of a text and then respond to one another in writing. "Bridging the central but heretofore disparate learning activities of an ordinary English course—the messy, extemporaneous group discussion and the measured, structured exposition in writing—the online conference blends and

provides useful practice in both domains," says Jonathan Howland, chair of English. Used sparingly, these mini-conferences become excellent prewriting exercises that result in more substantive and sophisticated student dialogue than is generally possible in more typical oral discussion. Students are able to read, think, and respond to each other away from the immediate distractions of the class and therefore often generate more thoughtful and meaningful responses.

Students occasionally extend lessons beyond teacher expectations when access to course materials and to each other is enhanced. Lynn Slobodien, English teacher, recounts an example of a student who sent her a poem inspired by reading *The Odyssey*. "After getting her permission, I zapped it to her classmates," says Lynn. "The instant audience was inspiring. With just a little encouragement, six other students sent me original poems to be e-mailed to the group, and one sent a poem privately. Eight poems for an assignment that I never made!" Encouraged by the easy collaboration, the students built an artistic community somewhat apart from the usual atmosphere of the classroom. "They wrote and shared their poems just to be enjoyed, not to be judged, evaluated, and compared," says Lynn. After using the small groups to submit, garner feedback on, and revise passage analyses, one

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group e-mailed to ask if they could keep up the dialogue for other assignments. In this case, an electronic tool encouraged increased writing, thinking, and sharing in part due to the ease of reaching a broader audience.

Conclusion

We hope our experience provides new insight into the possibilities of providing all students and teachers with laptop computers. Our heavily integrated approach rejects a traditional lab-based computer skills training model and instead relies on a more natural, collaborative, and peer-to-peer system in which students learn skills as they are needed within the context of their academic studies. Constant access to a personalized laptop within a school environment

where computer use is inseparable from the regular educational functions of communication, collaboration, organization, and production propels all involved to learn and apply necessary technical skills.

Resources

Anytime, Anywhere Learning: http://www.microsoft.com/education/aal
Apple 1:1 Learning Solutions: Profiles in Success: http://www.apple.com/education/onetoone/
Boxer: http://dewey.soe.berkeley.edu/boxer.html
Cabri: http://www.cabri.com/en/
DataStudio: http://www.pasco.com/datastudio/
Fathom: http://www.keypress.com/fathom/
FirstClass: http://www.firstclass.com
Interactive Physics: http://www.interactivephysics.com
Rockman Et Al: Bringing Technology and Learning Together (research on student

laptop programs): http://rockman.com/projects/laptop/
Telling Their Stories: Oral History of the Holocaust: http://www.tellingstories.org
The Urban School of San Francisco: http://www.urbanschool.org
The Urban School Laptop Program: http://inside.urbanschool.org/laptops

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Online Supplement

Implementing a 1:1 Laptop Program

An online supplement to Laptops Unleashed (*L&L* March 2004)

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School Ownership

We researched various purchase options, paying close attention to financial and legal issues. At Urban, we directly purchase all student laptops and families pay a yearly "computer use fee" which is approximately 1/3 the cost of the computer, software, warrantees, and other equipment ($725 for 2003-04). All incoming students are issued a laptop to keep full-time through their Junior year at which time ownership transfers to families for a nominal fee. After three years, we consider these laptops outdated, in part because their warrantees will have expired.

Seniors are therefore issued a new laptop during the final year of school. Families can choose to rent for a year or they can commit to purchasing it at the end of the year. The key, however, is for the school to retain legal ownership.

There are several advantages to school ownership. First, computer manufacturers provide significantly better pricing to educational institutions so long as the school retains ownership. Second, school ownership permits us to take advantage of institutional discounts on software licenses that are only available for school-owned equipment. For example, the student cost for Microsoft Office is approximately $150 (retail cost is $360), however, the school

can purchase a license of the same software for less than $50. This permits us to install a wider array of software given these steep discounts, while saving families several hundred dollars over the course of the program on software alone.

And finally, school ownership supports the smoothest possible maintenance plan for laptops. By keeping all computers in each grade the same, we are better equipped to provide support through common training and troubleshooting. Identical loaners are available when a machine needs to be repaired—about 5% of the total has been sufficient. This helps all our teachers and students to stay focused on their learning. Some laptop schools have students wait several days until the laptop is repaired but this is unfathomable at Urban where laptops

are so integrated throughout the curriculum.

Although all laptops are school owned and labeled, we strive to build pride of ownership by allowing students to customize at will. We allow—even encourage students to do anything with their laptops that is legal and does not permanently alter the equipment. Therefore, they can apply stickers and freely install software so long as they are not violating copyright laws. For example, we prohibit installing any file sharing software (Kazaa, Limewire, etc.) to help establish clarity about music downloads. Our Acceptable Use Policy prohibits students from carrying out other illegal or unethical actions with their laptop. So far we've been pleasantly surprised at how well students take care of their laptops. They by and large care for them as

if they were their own and therefore issues of mistreatment or negligence have been rare.

We have established consequences that are clear and simple when loss or breakage occur. Families are charged $100 for a first occurrence of a non-warranted repair regardless of cost so long as breakage is not what we consider gross negligence. Multiple breakage results in increased charges. For example, accidental drops and liquid spills are covered, whereas a stolen "unattended" laptop is considered gross negligence and families are billed the full replacement costs. To heighten awareness about security we confiscate laptops that are left unattended. Students receive a warning on the first incident; parents are contacted with repeated incidents. In the two years of our program, only three laptops have been stolen.