Students at Littleton Public Schools (CO) use basic netbooks and an array of cloud-based and open source tools to support a district-wide writing initiative.

BUILDING 21ST CENTURY WRITERS

DURING WHAT MIGHT HAVE in the distant past been called "quiet time" in Arlene Anderson's fourth-grade classroom, many of her students are glued to their netbooks. The intense, enthusiastic focus and the hushed chatter amongst the students are all about high scores and strategy. But the students aren't playing video games. Instead, they're revising and editing their writing assignments within a web-based application that instantly assesses their writing skills and suggests ways to improve their work before turning the assignments in to their teacher.

Student achievement scores take off with the implementation of tech-supported writing initiatives that cross curriculum lines.

BY JENNIFER DEMSKI

"For students, the software is an amazing self-motivator for writing, editing, and reviewing their writing," explains Anderson. "They're constantly working at learning the skills that will raise their scores."

The software and netbooks are part of the **Saugus Union School District**'s (CA) Student Writing Achievement Through Technology Enhanced Collaboration (SWATTEC) initiative, one of a number of similar tech-supported initiatives that encourage writing across the curriculum. At the same time, the Saugus initiative is helping to prove that schools can see improvement in student achievement and engagement by harnessing 21st century tools to enhance writing skills.

Why Writing?

Writing isn't typically the first skill that comes to mind when one imagines a high-tech learning initiative. At Saugus, the SWATTEC initiative was born out of a grant proposal for 1-to-1 implementation. The team behind the proposal explored research to see where the implementation would have the most impact, and eventually decided its focus should be on fourth-grade writing skills.

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"Writing itself is a higher-order area of the curriculum in terms of thinking," explains Anderson. "If students do better in writing, they'll do better across the board in other subject areas."

What's more, she adds, "In California, fourth-graders take a cold writing test every March." By choosing a year in which students participate in a standardized test on writing, the team could easily measure the impact of the initiative.

Writing not only helps develop students' critical thinking skills, it also is a skill in and of itself that is applicable throughout the curriculum. "There's writing for science, there's writing for social studies and history—writing can be incorporated into any subject area," explains Jim Klein, Saugus' director of information services and technology.

The district rolled out the initiative in 2008. Since fourth-grade students remain in the same classroom throughout the day, the team worked collaboratively with their teachers to find the best practices for transparently incorporating writing and technology across the curriculum. The grant that funded the SWATTEC initiative also allowed the district to employ Anderson as an instructional trainer for two years.

"My job was to travel from school to school and work with the teachers so they knew how to use the technology to get the effect that they wanted out of it," she says. "Some of the teachers took to the initiative like a duck to water, while others had a tough time adapting."

Still, by the end of the second year, each of the district's elementary schools had a fourth-grade teacher on staff who could lead that school's program and help keep its teachers on track.

In the end, Klein notes, "Our teachers have embraced it tremendously and, by collaborating with them in the beginning, we were able to eliminate those islands of innovation that happen in districts, where individual teachers are doing great things, but nobody knows about it or it doesn't scale up. The idea-sharing and brainstorming had a significant impact on the initiative's success."

An Inspired Approach

A thousand miles east of Saugus, in suburban Denver, **Littleton Public Schools**' (CO) Inspired Writing initiative was born out of a similar desire to find the best way to construct a 1-to-1 implementation. "In 2007, our board of education asked a team of educators and administrators to do research projects on what 21st century learning would look like," recalls Littleton CIO Dan Maas. "We evaluated all of the ideas out there. Both the external research and our internal findings pointed to a form of 1-to-1 laptop initiative supporting writing

AN OPEN SOURCE SOLUTION

WHEN DESIGNING THE technology components of **Saugus Union School District**'s (CA) Student Writing Achievement Through Technology Enhanced Collaboration (SWATTEC) initiative, Jim Klein, director of information services and technology, built an open source Ubuntu Linux-based operating system called ubermix, designed specifically for student and classroom use with the goal of redirecting the students' and the teachers' focus from the technology itself to the curriculum and skill-building that it supports.

The ubermix desktop is based on the typical smartphone interface and features large, fixed icons to help prevent accidental clicks or deletions that typically take away from instructional time or hamper use. The system can be reset to its default settings in just 20 seconds, making it easy for teachers to resolve software-based technology issues without relying on IT support staff.

Netbooks running the ubermix operating system are now being used at schools across the country, including the **Littleton Public Schools** (CO). Klein's simple, no-frills creation addressed a common problem faced by districts looking to adopt 1-to-1 initiatives. "The typical computer OS provided by Microsoft or Apple is designed to be customized to users' working preferences," he says. "In a shared computer environment, when used over time, this becomes a big problem because the laptop just builds more and more profiles that slow down the computer, and you end up having to reimage the computer every three to six months."

In a school environment, Klein adds, the technical support staff is not always available to ensure that a Windows- or Apple-based laptop is going to work the same way every time it is booted up. "The Linux operating system doesn't try to do any of that fancy stuff," he says, "but it works the same way every time."

With feedback from teachers and the ubermix community at large, Klein has worked to ensure that ubermix is constantly evolving to meet the needs of the teachers and students who rely on it to support their learning. Many districts have created their own custom-built ubermixes to meet the needs of their specific 1-to-1 initiatives.

"I think ubermix's success versus other alternative operating systems is in its design fundamentals," remarks Klein. "It has been and continues to be built with an understanding of teachers, the classroom environment, and learning in mind, along with a healthy perspective of the challenges associated with implementing technology in the classroom."

as a focus."

Littleton began its writing initiative in fifth-grade classrooms. Then, over the course of four years, it rolled out a full deployment of the initiative throughout the district. Maas and his team planned their professional development around the Learning Services Department's curriculum development initiatives, specifically the language arts teachers' participation in the Lucy Calkins Writers Workshop. Before the seminar, Maas and his team introduced the netbooks to the teachers who were participating in Inspired Writing, showed them how to use the Linux operating system and cloud-based tools, and spoke about classroom management issues and cyber safety.

Next, the district's tech trainers attended the two-day writing workshop with the teachers so they could get on board with the instructional goals of the initiative. Two days after the workshop concluded, Maas and his team met with the teachers again to unpack the core goals of the writers workshop and demonstrate how web-based tools could support the literacy initiative's goals.

"Instead of providing training on wikis, for example, our training was on engaging students in peer review, and how a wiki could help you do that," explains Maas. "That really scratched an itch for our teachers because they want to adopt these instructional practices, and we're there with really engaging and powerful tools to help them succeed. They just took it and ran."

Maas adds, "To me, the killer app for 21st century learning is a good teacher, and well-deployed technology makes good teachers into great teachers."

The real key to success in both Littleton and Saugus Union was ensuring that the netbooks would not be used as glorified word processors. With web 2.0 and social media tools, wireless connectivity, open source word processing and presentation software, cloud-based collaborative writing tools, and web-based writing tools like Vantage Learning's MY Access—Arlene Anderson's aforementioned writing assessment software—both districts built initiatives that have brought English language arts and classrooms as a whole into the 21st century—and made a significant impact on student learning.

When Dan Maas got the go-ahead from his board of education to design Littleton's 1-to-1 implementation, he looked at laptop and netbook implementations at districts across the country to see what could work best for his schools. Littleton only employed three computer support technicians for the district's 22 buildings, and the grant did not allow for the hiring of any additional support staff.

"We looked at the **Henrico County Public Schools**' (VA) 1-to-1 implementation, for example, and their model included adding a support technician to every building. We couldn't afford to do that," explains Maas. "We were looking for a practically zero-support device that was low cost to both purchase and maintain."

The district had built up its open wireless infrastructure in anticipation of the 1-to-1 implementation, and was ready to jump in when Asus released its Eee PC 700 netbook in 2007. "Shortly thereafter," recalls Maas, "we bumped into Jim Klein's blog and saw what they were doing at Saugus. We started collaborating with them, and then we were off to the races."

At Saugus, Klein and his team had deployed Linux-based netbooks loaded with free, open-source software and created a customized and easy-to-manage desktop interface that mimicked students' favorite technology—the smartphone—by incorporating large, fixed icons on the netbook desktops that could not be easily moved or altered. They also incorporated a "quick-restore" feature on the netbooks that would allow teachers to reset them to the default settings in seconds. The result was an interface that provided ease of use and stability to the fourth-grade users, at the same time allowing teachers to manage software problems at a moment's notice, without the help of an IT person.

At Littleton, Maas built on Klein's Linux implementation, but focused on cloud-based software rather than open-source tools—the district has a Google Apps for Education deployment and uses free services on the web for activities like blogging and collaborative writing rather than relying on a traditional learning management system. "Our netbooks are very basic," explains Maas. "We're not dependent on a lot of software. We've really adopted a cloud mentality, which means we don't have to do much to maintain the devices."

Maas implemented a tool called Clonezilla, which allows them to image each netbook in less than five minutes from a memory stick. As part of the image, they have a locked boot sector that allows support technicians to enter a keystroke command upon reboot to basically reimage the computer back to its original settings. "Once we image them and we deploy them out into the schools, we don't touch them again for about a year, unless they have some sort of hardware failure, which is rare," he explains.

Designing the Initiatives

Like most highly successful ed tech initiatives, SWATTEC and Inspired Writing were developed through close collaboration between the districts' curriculum and technology departments. Saugus' Klein and Anderson, who was a curriculum technology coordinator in the district when the initiative began, focused on finding a technology that would allow teachers to do things they couldn't previously do in classroom writing assignments: for instance, provide instant feedback on student writing.

"Under normal circumstances, when a classroom of 30 students writes essays on paper and hands them into their teacher," Anderson explains, "it would be impossible to give them each feedback within 20 seconds, and by the time you do get back to the students with notes or corrections, they've mentally moved on from the assignment."

At the time, MY Access, which Klein describes as "Microsoft Word's grammar checker on steroids," hadn't been used for students as young as fourth-graders. Saugus worked with MY Access to provide suitable prompts and build better assessments for students at that level. "We stressed with our

teachers from the beginning that no piece of software, including MY Access, is perfect. It's a system, and students are going to find ways to game the system," explains Klein. "There truly is no replacement for the teacher in the classroom."

Yet, MY Access tells students where and when their grammar or spelling is incorrect and, in certain settings, can even address the content of their writing. When students submit a piece of writing, MY Access scores the assignment on a scale of zero to 6.0, highlighting areas that need work. Students can resubmit their work and watch their scores improve as they make revisions. The goal is to fix all grammar, spelling, and usage errors before turning the assignment into the teacher, who can then focus on assessing the content.

"MY Access helps our students become better self-editors," explains Anderson. "These are 9- and 10-year-olds, so whether the topic they're writing about is in social studies, or science, or math, or an English narrative response, the topic is irrelevant. The software just looks for good writing, and it helps us as teachers be more effective in teaching the whole writing process, including editing and revising."

Lend Me an Ear

The second component of Saugus' SWAT-TEC initiative is providing students with an authentic audience for their writing through web 2.0 and social media tools. "An authentic audience lends weight to the students' work and adds value to writing assignments," explains Klein. "By posting content online, writing becomes much more important and relevant to the students. Writing activities suddenly take on a new life. You couldn't incorporate the social aspect of writing at this scale without technology."

Instead of writing a report on Martin Luther King Jr., for example, which might be tacked to a bulletin board in the classroom, students now post that report to their blog and incorporate photos, videos, and citations. Or maybe they'll record themselves reading that report aloud for a podcast. "We're not sacrificing any standards or content by focusing on this initiative," explains Klein. "Instead, we're enhancing our students' capability to understand and deliver their knowledge on the standards through this mix of writing and technology."

And, as Anderson notes, within the confines of the fourth-grade classroom, the netbook truly becomes a cross-curriculum tool. "In my classroom," says Anderson, "the computers come out in the morning and they go back into their cart 15 minutes before the end of the day. We use them for writing, but the students also use them as needed to access the internet for research and skill building throughout the day. The kids absolutely love having this tool."

At Littleton, the initial deployment required that teachers incorporate the students' netbooks in fifth-grade classrooms as well as language arts instruction in every grade. That initial grant paid for 2,900 netbooks. As the popularity of the initiative has grown, individual parent-teacher organizations and schools throughout the district have placed 3,100 more netbooks into individual science and social studies classrooms, lower-grade elementary classrooms, and some shared environments.

"It's been really exciting, because at the district level we just wouldn't have the funding to do a true 1-to-1 initiative beyond the fifth grade, where the students don't trade classrooms," explains Maas. "To see our PTOs really get behind the initiative and fund a further deployment in their own way is a real testimony to what the parents see in this effort."

The Littleton Inspired Writing initiative focuses on using cloud-based tools to enhance language arts instruction and increase students' enthusiasm for writing. As Maas notes, the initiative isn't designed to reintroduce the idea of writing to the districts' teachers, but to take what the teachers know about writing, "which is extensive," and forward it to the 21st century. Now, instead of giving a lecture in front of the classroom, a fifth-grade teacher might engage students in a five-minute mini-lesson that covers the day's topic before the students form small groups and begin contributing to a collaborative report in Google Docs, or posting research into a wiki environment.

"Writing itself is a higher-order area of the curriculum in terms of thinking. If students do better in writing, they'll do better across the board in other subject areas."

—Arlene Anderson, teacher, Saugus Union School District

"The revision history feature of Google Docs enables better accountability in group projects," Maas notes. As part of their training in cloud technology, teachers attended a writer's workshop and then followed up to unpack what they learned for the technology-enabled classroom.

"For example, when teachers are asked to include a 'peer review' step in the writing process, we showed how Google Docs, wikis, and blogs can support that activity," Maas says. "Certainly, teachers do not audit every single document's revision history, but in some cases they will spot-check and in others they will use a specific assignment to measure group work."

Seeing Results

As a part of a national research program on the use of laptops in education, researchers from the University of California, Irvine Department of Education looked at state standardized test scores in both Littleton and Saugus before and after the writing initiatives were put in place. In their report, the researchers noted that, after the first

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year of implementation, test scores for Littleton fifth-graders improved by 25 percent and, for sixth-graders, 20 percent.

In Saugus, researchers compared individual student gains in writing and language arts scores before, during, and after the SWATTEC program's implementation. Writing scores improved 10 percent when the writing program was available part of the year and 23 percent when available the entire school year. Similar improvements for English language arts scores were 8 percent and 33 percent, respectively.

Anecdotally, the Saugus district's fifth- and sixth-grade teachers report that students are coming out of the fourth grade with far better writing and critical thinking skills than they had previously demonstrated, explains Klein. "Our upper-elementary teachers are reporting that they can move forward with their own initiatives and do far more interesting things in class because their incoming students are better prepared for the new school year."

At Littleton, the Inspired Writing initiative is one of many initiatives the district has implemented to move its curriculum into the 21st century. Significantly, Littleton Public Schools is the only district in the Denver metropolitan area to be accredited with distinction by the Colorado Department of Education the last two school years. Most impressive to Maas, though, has been the enthusiasm students now demonstrate for writing.

"The students went from not liking writing to writing a lot," remarks Maas. "The obstacle before was the rewriting; they just don't want to rewrite an entire handwritten report to improve it. If that's the simplest thing you take away, because on a computer you don't have to rewrite the entire assignment, then you add the collaboration and sharing that the web provides, it transforms writing from a dull, monotonous task to one of the most exciting things you can do at school." the

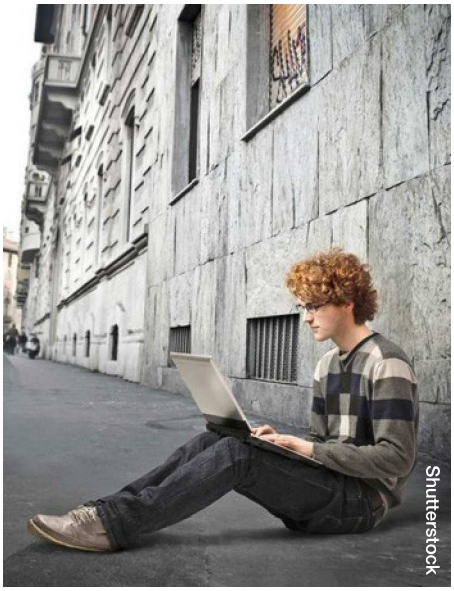
"By posting content online, writing becomes much more important and relevant to the students. Writing activities suddenly take on a new life. You couldn't incorporate the social aspect of writing at this scale without technology."

—Jim Klein, Saugus Union School District

THE RESEARCH ON WRITING

WHILE A BODY OF RESEARCH on properly implemented 1-to-1 laptop programs that give students 24/7 access to devices is already well established, another set of studies has focused specifically on laptops' boost to writing scores.

In a comprehensive summary of 1-to-1 studies, Lori Holcomb, a researcher on instructional technology at North Carolina State University, notes a 2003 study where researchers gave students writing assessments both before and after the introduction of laptops. The study found a 22-percent increase in the number of students who met or exceeded writing performance standards for their grade the year after the initiative began. Writing and problem-solving skills also improved when students were given round-the-clock access to laptops.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Research performed in Maine—where the state has provided each seventh- and eighth-grader with a laptop and schools with related professional development since 2002—has shown that the average student post-implementation has scored better on state writing tests than approximately two-thirds of all students before the 1-to-1 program was introduced.

And although all students in Maine have laptops, the same study found that those who used them for all phases of the writing process had the highest scale scores. The average student who used laptops for all phases scored better than approximately 75 percent of those students who did not. Additionally, writing scores in Maine increased regardless of whether students took tests using paper and pen or computers, reinforcing the notion that properly implemented 1-to-1 programs aid students in becoming better writers in general.

Jennifer Demski is a freelance writer based in Brooklyn, NY.

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