# Case Study One

## Promoting Effective Technology Use — A Superintendent's Story

**Authored by William E. Powell**
**Edited by Suzie Boss**

*In rural areas, the use of educational technology is having a significant impact on both students and teachers. This case study opens with a story. As you read about Lisa, consider how the strategic use of technology can help students overcome challenges and make learning gains.*

*The case study continues with a discussion of strategies that support effective integration of technology in a rural community. These include:*

**Leadership Role:** Superintendent

**District Profile:**
Strasburg School District 31-J
Strasburg, Colorado
Type - Rural
# of Schools - 3
# of Teachers - 52
# of Students - 900
% Free and Reduced Lunch - 18%

**ISTE NETS-A Standards and Behaviors Addressed:**
IA, ID, IIA, IIC, IID, IIE, IIIB, IIIC, IVC IVD, IVE, VB, and VIA

- *Collaboration among rural districts, using technology to align the curriculum with standards, and linking teachers with resources*
- *Professional development to help teachers effectively integrate technology into the classroom and design standards-based units*
- *Leveraging resources to expand technology infrastructure and ensure ongoing technical support*

### Lisa's Story: Using Technology to Make Learning Gains in Math

Superintendent William E. Powell squinted as the brilliant early morning sun came up over the brown prairie plains of eastern Colorado. He drove to his small office, located in a back cubbyhole of the red brick Strasburg High School building. He made a cup of instant coffee in the teachers' lounge and started the week with a quick check of e-mail messages. He responded rapidly to those e-mails that required immediate action, then unapologetically propelled the spam and the rest of the e-mails to cyber


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heaven with one click of the laser mouse. He reviewed his electronic calendar to remind himself of the appointments and meetings for the day.

He heard a knock behind him and turned to see Lisa, a slender, blonde tenth-grader, standing awkwardly in the doorway. She held what appeared to be a white paper flag tight in her hand, waving it back and forth as if to signal surrender. Her voice, however, sounded of triumph, not surrender. "I've got the decimal test done, and my mom graded it for me. I only missed one out of 40. I want you to print out a study guide and a test for me on geometry."

The superintendent smiled and invited Lisa to sit down in a vacant chair beside him at the computer table. He quickly read her test paper, then asked, "This one that you missed, Lisa, do you understand why you missed it?"

"Yes, I forgot to move the decimal point far enough to the right on the scientific notation. Please, Mr. Powell, can you make me a study guide on geometry and get it to me later this morning?"

"Yes, Lisa, I can do that and get it to you at your passing between first and second periods."

As Lisa left, Powell smiled to himself as he reflected on Lisa and her struggle with math. Lisa had not done well on the state assessment test. In fact, her score was Unsatisfactory, according to the state. The state assessment test was administered last spring, and the results did not arrive back in the district until just before school started in the fall—a five-month delay. Powell and the high school principal, Jeff Rasp, sat down after the state results arrived to look at the high school test scores. It was clear that many of the tenth-grade math students needed more help. Powell and Rasp agreed that they lacked sufficient, timely information from the state test results. Powell will never forget Lisa's comment about the test. "The state assessment test is not about me … it's about the teachers," she said. "I need a test that is about me."

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Powell and Rasp agreed to use an Internet-based adaptive math test[1] to get more current and detailed math scores from each of the tenth-graders. The online math test took about 50 minutes to administer in the computer lab, equipped with a high-speed Internet connection. Results were available as soon as each tenth-grader completed the test. Individual student scores could be displayed in a clear, blue, bar-graph profile showing the scores for each student in eight sub-categories of math: 1) decimals, 2) fractions, 3) measurement, 4) geometry, 5) real numbers, 6) whole numbers, 7) algebraic patterns and functions, 8) data analysis and probability. Additionally, the online tool generated a student learning profile of deficiencies in specific skills. A linkage to a skills connection software application[2] allowed the immediate development of a study guide, individualized for Lisa or any other student. By using Internet-based software for testing and generating individualized study guides, administrators had answered Lisa's request for a more personalized assessment approach.

The superintendent and principal had agreed to divide the tenth-graders among the administrative team. Each would take several students and would meet one-to-one to review each individual's math scores. Lisa, Luke, Christi, and five other students were assigned to the superintendent. Powell sat with Lisa, and together they reviewed Lisa's math profile sheet. Powell got on the Internet and showed Lisa that, even though decimals were her weakest area, there were many specific decimal skills that she actually knew. He knew he needed to build on her strengths in decimals to help her overcome any weaknesses. He printed out an Individual Learning Profile sheet on decimals that showed Lisa specifically what decimal skills she knew, and what specific decimal skills she needed to work on. "You have some pot holes in your math road, Lisa, you need to fill in," Powell remembered saying to Lisa. "Do you want to fill in the holes?"

"Yes, what do I need to do?" Lisa quietly asked.

"We can print out three things for you, Lisa, which you can take with you today to start filling in the pot holes. Here is a **study guide** on decimals


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that is individualized for your current grade level in decimals. Even though you are in tenth grade, you are performing in decimals at about level 5. We can bring you to a higher level, if you are willing to work at it."

Powell printed out the 14-page study guide on decimals for Lisa. He went over the study guide with her, marking in yellow the specific skill areas she needed to study. The study guide gave her step-by-step help on how to solve each of the specific skill areas in decimals, and each skill area had at least two example problems. "Do you understand how the study guide works, Lisa?" Powell asked her after they had gone over the first section together.

"Yes, it is pretty clear to me. I think I can do this."

"The next thing I am going to give you, Lisa, is a test, so that when you complete the study guide, you can take a **test** to see if, in fact, you do understand the concepts and skills of decimals. The test will help you see how many holes in decimals you have filled in." Powell printed out a test on decimals individualized for Lisa, based on her Individual Learning Plan profile. There were at least three different test items for each of the specific decimal skills in Lisa's Individual Learning Plan.

"The third and last thing I am going to give you, Lisa, is an **answer key** to the test, so you can score yourself when you finish the study guide and the test."

"Mr. Powell, I don't want the answer key, because I might cheat."

"Lisa, you take the answer key. This is all about you learning the decimal skills you need to fill in the holes in your math road. It is not about cheating. I trust you, and you need to trust yourself."

Yes, mused Powell, Lisa is making progress. She has just finished the decimal test. Now, she is asking for another study guide on geometry, the second-lowest area on her math profile sheet. She sees the need herself, and came to get the material to fill in the next big pot hole in her math road. Powell turned back to his computer, got online, pulled up Lisa's

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profile, and printed out the geometry study guide, test, and answer key. He told the school secretary to make sure Lisa saw him after her first period. She did. He gave Lisa the geometry packet, expecting her to return it early the next morning. She smiled with a teenage grin and disappeared out the door.

Surprisingly, just before the school buses left to take students home that afternoon, Lisa came back with her geometry test already completed. Nellie Ann Tresch, her math teacher, had scored the test during seventh hour, and Lisa had missed four out of 50 geometry items. Now she wanted three more study guides, covering real numbers, algebraic patterns, and data analysis. As he handed her the three additional individualized packets, she told him, "I like math. I want to do well on the next state test." Powell stopped by the math class to talk with Lisa's teacher. "I don't know what you have done to Lisa," the teacher said, "but whatever it is, keep it up. She asked me near the end of seventh period if she could do her homework at home tonight rather than at the end of class, since she wanted to finish the geometry materials you gave her. When she finished, she asked me to grade her test."

Powell left the math classroom and saw Luke headed to the gym. "Hey, Luke, got a minute?"

*Lisa's story offers a powerful example of how a strategic use of educational technology is helping to improve teaching and learning in this rural community. Now, let's take a look at the key decisions involving curriculum, professional development, and technology infrastructure that have helped to make such success possible.*

**Collaboration to Align the Curriculum and Link Resources**

Four years ago, rural school districts located in the region known as the I-70 Corridor began working together to develop a common core curriculum, aligned to Colorado state standards and supported by technology. For the school districts of Bennett, Strasburg, Byers, and Deer Trail, collaboration is an effective strategy. Student mobility is high in the region, with both elementary and secondary students moving


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frequently up and down the corridor, transferring from one district to the next. By sharing a common curriculum, the four rural districts could better address the challenges of serving a mobile student population.

In designing the I-70 Corridor Curriculum, the districts used technology to develop interactive, teacher-friendly materials. More than 165 educators in the four school districts spent more than 5,000 teacher hours aligning a common curriculum in language arts, math, science, and social studies. Teachers from the four districts worked together in K–12 grade-level teams to align the curriculum horizontally and vertically. For example, there were 11 kindergarten teachers combined in the four rural districts. It was easier for all 11 to get together and work on the kindergarten curriculum, rather than trying to work on it alone or with only one or two other kindergarten teachers. Working collaboratively proved useful for teachers in the other grades, as well.

The curriculum was developed using a database program, then was moved to a word processing program to make it more teacher-friendly. It is easy for teachers to add, delete, or re-sequence concepts or skills to fit unique student needs in a teacher's own classroom. Teachers can download the I-70 Corridor Curriculum CD-ROM onto a computer at school or at home. That means teachers can work on curriculum and instruction anywhere they have computer access.

### Using the I-70 Corridor Curriculum

The I-70 Corridor Curriculum contains both concepts and skills. Each skill is numbered to facilitate dialog among teachers. Teachers have identified the performance level of each skill as either **introduce**, **stress**, **proficient**, or **enrich**. For example, a specific math skill may be "introduced at first grade." The same skill is "stressed in second grade." The student has to "show proficiency in third grade." The skill is "expanded or enriched in fourth grade," so there is no regression of learning. The curriculum is organized in a spiraling, pyramid-like structure with skills articulated and coiling upward from one grade level to the

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next. Skills that students must show as proficient are color-coded and bolded in blue, so the teacher can quickly and easily identify the learning goal.

The CD contains a wide variety of instructional and assessment resources, all in one easy-to-find place. Resources include: state assessment frameworks; state test item maps; state test released items. The CD also contains detailed **study guides** in the areas of language arts, math, reading, and science. It contains a **unit plan template** to help teachers: 1) develop an essential question for a unit; 2) use the Elements of Effective Pedagogy (Marzano, Pickering, & Pollock, 2001); 3) link directly to Internet-based activities and resources. Furthermore, the CD has an **index feature** that allows a teacher to go from a specific skill in the curriculum to the Internet to find instructional resources for that skill. The teacher can also cut and paste resources into the curriculum from various software programs[3] used by the district. Exemplary samples of student work can be scanned into a student's individual portfolio link.

When it comes to using the CD, a teacher is limited only by her or his own imagination. For example, the CD has a **grade book feature** that allows teachers to re-shuffle skills based on the learning needs of individual students. This allows teachers to form flexible instructional groups. A grade book can be developed using either a spreadsheet or a table in order to track each student's progress by each skill listed in the curriculum or by selected skills. A hyperlink from the grade book to an individual student's portfolio is available. The grade book feature is used by teachers during parent-teacher conferences.

The I-70 Corridor Curriculum also offers a powerful resource for new teachers. For example, Superintendent Powell has used the CD in classes for new teacher licensure candidates. In a recent class offered through the East Central Board of Cooperative Education Services (BOCES), Powell burned CDs for each of 16 new teachers and had them use the interactive elements of the I-70 Corridor Curriculum.


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Dr. Ron Van Donselaar, supervisor of the BOCES teacher licensure program, sees the value of new teachers learning to teach to the I-70 Corridor Curriculum aligned to state standards, not just teaching out of a textbook. New teachers need to learn how to find and index both instructional and assessment resources to each of the concepts and skills contained in the curriculum. Powell and Van Donselaar have the new teacher licensure candidates learn how to find and index resources using the I-70 Corridor Curriculum, and how to imbed the resources right into the curriculum on their desktops.

The I-70 Corridor Curriculum CD-ROM is distributed free to new and continuing teachers in the East Central BOCES, which includes 19 school districts and covers an area from the east edge of Denver to the Kansas border. Powell and a team have made more than 20 free staff development demonstrations throughout the East Central BOCES to teachers using their school computer lab. A copy of the curriculum materials is on the Strasburg School District's Web site at **www.Strasburg31J.k12.co.us**. The team has also made free presentations of Internet-based testing software, classroom software, and other technology tools for teacher use.

### Professional Development: Using and Integrating Technology in the Classroom

New teachers, as well as continuing teachers, need to know how to teach the approved curriculum more effectively by learning how to integrate technology into their classrooms. Superintendents in the I-70 Corridor's four rural school districts have taken a collaborative approach to providing teachers with professional development in effective technology integration.

Three years ago, the superintendents agreed to send two teachers to Colorado Springs for five days to be trained as Master Teachers in the Intel® Teach Essentials course[4]. According to Powell, "This was one of the best decisions the four rural districts have made together." The Master Teachers came back and provided 40 hours of training to 103 of the 165

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classroom teachers in the four districts. The free training was voluntary. Teachers learned how to use a wide variety of computer productivity tools, including how to make more effective classroom presentations[5], how to create publications[5], and how to build Web sites that support student-driven project-based learning.

More importantly, the Essentials course explains how to develop units through the process of "backward design," where a teacher starts by identifying desired results and determining acceptable evidence of understanding before planning teaching and learning activities. Teachers learn to design unit plans using a template (the big ideas, the "whys," "hows," and "to what extent"). Additionally, the Essentials course offers cooperative learning strategies, aligned to standards, to use in the classroom.

Many teachers now have the basic computer skills and pedagogy to teach their students how to use these same tools in the computer labs and in the classrooms. Technology tools are used in the classroom in systematic, practical, useful ways to: 1) compare and contrast or to show similarities and differences (Venn Diagrams); 2) summarize and take notes using a personal digital organizer; and 3) use graphical representations (such as *Seeing Reason*, a free online causal mapping tool available from Intel® Education); 4) generate hypotheses; and 5) use advanced organizers.

**Expanding Technology and Ensuring Technology Support**

For teachers to take advantage of technology to meet learning goals, they need technology support to ensure that computers and peripherals (printers, projectors, scanners, digital cameras, etc.) work properly. When Powell came to the Strasburg schools ten years ago, he took a tour of the two rural Strasburg schools. In the elementary school, he stepped into what was called the computer lab to find 20 computers piled on a table in the corner; only one worked. When he visited the computer lab at the high school, it had about 20 out-dated computers, with half of them not working properly. Powell knew he had to get some help with technology.


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The first thing he needed was a competent technology director to help develop a five-year technology plan and to keep the plan up-to-date. Employing Dave Spiller, the new technology director, was a critical step. Spiller helped the superintendent and the staff to develop a plan for: 1) upgrading the computer labs, 2) keeping the labs upgraded, and 3) expanding technology into other areas of the school, beyond the computer labs. It was Powell's job to work with the board of education to budget an approved plan and to make sure the plan was implemented as approved.

The initial plan called for placing the newest computers in the high school lab, and then, each year, cascading the older computers to the junior high lab and the elementary lab. The yearly updates to the plan also included upgrading outdated internal parts of the older computers as they were cascaded down to the lower grade levels. Over time, Spiller taught high school students how to help him upgrade the older computers by exchanging old parts for new parts. Additionally, some of the renovated computers were put in classrooms for use by students and teachers. The district went from about three dozen basically dysfunctional, individual computers 10 years ago to more than 350 new, wide-area-networked computers now serving 900 students in the Strasburg schools. Teachers and students now have e-mail and Internet access.

The plan also included information on upgrading the Strasburg High School fiber optics classroom that is linked to the nearby rural high schools in Bennett, Byers, and Deer Trail. The fiber optics linkage allows advanced classes in math, science, and foreign language to be taught via live interactive voice and video instruction between the four rural high schools. Students can earn an associate degree from the regional Morgan Community College while finishing their high school program.

To help Spiller keep the technology current, Powell has a third-grade teacher on a supplemental contract to also serve as a Teacher on Special Assignment (TOSA) at the elementary school to look after the computer lab there. This teacher is an Intel Teach Master Teacher, and she teaches an Intel Teach class on the weekends to new teachers in the district.

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Powell also has TOSA supplemental contracts for several other teachers to help students with new software in elementary math, secondary math, and English as a Second Language (ESL).

The four rural school districts also jointly sponsor the Prairie Creeks Public Charter School, which serves as an alternative high school for the four districts. Prairie Creeks serves 41 highly at-risk students in grades 9–12 for three different time tracks during the day: 8 a.m. to 11a.m.; 11 a.m. to 2 p.m.; and 2 p.m. to 5 p.m. Some of the students are young mothers who bring their infants with them to school. The alternative students use various integrated learning software[6] for part of the day, and each student is also required to be employed part-time job where he or she learns work and social skills on the job. The students also have high-speed Internet access to learn to do supplementary research projects. About eight students per year graduate from Prairie Creeks, and most go on to trade school, the military, or the workforce.

Technology support is provided for high school math teachers to use handheld computers in the classroom. Teachers can construct their own lessons and tests, and load them via infrared beaming to the handhelds for students. The handhelds also can connect to the district's skills and classroom manager software applications, so individualized student tests can be administered in specific skill areas in reading, math, and science. The feedback of the test results is immediate for the students and the teachers. Teachers can regroup students quickly for re-teaching, if necessary, or use the information to determine the specific lesson plan for the next day.

Technology support is also provided for English teachers and students in the junior high to connect via high-speed Internet to the "Summary Street" program through the University of Colorado in Boulder. This is an artificial intelligence, interactive Internet program that downloads a reading passage to the Strasburg junior high computer lab for a student to read. Once a student reads a content passage (i.e., poem, short story, math, science, history, etc.), the student then demonstrates his or her comprehension of the reading passage by writing on the computer a


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cogent, concise summary of the reading selection. When the student completes the summary, an individual profile is immediately displayed on the computer screen for the student to see. The profile shows the student whether he or she properly comprehends the passage and whether he or she is able to write an accurate summary of the passage. The profile shows graphically in color bars whether a student summarized all the key points of the passage, and whether the student had a summary that was sufficient in length, not too short or not too long, for each of the key points in the passage. According to Marzano and Pickering (2001), one of the most important research instructional strategies is for a student to be able to exhibit effective summary skills. The student can then immediately re-edit any portion of the summary and re-submit it for another profile update on summary skills of the passage. The students like this immediate feedback on their work, and it is difficult for the teacher to get them to leave the computer lab at the end of the hour.

**Summary**

*Use of technology in rural areas is having a significant impact on both students and teachers. It is helping individual students get timely, specific information on their academic strengths and weaknesses. It is providing individualized learning and testing materials for teachers to use with students. It is enabling teachers to align and realign curriculum to state standards, to form flexible instructional groups based on timely student testing, and to track individual student performance by individual skills. It is enabling teachers to develop unit plans that are more comprehensive and that tie directly to a greater variety of research-based instructional strategies and assessment resources. Effective planning and successful implementation of technology in rural schools starts small. Technology can expand into many different areas beyond a school computer lab. Technology can support classroom instruction and learning if the superintendent and school team work collaboratively on developing and implementing a long-range technology plan.*

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## About the Leader

William E. Powell (WPowell955@aol.com) is Superintendent of Strasburg School District 31-J in Strasburg, Colorado. For the past thirty-five years, Powell has served as a public school administrator, holding various superintendent and assistant superintendent positions in Colorado and South Carolina. He holds a BA in English, with a Masters degree in English literature and an Education Specialist degree. Powell's wealth of knowledge and experience has contributed to his success as an instructional leader. His focus on collaboration, continuous learning, and vision is helping his school district be successful, one student at a time.

## References

Marzano, Robert J., Pickering, Debra J., & Pollock, Jane E. (2001). *Classroom Instruction That Works: Research-Based Strategies for Increasing Student Achievement.* Association for Supervision and Curriculum Development (ASCD): Alexandria, VA.

## Resources

[1] Scantron's Performance Series* software (www.scantron.com/products/performance/index.asp)

[2] Scantron's Skills Connection* software (www.scantron.com/products/sc/index.asp)

[3] Inspiration* software (www.inspiration.com) and Scantron's Classroom Wizard* software (www.scantron.com/products/performance/index.asp)

[4] Intel Teach Program (www.intel.com/education/teach)

[5] Microsoft PowerPoint* and Microsoft Publisher* software (www.microsoft.com)

[6] PLATO Integrated Learning* software (www.plato.com) and A+nywhere Learning Systems* (www.amered.com/adv_products_migration.php)



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