

CHANGE & CONTEXT

A FIVE-YEAR OVERVIEW OF TWO 1:1 PROGRAMS

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The Project

The Tech-Know-Build (TKB) project, which combined 1-to-1 computing and problem-based learning, was a partnership between the Crawfordsville School Corporation and the Indianapolis Public Schools (IPS), funded in 2000 by a 5-year, \$9.8 million U.S. Department of Education Technology Innovation Challenge Grant. Furthering its own 1-to-1 initiative, Crawfordsville launched TKB in 2000, issuing laptops to 6th–8th grade students and teachers in the corporation’s one middle school. IPS joined in 2001, starting with 6th grade teachers and students in 3 middle schools, and adding grades 7 and 8 in the next two years.

By the 2003-2004 school year, and continuing in 2004-2005, laptops and wireless internet access were available to 6th–8th grade teachers and students in all 4 schools. Crawfordsville provided laptops to 40 teachers and 600 students annually; IPS, to 140 teachers and 2,500 students. Through summer institutes and onsite training, both districts also offered teachers technology and PBL professional development, with the help of Indiana University/Purdue University Indianapolis (IUPUI), Purdue University, and the Center for Interactive Learning and Collaboration (CILC). In 2005, the USDE approved a no-cost extension year to help districts further their goals.

The Districts

Crawfordsville and IPS are in many ways very different: Crawfordsville is a small, rural district serving 2,500 students. Though still largely homogeneous, the district was undergoing changes when school leaders applied for the grant: numbers of minority students had more than tripled from 1995 to 2005 (from 3% to 11%), and numbers of students receiving free

lunches had gone from 29% to 47% in half that time. IPS, Crawfordsville’s urban partner and Indiana’s largest district, serves 40,000 students; the 3 TKB schools have high %’s of minority students—55% to 85% Black, 1% to 15% Hispanic. An average of 80% of the students are eligible for free and reduced lunch.

Despite differences, school leaders shared some basic concerns when they joined forces to write the Challenge grant. Test scores and blue-collar jobs were declining, equity of access was a nagging issue, and schools didn’t seem to be doing enough to prepare students—for higher standards, higher education, jobs, or a global economy. Leaders also shared a commitment to innovative uses of technology, and a hope that ubiquitous computing could improve teaching, increase school resources, and help students acquire 21st Century skills.

The Teachers and Implementation

Teachers had had laptops for two years when Crawfordsville launched TKB, but they were still on the upslope of proficiency, and looking for ways to use laptops effectively. TKB enhanced *and* complicated integration. Teachers were faced with the challenge of integrating laptops and PBL, and of managing classrooms when every student flipped open a laptop. Prior to the installation of wireless access points and cards, it was, according to the Project Director, “an agility test just negotiating cables and power cords running through the room.” In Year 2, a system-wide virus disabled computers and very nearly halted the project. Participants were beginning to understand why they called these “Challenge Grants.”

IPS had its own Challenge Grant challenges. Coming just after 9/11, the first roll-out was delayed, causing frustration among teachers, students, and parents. The simultaneous teacher/student deployment left teachers trying to keep up with students, and facing issues similar to those in Crawfordsville—classroom management, the allure of games and web sites, and the double whammy of learning new technology while incorporating problem-based learning.

Though the challenges were formidable and full implementation took time, by TKB’s fourth year both districts were successfully deploying laptops to all teachers and eligible students in the 4 participating schools. Comfort levels among teachers, buy-in from administrators, students’ care for an expensive piece of equipment—all had improved. All teachers had been trained, and most had found ways to fit laptops and PBL into teaching goals and styles and content standards. Laptops were loaded

with productivity and multimedia software, and software—Beyond Books, Inspiration—licensed by each district. Teachers and students also had access to peripherals—digital camcorders, projectors—and to the ANGEL learning environment, the public portal to the web. Both districts had wireless internet access, expanding classroom resources and bringing participating schools closer to the vision of anytime, anywhere learning that inspired both districts to embark on this ambitious project. *And*, almost all teachers said they wouldn't go back to teaching without laptops, especially without the internet.

The Students

Not surprisingly, it took little time for TKB students to feel comfortable with the technology. Even after one year, observation data and self-reports indicated that they used laptops for an array of tasks: completing assignments, conducting research, gathering information, downloading images, writing reports. Tech-savvy students helped teachers trouble-shoot computer problems. IPS Student Assistant Lab Technicians diagnosed problems, fixed some, and dispatched the rest to the proper repair line.

TKB students used technology—PowerPoint, iMovie, Keynote—to collaborate and create presentations of PBL projects, on topics ranging from polluted streams to childhood obesity to disparity in supermarket fare between poor and upscale neighborhoods. IPS students were especially drawn to problems linked to poverty—infant mortality, teen pregnancy, drug abuse, dropouts. Students also researched current issues—the impact of sex and violence in movies, music, and videogames, and the viability of all-day kindergarten. As part of their investigations, students collaborated with experts and community partners.

Projects with a life beyond the classroom included an IPS iMovie that inspired a school-based adopt-a-family program and a promise from the principal to make it a school legacy and a gift to the community. IPS special education students created a pollution “Tox Drop” rap and iMovie that earned them a PSA on a local radio station. English-as-a-New-Language (ENL) students in Crawfordsville wrote a 3-act, bilingual play describing the challenges of non-native speakers in an English-speaking world. The play evolved into a movie, *Sueño Americano (American Dream)*, which students shared with younger English language learners. Other Crawfordsville students involved in a heart monitor project increased physical activity levels and joined a local hospital in a wellness project for seniors. Teachers designed workshops for health and PE teachers around the state.

The Lessons Learned

Through successive years, TKB leaders and partners gained considerable collective wisdom about implementing a long-term, large-scale, high-stakes laptop project. Experience refined mechanisms for repairing, re-imaging and redistributing laptops year after year to increasing numbers of students. District leaders refined the TKB model—and eventually used 1-to-1 computing as the standard for long-range planning and district technology integration. University and professional development partners tailored training to teachers' needs and to the kinds of authentic problems students generated. As the project neared its end, district leaders began addressing obsolescence and other issues associated with fast-changing technology. A year later, they reflected on the TKB model—what worked, what didn't, what they had learned. Among the lessons were:

- Encourage a curriculum that lends itself to rich technology; help teachers fold technology into content and standards. Give them, and students, ways to use laptops creatively.
- Don't try to do everything at once. Start with technology training, then focus on integrating technology into instruction, then on new instructional strategies.
- Offer teachers follow-up training; encourage professional development providers not to teach a class and wave goodbye. It's not a credit—it's an ongoing learning process.
- Include professional development for principals. Without building-level leadership, you're “dead in the water.”
- Provide building-level tech support: in a perfect world, a high-level technician; in the real world, a tech coordinator, skilled teachers, or students. Remember: kids are hard on laptops, 3-4 year old laptops are hard to repair—and a week is too long for students to be without one.
- Develop a digital literacy curriculum for students; involve teachers and librarians in the process.
- Look for authentic problems: neighborhoods are urban kids' communities; you often don't have to go further to find problems they can connect to.
- Look for creative ways to support parents and the home piece. It's critical for a 24/7 vision, but often a downfall in urban environments where families may not have phones for dial-up and a visit from the cable guy is too intrusive.
- Don't rely on paper partnerships or base them on the capacity to write a check. Build partnerships in which everyone brings something to the table.
- Remember how downtown works. Get the support of technology *and* curriculum departments; let the latter know that teachers' skills may exceed their own.
- Plan aggressively for obsolescence.

The Evaluation

ROCKMAN ET AL served as the external evaluator for TKB's 5 years. The questions the school community asked in the first 3 years focused on *implementation*: how and to what extent teachers and students used laptops and PBL strategies, how and why implementation varied, what training teachers needed. In Years 4 and 5, questions shifted to *impact*: how classrooms were changing and whether laptops and PBL had an impact—on students' problem-solving and digital literacy skills and on traditional literacy and academic achievement.

Formative activities included pre/post surveys of students, annual teacher and parent surveys, classroom observations, interviews and focus groups—to document implementation and explore changes among teachers and students and differences between sites and within schools. *Summative* studies included a comparison of writing attitudes and performance between TKB students writing with paper/pencil and those using laptops, a pilot study of internet search skills and strategies, a comparison of student performance on a problem-solving assessment between TKB students and students in matched comparison sites, and an analysis of achievement and institutional data between TKB and demographically matched sites.

Results showed that:

- TKB teachers used laptops once a week or more, and were increasingly comfortable doing so.
- Almost all TKB students used laptops eagerly and regularly, and reported that they never or rarely needed help with basic technology skills.
- Most teachers believed laptops increased motivation.
- Students used laptops for multiple tasks: completing assignments, conducting research, gathering information, downloading images, creating surveys, writing reports. Tasks related to PBL activities were often more substantive.
- Internet research was one of the most popular, regular uses of laptops, incorporated by almost all teachers. Though students used the internet frequently and confidently, most needed help to search efficiently.
- Incorporating PBL effectively took longer than expected; not all teachers embraced PBL, though most used individual strategies.
- Students preferred writing with laptops to writing with paper/pencil. Data showed no significant differences, but did show correlations between higher writing scores, enjoying writing, and writing with laptops.

- Analysis of achievement data showed no significant gains, although students in lower-achieving schools did show some gains during the period of the TKB project.
- School data indicated increases in attendance and enrollments.
- Students believed PBL activities helped them learn.
- Teachers, parents, and community members believed PBL's gave students a deeper awareness of community issues and their roles as citizens.
- PBL gave students 21st Century skills, which they gained through:
 - *conducting research on authentic issues.*
 - *presenting to real audiences,*
 - *practicing logical organization, communication, persuasive speech, and other higher-order thinking skills.*
 - *developing oral arguments on the importance of issues.*
 - *planning, developing, and editing high-quality videos and multimedia presentations.*
 - *developing leadership and collaboration skills and a sense of responsibility.*

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