

MOBILE COMPUTING IN K-12 EDUCATION

Chromebooks* Power 21st-Century Learning at Richland Two

Chromebook* devices with Intel® processors increase student achievement, stretch budget dollars, and simplify device management

Mobile devices, used under the guidance of highly qualified teachers, offer powerful ways to engage K-12 students, spark their curiosity, and improve achievement. But budgets are tighter than ever. How can cash-strapped school systems give all students access to vital educational technologies?

Richland School District Two is finding a solution in Chromebooks* powered by Intel® technologies. Since January 2012, this 27,000-student South Carolina school district has deployed nearly 23,000 Intel®-based Chromebooks in a one-to-one learning initiative. District leaders say:

- Their Chromebooks provide the performance and flexibility for a wide range of learning activities.
- The devices' cost advantages are helping the district provide more students with technology than they could have otherwise.
- The results are already impressive, with students more engaged in their learning and demonstrating greater mastery of 21st-century skills.

Student Learning and Equal Access

Richland Two is a fast-growing school system serving suburban Columbia, South Carolina—the state's capital and largest city. The much-honored district comprises five high schools, seven middle schools, 19 elementary schools, four magnet centers, a charter school, and other centers. In the 2012–2013 school year, 91 percent of the district's schools scored an absolute rating of Average or higher on statewide evaluations, and nine schools or centers scored an absolute rating of Excellent. Yet equity is a significant issue. South Carolina ranks 45th among the 50 states in child well-being, and 48 percent of Richland Two's students qualify for free or reduced-price lunches.

The district had an array of desktop and laptop PCs, with small-scale, one-to-one programs dating back to a Classroom of the Future demonstration program in 2000. "Equity was a big driver for us," recalls Donna Teuber, team leader for technology integration at Richland Two. "We wanted all children to have access to educational technology. We knew how fast technology was evolving, so we started talking about what the next level would look like."

"We found that Intel-based models provide a balance of price and performance that better meets our needs. If you evaluate ARM and Intel-based Chromebooks* side by side, it's easy to see the difference. It's also important that Intel is a trusted vendor of choice with the companies that produce the products that we want."*



Donna Teuber,
Team Leader for
Technology Integration,
Richland School District Two



Tommy Carter,
Senior Systems Engineer,
Richland School District Two

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Richland School District Two



- Web 2.0 sites
- Content management and creation
- App support
- Games and simulations
- Note-taking and other word processing
- Video editing
- Video conferencing
- Podcasting
- Reading e-textbooks and e-books

Building on the survey data, the team explored a variety of devices and set up demonstrations of the most promising possibilities. “In the surveys, we asked, ‘What do you need to do, and how important is it to be able to do it?’” says Tommy Carter, senior systems engineer at Richland Two. “Then, we evaluated all relevant platforms to see on a relative scale how well each one did it. We looked at Windows*-based tablets and laptops, Linux*-based laptops, Google Android* tablets, iPads*, Macintosh* laptops, and Chromebooks.”

The team concluded that Chromebooks powered by Intel technologies were well suited to the vast majority of students’ learning requirements. “Most people, most of the time, even students who had a full laptop, spent most of their time in a Web browser,” Carter says. “We looked at what best fills that need, and the Chromebook was the clear winner. Our conclusion overall was that the Chromebook was very capable and low cost. The iPad was less capable and higher cost. Windows machines were the most capable but also the highest cost. But cost is just one factor. The Chromebook excels in areas that matter in K-12 education, such as productivity, fast boot, fast login, multiuser design, long battery life, and ease of deployment and support.”

The Chromebooks’ open environment offers access to a wealth of free or inexpensive resources for teaching and learning. “Chromebooks get the students into the cloud environment, where they have access to everything that’s on the Web,” says Teuber. “It is such a rich work environment, and it

At a Glance

Project

- District-wide, one-to-one learning technology initiative for students in grades 3-12

Accomplishments

- 23,000 Intel®-based Chromebooks deployed for one-to-one learning in less than two years
- Teachers rank the program as successful and are integrating technology into modern teaching strategies
- Students are more engaged and are developing 21st-century skills

Lessons Learned

- Focus on learning, not technology. Start from a vision of how teachers and students will use mobile devices to improve learning outcomes and equity.
- Be systematic about device choices. Bring stakeholders together to identify device requirements and evaluate tradeoffs.
- Equip teachers with full-function laptops, and provide them well before students get their devices.
- Start early and plan holistically. Align professional development, curriculum, infrastructure, and other areas to set the stage for the successful use of technology.
- As an IT leader, be proactive in raising awareness of technologies that may be relevant to your school system’s educational and budgetary goals.

Choosing Technologies for Student Learning

Richland Two developed a vision of that “next level,” and summarized its goals in the acronym iPAC. One-to-one devices, used across the district for grades 3-12, would be a tool to deliver personalized, authentic, and collaborative learning experiences.

Richland Two’s IT organization believed Chromebooks could enable the district to buy and manage enough devices to fulfill what it calls its 1TWO1 vision. But would the devices provide the performance, reliability, and flexibility for serious learning at all grade levels?

Richland Two took a collaborative, data-driven approach to answering that question. It created a team of teachers, technology leaders, and others, and conducted surveys to identify and rank the capabilities teachers considered most essential for student learning. In order of importance, teachers saw the following as most crucial:

- Internet research and browsing
- Long battery life
- Easy setup for teachers
- USB port and/or card reader
- Flash sites (videos, games, and so on)
- Google Docs* collaboration
- Google Sites* (e-portfolios)

lets kids access so many resources. The creativity tools and collaborative tools are amazing, and there is plenty of support for project-based learning. It is a great device for what we do.”

The Chromebooks also allow students to spend more time on task. “With the Chromebooks, students come to class ready to go,” Teuber adds. “We don’t see them waiting for the boot-up, the virus scans, and the other initial tasks like we did in the one-to-one desktop environment or laptop.”

Flexibility to Meet Learning Requirements and Teacher Preferences

In addition to deploying 23,000 Intel-based Chromebooks for grades 3-12, each grade 2 class has five or more Chromebooks. Two middle schools that were early adopters of one-to-one computing with iPad devices remain on those devices. Teachers have full-featured Lenovo* laptops based on the Intel® Core™ i5 processor, and received them an average of four months before the go-live.

Desktop and laptop PCs running Intel Core i5 or i7 processors are available when a full Windows environment can best meet students’ educational requirements. “In some cases, a Windows device is the best choice for the task at hand,” Carter says. “Chromebooks fulfill most of our needs most of the time. We employ virtual desktop technologies to support legacy applications on the Chromebook where it makes sense, and we deploy full Windows desktops and laptops where it makes sense. Chromebooks have enabled us to reduce our Windows installed base significantly, at a great savings in both capital and operational expense.”

Intel Inside for Performance and Longevity

Richland Two rolled out its 1TWO1 initiative in three phases between January 2012 and August 2013. For each phase, teachers and IT experts

evaluated the available Chromebooks models, and each time, chose models powered by Intel technologies.

“Within the Chromebook category, we evaluated Intel and ARM* architectures. We weighed battery life versus cost and performance,” explains Carter. “We found that Intel-based models provide a balance of price and performance that better meets our needs. If you evaluate ARM and Intel-based Chromebooks side by side, it’s easy to see the difference. It’s also important that Intel is a trusted vendor of choice with the companies that produce the products that we want.”

With its most recent acquisitions, Richland Two has standardized on the Lenovo ThinkPad* 11e Chromebook with the Intel® Celeron® processor. “The Lenovo is built for K-12 education,” Carter says. “It’s a much sturdier device than early Chromebook models and most current devices generally. We’re impressed with the performance that the platform achieves with the low-cost Intel Celeron family of processors.”

Better performance means a better user experience, higher productivity, and the ability to run more demanding applications. “Cloud-based computing is evolving rapidly,” says Carter. “The quality and complexity of available applications is impressive. Demanding workloads such as video editing can be done within a browser today. Our students are producing great content every day with their Chromebooks.”

Savings Increase Sustainability

Chromebooks are helping make the Richland Two initiative affordable and sustainable. Richland Two has reduced the number of Windows platforms by about one-third, and expects to achieve a 50 to 60 percent reduction over the next year or two. “We started with approximately 18,000 Windows desktops and laptops,” Carter says. “Our budget has remained unchanged. We reduced to around 12,000 Windows devices and deployed 23,000 Chromebooks. We

Key Technologies

- Lenovo ThinkPad* 11e Chromebooks* with the Intel® Celeron® processor, Chrome* OS, 4 GB of RAM, and a 16 GB solid-state drive
- Lenovo ThinkPad laptops with the Intel® Core™ i5 or i7 processor for teachers and special-purpose use
- Google Apps* for Education and other tools and resources
- Hapara* Teacher Dashboard
- Chromebook management console
- Ericom AccessNow* HTML5 Remote Desktop Protocol Client
- VMware Horizon with View*
- Microsoft Remote Desktop Services (RDS)*

could not have added that capacity with another platform.”

The performance of the Intel technologies may help generate further savings by extending the devices’ useful life. “We believe that our choice of Chromebook models with Intel processors will extend the useful life for our devices,” says Carter. “It will make a big difference in our ability to keep up with the performance demands of the operating system and applications as they evolve. If you choose a minimally equipped machine today, you will realize the limitations more in the coming years.”

Easy to Manage

As a cloud-focused device, the Chromebook’s management capabilities are reducing complexity and adding to Richland Two’s savings. “There is a significant difference in the cost and complexity of supporting 23,000 Windows, Apple OS X*, or iOS* devices compared to 23,000 Chromebooks,” says Carter. “With the Chromebook, there is no significant local data to worry about in terms of migration and data loss, no backup and restore. It takes zero effort to move a user from one machine to another. Google’s cloud-based application delivery model is a major time-saver. There are no images to maintain, no application packaging. It’s a very efficient platform to manage. This translates into huge savings in total cost of ownership.”

A 20-year IT veteran, Carter says Chromebooks are the easiest devices he's ever deployed. "If you configure your network and set up the Google Apps* domain to suit your organizational needs, the Chromebook offers a truly zero-effort deployment," he states. "A small school district with few resources can very easily implement Chromebooks as well as a large school district."

Comprehensive Planning and Change Management

To create the conditions for success, Richland Two engaged in year-long preparations that included changes to professional development, curriculum, and more. Among the major preparations:

- Teachers, parents, school leaders, and other stakeholders worked together on collaborative planning. Everyone focused on the educational value of the initiative, not technology for its own sake.
- Policy modifications were aimed at helping students get the greatest educational value from their devices. For example, high schools and some middle schools encourage take-home use, so the district established policies and procedures, negotiated low-cost insurance coverage, arranged funding for families that could not afford the insurance, and worked to ensure students aren't disadvantaged if they lack home Internet access.
- The district provided more than 2,500 hours of professional development in 2011/2012, including the Intel® Teach Elements online course and many other online and face-to-face resources. Teachers continue to access ongoing professional development activities. Each school has a technology and learning coach.

- Technology and learning coaches and curriculum leaders assembled a starter kit of basic resources and classroom management tools, and have continued to expand it. Professional development and curriculum resources help teachers advance their use of technology-enabled approaches such as project-based learning and flipped classrooms. Students use a variety of Intel® Education resources, such as the Showing Evidence tool to help them learn how to construct arguments and the Visual Ranking tool to set criteria for ranking items in a list.
- The district is working with Getting to Outcomes*, based at the University of South Carolina, to clarify goals and measure success. Rigorous, ongoing evaluations will feed a cycle of continuous improvement.

Engaged and Developing Vital Higher-Level Skills

Early results show that Richland Two is on its way to achieving its goals. More than 90 percent of teachers say the initiative is going somewhat well or extremely well. Approximately two-thirds say it has enhanced or greatly enhanced their ability to reach curriculum standards.

The district's phased deployment made it possible to compare 1TWO1 students and teachers with peers who were not yet part of the initiative. Data shows that 1TWO1 middle school students in particular are more engaged, with elementary school students showing similar trends. Elementary, middle, and high school students in the 1TWO1 program reported more opportunities to develop 21st-century skills, such as critical thinking, communication, collaboration, and digital citizenship, than non-1TWO1 students.

Evidence also indicates student achievement is rising. "We've used direct assessments of engagement and of 21st-century skills from Learning.com," Teuber reports. "Our students were already above the global average. Now, we're seeing year-over-year improvements, and we expect to see even more as we expand our focus on project-based learning."

Engaged and Empowered

Teuber says the one-to-one learning environment feels more engaging and empowering—and it touches her heart. "You start to see what anytime, anywhere learning really means," she comments. "At home, in the cafeteria, in the hallways, after school—you see kids collaborating and working with their Chromebooks, wherever they need to work. The teachers are empowered to do a lot more personalized and small-group activities. When you see how engaged and empowered everyone is—it's exciting. I get emotional. It's a very different environment."

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