

Champions of Change:
Special Students Affecting their Communities

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Over the past five years, ROCKMAN *ET AL* has conducted the external evaluation of the Tech-Know-Build (TKB) project, a joint initiative between the Crawfordsville Community School Corporation and the Indianapolis Public Schools, funded in 1999 by a U.S. Department of Education Technology Innovation Challenge Grant. TKB was designed to improve teaching and learning for rural and urban Indiana teachers and students through the infusion of technology and pedagogical and curricular reform. The idea for the Tech-Know-Build project evolved, in part, from a need to bridge the widening gap of technology access and skills that separate rural and urban Indiana students from their suburban peers. Tech-Know-Build combines portable technology and problem-based learning, both lauded by educators for connecting classrooms to the world outside and engaging students in real-world activities.

TKB's two school partners have provided over 8,000 students with the same sophisticated tools many adults use to do their work. All laptops are loaded with productivity and multimedia software, along with other instructional software— Inspiration, Beyond Books, World Book Encyclopedia—licensed by each district. Teachers and students have access to peripherals such as digital camcorders and projectors, and to the ANGEL learning environment, the public portal to the web. Both districts also provide wireless internet access, significantly expanding classroom resources and bringing participating schools closer to the vision of anytime, anywhere learning that inspired school leaders in both districts to embark on the ambitious Tech-Know-Build project.

TKB students use laptops for a variety of tasks: they complete assignments, conduct research, gather information, download images, create surveys, make graphs, share data, write reports, and surf the internet for work and play—using not just the same *tools* adults use in the workplace but also the same *skills*. In the course of their daily work, problem-based learning activities, and even non-

educational pursuits (like adults, some students are nimble multi-taskers), TKB students have become sophisticated technology users.

TKB students also use technology to communicate results and create presentations, the most extensive of which are the culminating activity of problem-based learning projects designed to engage students in real, complex problems. Over the past five years, ROCKMAN *ET AL* has conducted several research studies, including case studies in TKB classrooms. This is the story of two teachers and their students projects implemented in the two school communities with two subpopulations of students—English Language Learners and Special Education students.

Amy Carrington, English as a New Language Teacher, Crawfordsville Public Schools

In January of 2004, my advanced ESL students asked to do a project. I thought it was a wonderful idea and welcoming departure from the everyday grind of learning English via textbook and workbook. Our school is a “laptop school”. (Every student has the use of a laptop for the entire year. They can be used at school and/or taken home for homework, etc.) We soon realized that we could do a project utilizing the latest and most useful technology. After considerable brainstorming, the students decided that they wanted to make a movie, conveying the story of a new immigrant family’s move to the USA. The central theme of the story was to teach other immigrant children and families that they can succeed here in the USA. The entire assignment took on a mind of its own. The kids wrote the script (in English and Spanish); they organized the shooting schedule, filmed it, and edited it. All through the process, the kids used their laptops. They used Word for the script writing, the Internet for research information, and Movie Maker for the editing portion. It was a great success. In fact, I was asked to write a grant (through Learn & Serve) to fund an even bigger movie project the following year.

This past year has been a whirlwind, but it was very successful. Again we utilized assistance from our corporation (i.e. technology services and personnel), our community, and a cooperative “Telecommunications Class” that works with high school students from our school corporation and a neighboring school corporation. We added an information packet to this movie. We felt this was a necessary component to our project. Now when we present to organizations, companies, schools, or factories, we have a complete tool for them to use. It includes our latest movie (“The Price for a Better Life,” which chronicles the life of a new immigrant family in the US workplace), a written summary of the movie, student biographies, copies of the three documentary newspapers the class wrote as the project progressed, movie posters, discussion questions that correlate with the movie, and a “Thank You” page. The students planned, wrote, and designed all facets of the project.

Students found this project to be a challenging, extremely comprehensive format for learning to read, write, and speak in English (and Spanish!). Since the project was student conceived, student driven, and involving real-life issues for them, (the PBL process), motivation was never an issue. The students loved every aspect of it. In fact, they frequently met together after school at one of their homes to keep working on it. Their regular classroom teachers found the student's poise, confidence and willingness to accept new language challenges to really accelerate. The student's parents can't stop talking about the wonderful changes they have seen in their children. The language proficiency tests these students take yearly attest to the student growth in writing, listening, speaking, and reading comprehension after participating in such a project.

This project requires loads of planning and organization to be successful. While it is an extremely intense, time-consuming task for a class, I would highly recommend it. My students are now confident, motivated, and rather skilled new English language speakers. At the same time, they further honed their writing and reading skills in their first language, Spanish. It is truly a win-win project!

Laurie Blair, Special Education Teacher, Indianapolis Public Schools

My teaching assignment came last year when I found out that I would be teaching science and social studies blocks in self contained special education. The grade levels included 6th, 7th, and 8th. The disabilities range from specific learning disability, mild mental handicap, and emotional handicap. Since I knew I would see each class daily for at least a 40 minute block, I immediately started planning how I could integrate social studies, science, problem-based learning, and a way we could help our community and share our voices.

I began taking the students outside the first few days of school and asking them to make observations about the school surroundings. There is a contaminated stream next to our school with a warning sign and I pointed that out and began asking why this is necessary. We launched an investigation and discovered that our outdated sewer systems were to blame for the most part, but there were some things we could do to educate our community about to reduce the pollution and sewage that flowed into this waterway.

By researching the problem, we wanted to know what could be done and what was being done to address the problem. We found information on the internet and called a group called the Indianapolis Clean Stream Team that is part of the Indianapolis Department of Public Works. We explained what we were doing and invited them to our class and talk about what they do. We asked what we could do as students to help them in the quest for clean water in our city. This is where our journey begins...

When our new community partners came to our class, they shared videos, maps, and information that was currently available in the community. The Deputy Program Manager of Public Outreach asked if we could make an activity book for children to teach them about water pollution, prevention and conservation. She had an example of one that was created in Fort Wayne on storm water and hoped that we could make one for our city. We began researching and reading different levels of reading materials for children in kindergarten through third grade to make it kid-friendly and fun. The students looked for examples of puzzles and pictures, along with interesting facts and information.

Once we had the activity book together, we began working on our presentations. The sixth graders were working on prevention tips to share in an iMovie format. The seventh graders worked on a poem/rap with information to share. The eighth grade students worked on the PowerPoint and fun facts in the iMovie. The eighth graders also were responsible for presenting at our celebration dinner for the Tech Know Build grant. We worked tirelessly on a script and selected volunteers to work on the project for the final presentations. We first presented at the celebration dinner, then our talent show, and finally for the director of the Indianapolis Department of Public Works. We were the first to receive community appreciation rewards for helping the Indianapolis Clean Stream Team. Our presentation has been sent to a public relations firm and will be presented to our city's mayor.

The students were thrilled with the awards and public recognition (we have been featured in the Clean Stream quarterly report and the Indianapolis Star). The learning that has taken place this year has been phenomenal. The understanding and transferring of knowledge to answer questions and discuss (with confidence) the problems and solutions of water pollution has been the most spectacular growth to witness. Parents and students have all learned a great deal from our investigation from the very beginning to happy ending. Parents are astonished by the iMovies and presentation skills their children have polished. We continue to strive toward excellence in educating our students with special needs. The results of this project will continue to grow and mature as each child moves on in his/her academic and personal endeavors.

Research Findings

TKB students put considerable effort into these products and presentations, many of which could easily rival adult boardroom fare. Even audiences don't look that different: at celebration dinners in Indianapolis and open houses in Crawfordsville, students have shared their presentations with parents, city officials, and community and industry leaders, who say that students have gained communication and collaboration skills, a sense of "responsibility and leadership," and "greater

awareness of their city and their citizenship.” Partners also say that the community gains something in return—“knowledgeable citizens.” Long before they enter the workforce or think of themselves as productive citizens, students are gaining real-world skills and experience. These less tangible results of project participation indicate that the TKB project is moving closer to its goals of fostering 21st Century skills.

TKB is designed to develop students' 21st Century skills—digital-age literacy, inventive thinking, problem-solving, communication, and productivity—by integrating laptops and engaging students in learning activities that help them develop technological literacy, apply higher order thinking skills, collaborate with others, communicate effectively, and produce high-quality products. Student data, collected by ROCKMAN during the 2003-2004 school year from site visits, interviews, email reflections, and surveys of students (N=1753), show:

- ***All students are acquiring basic technology skills as well as the research, presentation, and communication skills outlined in project goals and district and national technology standards.***
The majority of students say they “never need help” or are “experts, and can help others” when performing a number of computer tasks.
 - doing internet searches (84%)
 - word processing (69%)
 - creating PowerPoint presentations (69%)
 - using the ANGEL online learning environment (57%)

Overall means for technology proficiency show that students are moderately comfortable reading and sending email ($M=2.53$ on a 6-pt. scale where 0= I've never tried to do this, 1= I always need help, 2=I sometimes need help, 3=I rarely need help, 4=I never need help, and 5=I'm an expert; I can help others), and working with graphs and pictures ($M=2.7$), somewhat less so with downloading games ($M=2.23$) and creating PowerPoint presentations ($M=2.36$), but still between the “sometimes” and “rarely” need help level. ¹Students are least comfortable using spreadsheets ($M=1.57$) and creating bibliographies for internet research ($M=1.65$). Teachers, including special education and ESL teachers, report that students use most common applications with ease, and that students' lack of technology skills rarely limit instructional activities. Approximately three-fourths of the parents surveyed say they have seen increases in their children's basic technology and research skills and ability to access information about assignments; just over half report increases in communication and organization skills.

¹ The means for this particular question may not be as useful and telling as percentages. Because of the scale (0-6) and the descriptors for each category, means may seem somewhat low, though proficiency is relatively high. For example, over half of the students (55%) say they never need help (5) or are experts (6) with email; adding those who say they rarely need help (4), the percentage rises to two-thirds (66%)—a percentage more impressive than a mean of 2.53 would indicate. Also, standard deviations for this question ranged from 1.05 to 1.95, which is the sd for sending and reading email.

- ***TKB students use their laptops frequently and routinely for schoolwork and personal knowledge, and have come to think of the laptop as an indispensable tool.*** Well over a majority of students—84%—report that they use laptops “once a week or more” for schoolwork. Specific tasks that students use laptops with the same frequency include:
 - searching the internet to find information for school projects and homework (73%);
 - searching the internet for information on things they’re interested in (72%);
 - using graphics, pictures, and clip art more (56%);
 - using Word to create, review, or revise written documents (55%).

Overall means for frequency of use were lower for activities students might not be expected to do on a daily or weekly basis—e.g., creating PowerPoint presentations ($M=2.35$, on a 5-pt. scale where 0=never, 1=once or twice this year, 2=once or twice a month, 3=once or twice a week, and 4=almost daily)—and for applications where reported skill levels were also lower—using Excel spreadsheets ($M=1.53$). Teachers’ estimates of how frequently students use laptops for various tasks generally jibe with students’ reports, though teachers report slightly lower numbers. Means indicate that, in their core classes, students use laptops most frequently in language arts and social studies, a little less frequently in science, and least frequently in mathematics. Parents report that their children use the laptops for most often for word processing and for creating PowerPoint presentations. IPS parents note the popularity of iTunes.

- ***For teachers and students, Internet access is one of the most appealing, instructionally rich, and indispensable aspects of one-to-one computing and the TKB project.*** Searching the internet to find information for both school and personal interests tops students’ lists of how they use their laptops, as well responses about what they would miss most if they did not have laptops. Teachers say that ready access to the internet greatly facilitates problem-based learning and expands available resources. Internet research has helped students explore issues, locate experts, and compile data. In reporting activities that have increased with TKB, teachers say that, more than any other activities, students “consult the Internet for information.”
- Although internet use is high, and essential to PBL and research activities, students may need lessons devoted to effective searching and regular reinforcement. Teachers agree that students get better at Internet research the more they do it: 7th and 8th grade teachers say that students are more proficient than they were a few years ago. Teachers also agree that students may not develop efficient search strategies instinctively: many browse without a plan, struggle with key words, rarely revise searches, or look beyond the first site listed. A pilot digital literacy study showed similar search practices. TKB can truly narrow the digital divide, but can do so more successfully if students develop efficient internet research skills.

- One-to-one computing has changed attitudes about schoolwork and given students pride in their work. Students believe that laptops have a positive effect on the quality of their work and grades, and that laptops make schoolwork easier and more interesting. The majority of students “agree” or “strongly agree” with several statements about how laptops help:
 - 88% agree or strongly agree that laptops make schoolwork easier to do;
 - 85% agree or strongly agree that laptops make schoolwork more interesting.
 - 80% agree or strongly agree that laptops help them improve the quality of their schoolwork.
 - 68% agree or strongly agree that “Using a laptop for school improves my grades.”

- ***Problem-based learning activities have also increased students’ engagement in school and schoolwork and given them a sense of ownership for the work they do and topics they research.*** All TKB students have participated in PBLs at some level, and many agree or strongly agree that:
 - solving real problems helps them learn (80% agree or strongly agree)
 - gathering real-world information helps them learn (82%).
 - they learn more from projects when they get to choose the topics to study and research (87%).

- ***Participation in PBL units has given students a deeper awareness of community issues and their roles as citizens.*** Teachers and parents have been impressed by students’ involvement in local, neighborhood issues. One parent noted that PBL activities have helped students “notice more about the things around them.” On a broader level, these activities have given students “Greater awareness of their city and their citizenship.” In some cases, students not only develop a social conscience but also get a measure of reality that helps understand how complex and multifaceted social issues are and “some of the partnerships needed to make improvement in their community.”

- ***PBL activities have also helped students develop leadership and collaboration skills and a sense of responsibility.*** Sometimes on their own, sometimes at the direction of teachers, students have devised way to work together, dividing tasks, assuming responsibility, combining talents for presentations. One parent noted that her child’s experience was “group oriented and team tasked, so she learned to work in a high-tech environment on a cooperative level.” According to another parent, adversity has also built skills: students in her child’s group had “to work through crisis because they lost all their work and had to start over.”

Tech-Know-Build's combination of portable technology and problem-based pedagogy continues to give ROCKMAN *ET AL* a unique opportunity to explore and assess how TKB has changed, in two different school districts, and what teachers and students do in and beyond the classroom. Ongoing research activities focused on student outcomes include a study of student writing, students' digital literacy skills, a problem-solving performance assessment, and analyses of longitudinal institutional data and standardized test scores.