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*One-to-One Computing in Indiana*  
**A STATE PROFILE**

**PRELIMINARY REPORT**  
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## Executive Summary

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*“Achievement in U.S. schools was lagging behind that of other countries. Home computers were the competitive edge Indiana needed to catch up by extending learning beyond the school day, and, at the same time, involving parents more in their child’s learning.”*

--Dean Evans, Former  
Indiana State Superintendent

Indiana has been a pioneer in ubiquitous computing. As early as 1988, state leaders had launched the Buddy Project, which placed computers in the homes and schools of 4<sup>th</sup>, 5<sup>th</sup>, and 6<sup>th</sup> graders in select schools. Legislative support for Buddy was driven by two factions: industry leaders and state education policy leaders. The telecommunications industry believed that ubiquitous computing could help build the high-tech workforce needed to diversify Indiana’s economy and extend telecommunications infrastructure throughout the state by increasing demand. Dean Evans, then State Superintendent, served as the major catalyst for enactment of the legislation for one-to-one computing. He was determined to increase students’ time on task, and was convinced that home computers would extend learning time and reconnect parents to their students’ academic studies, especially in the case of high-need students.

The Corporation for Educational Technology (CET) provided oversight and guidance for the Buddy Project. Yearly evaluations by the North Central Regional Educational Laboratory (NCREL), along with 1993 and 1995 evaluations by Rockman et al., found varying degrees of attainment of the three educational objectives associated with Buddy: enhancement of students’ higher-level thinking through the use of technological tools, increased parental involvement in the education of their children, and the establishment of a foundation for life-long learning. These evaluative reports leveraged continued legislative support and ongoing improvement of the program by the CET. But while it was clear that students and their families were gaining competency and fluency with technology, evaluation results were mixed on the impact the Buddy Project had on learning.

### **Indiana’s Expected Return on Investment from Ubiquitous Computing in Schools:**

- Economic viability through a high-tech workforce
- Improved teaching and learning
- Digital equity
- 21<sup>st</sup> Century Skill building
- Increased writing achievement
- Increased parental involvement

After more than a decade of state support, Buddy was reinvented, based in part on the aforementioned evaluative reports. Buddy<sup>2</sup> continued its emphasis on home and school computers, but with renewed focus on academic achievement. In fact, Buddy<sup>2</sup> focuses almost exclusively on writing and technology. The program now provides resources and professional development that enable teachers to engage students in the high-quality, authentic process of writing, as augmented by technology. This shift in emphasis has significantly downplayed the role of associated technology tools. More than 30,000 students have been involved in the Buddy project to date.

Even more recently, the Indiana Department of Education launched a third ubiquitous computing program with low-cost desktop computers focused on literacy at the high school level. This program is currently underway, with research results expected soon. The Department’s intent is to identify affordable models for one-to-one computing at the high school level.

Essentially, ubiquitous computing in Indiana was an idea before its time. Launched in 1988, Indiana's Buddy Project predated the Internet, affordable laptop computers, and daily email. As a result, it was an important long-term study in:

- Closing the digital divide by placing computers in students' homes for family use
- Increasing the technology competency of students and family members (and thus increasing their economic viability)
- Adding the value technology brings to learning.

The Buddy<sup>2</sup> Program shifted the focus from the technology itself to effective uses of that technology to augment sound methodology for learning.

**1:1 in Indiana - Quick Facts:**

- *The Buddy System Project (first incarnation): 1988 – 2000*
  - Involved over 9,000 families
- *The Buddy<sup>2</sup> System Project: 2000-present*
  - Involves over 750 families and 40 teachers and their classrooms in the writing process
- *U.S. Department of Education Technology Innovation Challenge Grant, awarded to "Tech-Know-Build" (TKB) Project:*
  - Year 1 Implementation at 1 middle school in Crawfordsville, IN: 1997-1998 school year
  - Year 1 Implementation at 3 middle schools in Indianapolis, IN: 2001-2002 school year
  - Students and teachers currently involved: 2,935 6<sup>th</sup> through 12<sup>th</sup> grade students and teachers
  - Number of schools: 5 schools in 2 districts
  - Technology currently used: Mac and PC laptops, wireless networks
  - Actual cost (TKB only): \$9.8 million over 5 years
- *Indiana Department of Education's High School Literacy through One-to-One Computing project: 2002 - present*
  - Pilot in three high schools in fringe areas beginning in 2003

Indiana programs differ significantly from many of the other ubiquitous computing initiatives across the nation. Whereas Buddy, Buddy<sup>2</sup>, and the IDOE High School Literacy one-to-one pilot were centered on the use of a desktop computer at school and home, most ubiquitous computing initiatives nationally are now centered on mobile, personal, anywhere, anytime computing.

While state officials are extremely supportive of ubiquitous computing, they are concerned about the costs in today's troubled economic times. They are supporting laptop ubiquitous computing through EETT grants, but are also piloting low-cost, desktop one-to-one computing to ensure that their districts have affordable models through which student learning can be augmented.

*One-to-One at the School and District Level:*

The picture is somewhat different at the district level in Indiana. Thanks to the leadership of a former Superintendent at the Crawfordsville Community School Corporation, that district began a one-to-one laptop program in 1997 with the idea of giving their rural middle school students equal access to the digital tools of the 21<sup>st</sup> century.

*“Teachers – even the ones who were reluctant at first – really started to see how this transformed the kids, so they made the effort to make one-to-one work.”*

– District Administrator,  
Crawfordsville Community School Corporation

Following in the footsteps of their pioneering neighbor, urban Indianapolis Public Schools sought to leverage the potential of one-to-one as well, for many of the same reasons. As both districts were seeking to improve teaching and learning, close the digital divide, and build the skills their students would need to succeed in the future, they joined forces in 1999 and applied for a 5-year, \$9.8 million dollar U.S. Department of Education Technology Innovation Challenge Grant.

**Pleasant Surprises:**

- Improved relations between teachers and students
- Increased involvement of parents and communities with students and schools
- Increased teacher engagement and enthusiasm – positive changes in school culture

The resulting project, known as Tech-Know-Build, now provides nearly 3,000 students and teachers at H.L. Harshman (IPS), Crispus Attucks (IPS), Forest Manor (IPS), and Tuttle (CCSC) middle schools (6-8) with wireless-enabled laptop computers 24 hours a day, 7 days a week. One hundred and fifty students at Crawfordsville High School (9-12), through cart-based laptop use during school hours, are beginning to benefit from the technology as well.

The Tech-Know-Build project incorporates a strong emphasis on problem-based learning, including a comprehensive professional development component for teachers and administrators developed in partnership with

Indiana University (Indianapolis), Purdue University, and the Center for Interactive Learning and Collaboration (CILC). This professional development component is proving to be a key to program success.

In keeping with the goal of engaging, problem-based learning, students are expected to begin each school year by constructing a critical question with an authentic, real-world application. They work collaboratively throughout the year on their projects in the context of a standards-based curriculum (across disciplines, doing pieces of their project along the way). At the end of the year, a peer review process takes place and team projects from each school are selected for presentation to teachers, administrators, parents, and the community.

As specified under the terms of the grant, an external Year 3 evaluation of the Tech-Know-Build project is currently underway by Rockman et al. Though the full report is not yet available, its preliminary findings (as appropriate) supplement those included here.

**Remaining Challenges:**

- Sustainability beyond grant
- Additional tech support – especially on-site
- On-going and just-in-time professional development throughout the school year
- Keeping students on track – with educational rather than entertaining uses of technology – during the school day

## 1. Why did (or didn't) educational policymakers in Indiana focus on ubiquitous computing?

*"Indiana's first venture into ubiquitous computing in 1988 was driven by economic interests, focusing on the technology. Over time, the focus shifted to academics—with special emphasis on students' writing skills."*

--Phyllis Land Usher, Associate Superintendent

Indiana was ahead of its time in thinking about ubiquitous computing. As early as 1988, state leaders had launched the Buddy Project, which placed computers in the homes and schools of 4<sup>th</sup>, 5<sup>th</sup>, and 6<sup>th</sup> graders in select schools. The initial drivers for the Buddy Project were:

- Economic viability – diversifying Indiana's economy and developing a high-tech workforce
- Educational achievement – extending learning beyond the school day and into the home
- Improved parent-student interaction – re-engaging parents in their children's learning

In the 1990s and 2000s the Buddy<sup>2</sup> Program and other ubiquitous computing initiatives have focused on:

- Academic achievement
- Literacy, especially writing

### **Vision:**

Initially, the vision for ubiquitous computing in Indiana came from the state education agency and the telecommunications industry. While that 1988 vision focused on diversifying Indiana's economy beyond manufacturing, industry leaders clearly saw the opportunity to establish schools as the "anchor tenant" required for expanded telecommunications services in all Indiana communities. Dean Evans, the state Superintendent at the time, believed that a computer in the home would expand learning time and increase time on task. As a result, he viewed the telecommunication industry's idea of ubiquitous computing, starting with select students and schools, as positive and viable for learning, and the Buddy Project was launched with an emphasis on using technology at school and at home.

After nearly a decade of support for ubiquitous computing in grades 4, 5, and 6, the Buddy Project was reinvented, with a strong focus on improved academic achievement. Though technology was still a component, it was no longer a focus of Buddy<sup>2</sup>.

Despite the dual visions of economic viability and higher academic achievement, the major focus of the first decade of ubiquitous computing in Indiana was on the use of the technology.

That emphasis has now shifted to academic achievement, with a focus on writing.

## Advocacy and Justification:

### *Leadership at the State Level:*

While the original drivers for ubiquitous computing came from the telecommunications industry, education leaders quickly acknowledged the potential benefits of one-to-one for students and advocated for the initiatives. In fact, the drivers for ubiquitous computing in Indiana today differ significantly from when the idea first took hold in 1988.

The circumstances that caused the telecommunications industry to think about ubiquitous computing were economic. At the time, Indiana had one economic base — manufacturing — and needed diversification. At the same time, the state lacked a robust telecommunications infrastructure that reached all of its counties. Leaders from the telecommunications industry believed that ubiquitous computing would simultaneously generate demand for a high-speed telecommunications infrastructure *and* develop a strong, high-tech workforce.

Meanwhile, educators in Indiana were being challenged to improve academic achievement. Their research confirmed the importance of parental involvement to student achievement and noted that 4<sup>th</sup> grade was a pivotal time where parents began finding it difficult to help their sons and daughters with schoolwork. Educators saw ubiquitous computing as a means toward increasing students' time on task, as well as increasing parental involvement in student work, and as a result threw their support behind the Buddy Project.

Since 1988, the Buddy Project has been continuously supported by public and private foundations, with major support coming from the Indiana General Assembly, the State Department of Education, the Lilly Endowment, and the Ameritech Foundation.

*“The majority of Buddy parents think that the skills and experiences their children gain in Buddy last not just into secondary schools but beyond: the ease with technology, the confidence, the new friends, the new community contacts, and the comfort with presentations — all of these, according to parents, are lifelong skills.”*

-- Rockman et al., 1998 evaluation

Annual evaluations have been conducted by the North Central Regional Educational Laboratory (NCREL), with periodic summary reports by Rockman et al. The reports have been used both as justification for continued funding and as formative assessments for continuously evolving and improving the program.

One study conducted by Rockman et al. in 1998 focused on the impact of Buddy beyond the targeted grades (grades 4-6). This study found that, *“the majority of Buddy parents think that the skills and experiences their children gain in Buddy last not just into secondary schools but beyond: the ease with technology, the confidence, the new friends, the new community contacts, and the comfort with presentations — all of these, according to parents, are lifelong skills.”*

The Buddy Project was different from many state education programs in that it was managed outside the state's Department of Education, though the funding was part of the Department of Education's budget. As a result, Buddy was initially viewed by many districts an add-on rather than as an integral part of learning in schools. The Buddy<sup>2</sup> Program has shifted its emphasis to the academics, helping districts to see the fit through alignment to standards. The Department's research project on writing and technology also has that more progressive emphasis.

### *Leadership at the School and District Levels:*

Still, rather than looking to the state for guidance, educators in both Crawfordsville and Indianapolis cited strong, district-level leadership as the most important factor in the conception and implementation of their one-to-one programs. Furthermore, according to the preliminary findings of a joint evaluation by Rockman et al., the ongoing success of one-to-one in Indiana is dependent upon the support and involvement of building-level leaders as well.

### **Research, Policy Studies, and Advocacy Documents Used:**

#### *State level:*

Since the early advocacy for ubiquitous computing in Indiana came from the telecommunications industry, the documents used to justify the program were largely economic reports that highlighted the large percentage of Indiana's economy dependent on manufacturing and the global shifts toward a new, knowledge-based economy. For example, business leaders at the time noted that the French company Intel had set a one-to-one goal of providing home computers across France and was beginning to provide online access to news services and information databases.

On the education side in Indiana, the state Superintendent based his support of ubiquitous computing on the research on "time on task" and the importance of parental involvement in student learning, as well as on growing evidence of a digital divide.

In their oversight of the Buddy Project, the Corporation for Educational Technology (CET) was influenced by major policy studies that took place between 1988 and 2000. Few of these addressed ubiquitous computing. In fact, most studies conducted during that time focused on achieving a 5:1 ratio of students to computers, with little attention paid to ubiquitous or even home computing.

By the time reports on ubiquitous, personal, mobile computing became available, Buddy<sup>2</sup> had been launched and the program's emphasis had shifted to the process of writing. And while Buddy<sup>2</sup> schools do use technology, this is limited to desktop computing and most often doesn't emphasize the overall culture shifts that mobile, personal computing seem to bring to learning.

The Indiana Department of Education's recent pilot program on high school literacy and ubiquitous computing, however, does provide insight into affordable one-to-one computing solutions available in these times of economic deficits. Though this research is only now underway, it will be interesting to see how the state uses the findings from this pilot program.

#### *School and District Levels:*

Most educational leaders in the two districts studied had at least read about other schools and districts where one-to-one was taking place. Somewhat surprisingly, however, neither district pointed to Indiana's own Buddy Project as having had any influence. In fact, though the Crawfordsville Community School Corporation (CCSC) actually began its program (initially with carts) in 1997 (prior to the start of the federal grant), project managers there attribute the impetus for one-to-one to a former superintendent who attended a Microsoft Anytime-Anywhere meeting in Atlanta. "*We never participated in Buddy,*" says one district leader at CCSC. "*I don't think it had much of an impact on our thinking about one-to-one.*" This is compounded by the fact that, in its

second incarnation as Buddy<sup>2</sup>, the statewide program has de-emphasized technology as a major component.

In reality, however, the Buddy Project may have had more of an influence on schools and districts than it is given credit for. According to district leaders in Indianapolis, *“Buddy may have been a forerunner, but the fact that the technology wasn’t portable was a bit of a barrier.”* Perhaps it is because of Buddy’s pioneering efforts that schools and districts in Indiana today are recognizing – and addressing – the need for true “anytime, anywhere” access to technology.

### Arguments Against One-to-One:

#### *State Level:*

The Buddy Project had the support of business and telecommunications sectors since its inception. In its initial years, there was not much opposition to the program at the state level largely because there were few state allocations for educational technology competing for the dollars spent on Buddy.

After the transition to Buddy<sup>2</sup>, the program’s focus turned to academics (specifically writing) rather than ubiquitous computing, and consequently continued to generate little opposition. To date, arguments against the program have more to do with resource allocation rather than with the phenomenon of one-to-one computing. For example, during the 2003 legislative session, allocations to districts for technology were discontinued while Buddy funding remained intact, albeit at a reduced level.

#### *School and District Levels:*

Early skeptics of the Indianapolis and Crawfordsville laptop one-to-one programs included teachers, many of whom were unfamiliar with the classroom management aspects of such widespread technology access. Others simply felt unprepared to integrate the technology into teaching and learning, and many building administrators admitted thinking their teachers would need *“quite a bit of training”* to meet even the basic levels of technology proficiency needed to get the programs off the ground. In general, the main arguments against one-to-one fell into the following four categories:

- Teachers will not be ready
- The laptops are *“just a frill”*
- Tech support levels will be insufficient to meet the needs of the initiative
- Students will break, lose, or sell their laptops

*“Once the district decided on one-to-one, we were told in May that we’d get our own laptops if we attended the 2-week workshop in June. Out of the ten 6<sup>th</sup> grade teachers here, only three of us could go on such short notice. Needless to say, the other teachers were pretty bitter about that!”*

-- Teacher, Crispus Attucks Middle School

To overcome opposition, school and district leaders offered teachers and administrators a supportive culture of risk-taking and up-front professional development workshops (though, as is noted in the sidebar, not all were able to attend the workshops during the first year they were offered). With practice, it wasn’t long before even the skeptics *“started to see how the use of technology transformed the kids,”* said one district administrator. *“It really changes the classroom landscape.”*

But though many detractors admit they've "learned a lot from watching the kids in action," a few remain unconvinced. In fact, 50% of the arguments against starting laptop initiatives reappeared as even more widely cited barriers to full implementation of one-to-one (see below).

## Barriers to One-to-One in Indiana:

### State Level:

Policy leaders in Indiana have continuously acknowledged their trust in the quality of the Buddy Project over a twelve-year funding cycle. It is telling that even last year, in difficult economic times, the program was funded, albeit at a reduced level.

However, it is also interesting to note that, despite policymaker support for Buddy, advocates for ubiquitous computing program were never able to convince legislators to scale the program to all schools and grade levels, even in years when Indiana was registering excess revenues of close to a billion dollars. It seems that the results from the Buddy Project, while fairly positive, have not been compelling enough to influence policy and resource allocation in the direction of one-to-one computing for all Indiana students.

### School and District Levels:

Though they did not cite additional barriers to the *initiation* of ubiquitous computing in Indiana, school and district-level educators identified the following barriers to the effective *implementation* of one-to-one at the classroom level:

- Lack of consistent, as-needed technical support
- Lack of on-going support for curriculum integration of technology
- A range of teacher technical proficiencies
- Non-universal connectivity and hardware access from home

### Lack of consistent, as-needed technical support:

Preliminary findings by Rockman et al. suggest that teachers in both districts are far more likely to engage in "higher-order applications" of technology when technical support is readily available. Though many teachers reported utilizing the on-demand support services provided by Indianapolis Public Schools, teachers across the two districts preferred having a technician on-site to address their needs as they arise in class (as is the current practice in Crawfordsville).

### **Example – The CILC Partnership:**

Having dedicated their Year 1 funding solely to professional development, Indianapolis Public Schools partnered with CILC (the Center for Interactive Learning and Collaboration) to create a multi-modal, problem-based unit that was taught in (paid) summer and weekend workshops. But while most teachers had an opportunity to attend either (and preferred the longer summer sessions), new-hires were only given the option of attending weekend workshops during the year. As a result, they've had to rely on their peers for many of their curriculum integration questions.

*"The two-week workshop was awesome! They sat us down and walked us through problem-based learning, and we developed our own units with curriculum materials we already use. The new teachers don't get as much training – they really miss out!"*

-- Teacher, Harshman Middle School

*Lack of on-going support for curriculum integration of technology:*

As teachers become more and more skilled with using technology, their needs shift from basic application or hardware training to learning how to integrate that technology into the curriculum in meaningful ways. Though many teachers involved in the Tech-Know-Build project were able to participate in summer workshops designed to immerse them in the use of technology for problem-based learning, newer teachers have been forced to condense their learning into weekend workshops that are much less comprehensive (see sidebar example). Furthermore, even teachers who did attend longer workshops admit that, without practice and opportunities to refresh their skills, the passage of time chips away at their ability to transfer what they learned over the summer.

*A range of teacher technical proficiencies:*

To complicate matters even further, some administrators in Indiana are having a difficult time selecting an emphasis for the ongoing professional development they *are* able to provide. At issue here is the range of technical proficiencies teachers possess; while some are ready to move on to more complex uses of technology, others continue to require more basic skills training.

*Non-universal connectivity and hardware access from home:*

Although the Challenge grant that funds these laptop programs is also intended to provide students and their families with home Internet access (a fact which should be enhanced in Indianapolis by a partnership with Time-Warner), Rockman et al. findings suggest that more than one-third of Indianapolis participants never had such access during that program's second year, and teachers report that this caused problems when assigning homework. While the issue appears to have been resolved in Crawfordsville, this may be an instance where simple sharing of solutions would have limited value; Crawfordsville is a rural district with a significantly smaller population than that of Indianapolis, and as such may not have a complete understanding of the logistics involved in supporting connectivity for large numbers of urban households.

*"Having observed the kids, we can see that they have a tremendous ownership of the laptop and its applications – as well as their own learning – because they can take the machines home."*

-- Tech-Know-Build Project  
Coordinator, Crawfordsville

## 2. What trends are emerging in national, state, and local policies that impact ubiquitous computing in Indiana?

### **National Trends:**

According to state policymakers in Indiana, there are five national trends that impact ubiquitous computing in the state:

- High-stakes accountability
- Equity of student access to technology
- Budget cuts in education
- Standards-based learning
- Renewed focus on highly-qualified teachers

#### *High-Stakes Accountability:*

The focus on high-stakes accountability through No Child Left Behind has been a significant factor in shifting the emphasis of Indiana's ubiquitous computing initiatives away from technology literacy and toward serious curriculum leadership to ensure that sound pedagogy is driving technology use.

#### *Student Access:*

Student access is a critical factor in the current IDOE pilot for low-cost ubiquitous computing at the high school level. The intent is to provide students in fringe areas of the state who don't have access to technology with ubiquitous access in school and outside of it. IDOE not only expects to build students' English language proficiencies, it expects that these students will become much more viable in today's workforce. IDOE intends to track students in the pilot as they enter the workforce to test their hypothesis.

#### *Budget Cuts:*

Indiana experienced significant budget cuts during FY03. As a result, all state level educational technology funds were cut except for the Buddy<sup>2</sup> Program, and those were reduced substantially. Consequently, the state's capacity to support pilots, much less full-scale implementations of ubiquitous computing, is diminished. However, it is important to note that, despite the fact that the Buddy Project has been supported legislatively since 1988, it has never scaled to the entire state, even in years of fiscal prosperity. Districts, on the other hand, are beginning to pilot ubiquitous computing through the use of federal funds, often without consulting the state or analyzing the lessons learned from the Buddy Project.

#### *Standards:*

A look at the history of the Buddy Project strongly indicates that the establishment of state standards and the enactment of Indiana Public Law 221 (requiring schools to engage in school improvement process aligned to those standards) have had an impact on ubiquitous computing initiatives. The state does not consider NCLB Title II D applications from schools for ubiquitous computing unless the driver is standards-based reform through school improvement. Furthermore,

the focus of the Buddy Project has shifted from technology to academic content (the writing process), in part because of the standards movement.

*Qualified Teachers:*

Early evaluation reports on the Buddy Project have found that the lack of emphasis on teacher professional development resulted in a technology program that was not fully integrated into core learning in schools. In general, early gains attributed to Buddy were on the technological literacy front rather than in academic learning. It seems, however, that Buddy<sup>2</sup> is recognizing the critical role the teacher plays in effective uses of technology. Thus, Budddy<sup>2</sup> focuses first on sound pedagogy and effective instruction in process writing, and secondly on the use of the technology in the writing process.

**Local Trends:**

*Pilot Programs:*

For Indianapolis Public Schools, the three Tech-Know-Build middle schools serve as unofficial pilot sites for the rest of the district. Given the funding and the support, district leaders would like to see one-to-one rolled out to other middle and high schools in the district. In fact, district administrators in Indianapolis would like to see the state become more involved in one-to-one across Indiana.

*Scope and Focus:*

Within the participating schools themselves, a very deliberate chronology of events took place. The first year of the grant was dedicated to professional development and the rollout of teacher laptops. The second year saw the laptops in the hands of every 6<sup>th</sup> grade student; these students kept their machines as they moved on to 7<sup>th</sup> (and then 8<sup>th</sup>) grade. For the past three years, a new “crop” of 6<sup>th</sup> grade students has received a laptop for use 24 hours a day, 7 days a week. The sole exception to this pattern of implementation is in Crawfordsville High School, where the program is currently being piloted among approximately 150 students who access their laptops via carts during the school day only.

According to evidence gathered by Rockman et al., the high school represents the least successful implementation of one-to-one across the Tech-Know-Build project, and at least some district administrators in Crawfordsville attribute this limited success to the fact that the laptops do not go home. For a district that began their middle school one-to-one program with the laptops on carts, the use of technology “24 x 7” is not incidental. *“Kids can – and do – go beyond our expectations only when they have this level of access, because it enables ease of use and familiarity.”*

Furthermore, school and district administrators in both districts report enhanced communications with parents and community members – including many area seniors – as a result of home laptop use. In Indianapolis, this is translating into greater parent-teacher interaction. In Crawfordsville, educators are finding that students communicate more with their parent and the community about the work they are doing in school. As a result, it is unclear why laptop use among high school students is limited to school hours only.

**3. What do Indiana’s policymakers expect will be the outcome of the ubiquitous computing initiatives in their state? Are these expectations the same as or different from those of educators? How are they aligned to Indiana’s overall education agenda?**

**Expectations:**

The following is a comparison of expectations held by state policymakers and Indiana educators:

<i>Expectations of Indiana Policymakers</i>	<i>Expectations of Indiana Educators</i>
<ul style="list-style-type: none"> <li>➤ Increased economic viability through a high-tech workforce</li> <li>➤ Learning gains through increased parental involvement</li> <li>➤ Learning gains through extensions of the school day into the home</li> </ul>	<ul style="list-style-type: none"> <li>➤ Improved teaching and learning that is problem-based and technology-rich</li> <li>➤ Closing the digital divide and leveling the playing field</li> <li>➤ The development of 21<sup>st</sup> Century Skills, such as higher-order thinking and problem solving, use of real-world tools, technological literacy, teaming and collaboration, and effective communication.</li> </ul>

State policymakers’ expectations in Indiana were significantly influenced by the evaluation reports from the Buddy Program. For example, a 1994-1995 study by Rockman, et al. looked at several schools that were implementing Buddy as recommended. The study assessed changes in mathematics, writing, school culture, and parental involvement. The following are findings from four schools in which Buddy was implemented effectively and are not necessarily representative of the typical Buddy school:

- Participation in the Buddy Project can make a significant difference in children’s writing.
- Efforts to improve mathematics among Buddy sites were limited and did not produce improved student achievement.
- The Project has provided effective staff development leading to substantial teacher improvement.
- The Buddy Project has established and strengthened home-school connections.
- Parents, teachers, and administrators believe that the Buddy Project is preparing Indiana’s children for the workforce of the future.
- Implementation of the Buddy Project has facilitated other school reform efforts that teachers and administrators have chosen for their particular schools.

- The Buddy Project has given access to computers and telecommunications to parents and families who would not otherwise have had them.
- Participation in Buddy has increased the self-confidence of children, including those who are learning disabled, lack confidence, or who would not succeed easily in regular classrooms.
- The Buddy Project has brought families together to work on and communicate about the computer and its value for learning.
- As a result of their participation in all aspects of Buddy and the stake they have in decisions about the project, Buddy students and their families feel they can participate more in state governance.

*School and District Level Expectations:*

It should be noted that the expectations of Indiana educators highlighted here reflect the fact that the one-to-one programs in Indianapolis and Crawfordsville are heavily funded by a Department of Education Technology Innovation Challenge Grant (Tech-Know-Build) that emphasizes pedagogy and problem-based learning. At the same time, it should also be noted that these same expectations drove the districts to pursue the grant in the first place, and served as a basis for their creation of the Tech-Know-Build project.

**Fit Within the Educational Agenda:**

*Significance in 1988:*

The initial legislation for ubiquitous computing was enacted in 1988 on the heels of the highly respected A+ Education Program, conceived by then State Superintendent Dean Evans. A year prior, Dr. Evans had been appointed to his position by Governor Robert Orr to complete the last three years of the former State Superintendent's term. Having left his position at the Lilly Foundation to do this as a favor to the Governor, Dr. Evans was well positioned to advance state education policy.

The ubiquitous computing initiative augmented the A+ Education package by extending learning into homes, equalizing education for all, and reconnecting parents to their children's learning.

*Significance Today:*

Public Law 221, enacted in 2002, requires Indiana schools to establish a school improvement plan and demonstrate their progress toward the goals of that plan over time. The current ubiquitous computing pilots and programs require participants to focus on school improvement learning goals aligned to state standards. The chart below outlines how this new development has shifted emphasis from the first incarnation of Buddy to the second.

The following chart outlines the shifts in emphasis in the Buddy Project to align to the shifts toward individual children’s academic achievement.

<b>Buddy then...1988-2000</b>	<b>Buddy<sup>2</sup> now...2000-Present</b>
Emphasis on state sponsorship.	Emphasis on local community sponsorship.
Focus on classroom curriculum integration of technology to meet student and teacher choice of topics.	Focus on core values and extending learning to home and community to support achievement of academic standards.
Trained teachers.	Supports teachers through parent/family training.
Exclusively available in state-specified grade levels.	Total school involvement or locally targeted grade levels or programs.
Provision of home technology for all, regardless of existing home technology resources.	Use of existing home and community-based technologies, but promotion of access for all.
Homework involves practicing what is learned at school by using technology.	Homework involves extending and elaborating upon school learning by using technology.
Building administrators had little or no input into local project direction and implementation.	Building administrators are pivotal in deciding curricular direction and program design.
Buddy was a single "project" - all member schools signed up for the same thing.	Buddy <sup>2</sup> is multifaceted, with a variety of projects and services offered that exemplify and magnify shared core values.
Facilitation services were evenly distributed among all participating schools.	Facilitation services are linked to specific project involvement.
Conferences were held twice yearly and were targeted to member school participation.	Events are held as appropriate to support and share Buddy <sup>2</sup> initiatives.
An annual site implementation plan was required.	A brief annual application form is required.

*School Improvement:*

As stated above, Indiana’s Public Law 221 requires schools to work toward goals outlined in their school improvement plans. The state requires the following components in each school’s plan:

1. A list of the statutes and rules that the school wishes to have suspended from operation for the school.
2. A description of the curriculum and information concerning the location of a copy of the curriculum that is available for inspection by members of the public.
3. A description of the assessments that will be used in the school, in addition to Indiana Statewide Testing for Educational Progress Plus (ISTEP+) assessments.
4. A plan to be submitted to the governing body and made available to all interested members of the public in an easily understood format.
5. A provision to maximize parental participation in the school.
6. For secondary schools, a provision to:

- a) Offer courses that allow all students to become eligible to receive an Academic Honors Diploma.
  - b) Encourage all students to earn an Academic Honors Diploma or complete the Core 40 curriculum.
7. A provision for maintaining a safe and disciplined learning environment for students and teachers.
8. A provision for coordinating technology initiatives.
9. A professional development program that includes:
- a) A narrative with:
    - (i) A summary analysis of data regarding student learning
    - (ii) Strategies, programs, and services to address student learning needs
    - (iii) Activities to implement those strategies, programs, and services
    - (iv) An evaluation of the impact of the activities.
  - b) An assurance that the program complies with the board's core principles for professional development.

The professional development program must be signed by the exclusive representative as an indication of support only for the professional development program component of the plan.

Indiana school resource allocations must now be aligned to school improvement plans, and technology programs are no exception. Indiana educators are beginning to incorporate technology into their school improvement plans, seeking ways in which technology might add efficiency and effectiveness to teaching, learning, and school administrative processes.

This means that ubiquitous computing in Indiana is generally not supported unless it is an integral part of the school improvement process. The Indiana Department of Education is also holding schools to this standard as they award competitive grants under the NCLB Title II D program.

Since the program's inception, select schools in the Buddy Project have used it as a vehicle for school reform. The sidebar on the next page outlines results from top Buddy schools.

### **Assessing the Growth: The Buddy Project Evaluation, 1994-1995**

Administrators indicate that one of the reasons Buddy is so successful is that it is a part of the reform effort, yet is anchored securely enough in the realities of schooling that it won't be another short-lived program.

Administrators say Buddy also facilitates other changes in the building and in the broader picture of education.

Buddy "*provides the staff development required by programs like Indiana 2000.*" Some teachers are more comfortable with change than others; administrators say they have about a 75% success rate. In general, teachers "*take the technology and run with it...once the light lights.*" Only in the case of a few teachers has that light dimmed or never shone. (Interestingly, administrators noted that in all cases where teachers had laptops, that tool engaged recalcitrant teachers more than any other form of technology.)

Among things administrators see Buddy doing for teachers are:

- "Buddy provides training that gives teachers choices."
- It "revitalizes curriculum."
- It shows "practical ways to successfully integrate technology into curriculum." • It fits into a "literature-based, whole language curriculum."
- Buddy "enables us to take change further."
- "Buddy encourages the kinds of long-range projects we're moving toward."
- Buddy has teachers "excited about teaching" again.
- "Buddy encourages staff to take risks."
- Buddy connects teachers; there is a lot of teacher-to-teacher support.
- The project "helped us move away from textbooks."
- Buddy efforts have "redefined staff development." There are no more faculty meetings; now there are staff development sessions and discussions "where no one is afraid to admit what they don't know."
- "Buddy helps us integrate math into other curricular areas."
- Buddy "filled in and broadened instruction where textbooks and workbooks left off."

#### *School Improvement at the School and District Level:*

Not surprisingly, then, school improvement goals for participating one-to-one schools in Indianapolis and Crawfordsville currently center on meeting state standards and improving academic achievement (as measured on the state ISTEP tests) through problem-based teaching and learning. Student teams are expected to begin each school year by constructing a critical question with an authentic, real-world application. They work collaboratively throughout the year on their projects in the context of a standards-based curriculum (across disciplines, doing pieces of their project along the way). To further their "*sense of ownership*" over their learning, a peer review process takes place at the end of the year and team projects from each school are selected for presentation to teachers, administrators, parents, and the community.

### **Example – Problem-Based Learning at Harshman Middle School:**

In one recent project, students worked to solve the problem of an abandoned fast food restaurant across the street from their school. They began by constructing and distributing a survey, polling the community about what should replace the building. An analysis of the results revealed that most locals hoped the lot could be turned into a neighborhood pharmacy. The students took the problem to their math classes, where they researched zoning rules, lot issues, etc., then contacted CVS pharmacies to talk about the square footage and other needs of a typical pharmacy (with a drive-thru, no less). Finally, they worked with an engineer to design the new structure based on what they learned, all the while considering cost-effectiveness and how the design would best suit the neighborhood. Their final presentation to the community included a summary of their methodology, research findings, and final solutions, mostly in a visual form. For example, where interviews were conducted, they were documented, edited, and presented using iMovie.

### ***Critical Factors:***

School and district interviewees in Indiana cited three factors that were absolutely critical to the effective implementation of one-to-one programs:

- Adequate upfront *and* ongoing professional development that includes sufficient time, resources, and support for developing teacher technology proficiency *and* for effectively integrating technology into the curriculum
- Strong, visionary leadership – from both administrators *and* “master teachers” – that is collaborative and supports risk-taking
- A quality infrastructure that is in place and well supported by on-site technical support personnel.

### **Assessment:**

To meet the requirements of the Challenge grant and to generate a comprehensive picture of how one-to-one

is working in these two diverse Indiana districts, external evaluators from Rockman et al. were brought in to conduct a Year 3 assessment of the Tech-Know-Build program. Using qualitative and quantitative research methods, including classroom observations, interviews, surveys, and case studies, the evaluation aims to explore the successes and challenges of implementation. Though

### **Example – Professional Development:**

Rockman et al. preliminary evaluation findings suggest that close to 3/4 (72-76%) of teachers participating in Tech-Know-Build summer workshops become more comfortable using technology and gain confidence in changing their instructional practices to incorporate laptop use into teaching and learning. But without upkeep, these positive gains decline as the school year progresses; just under 1/2 (43%) of teachers report having trouble making full use of what they learn over the summer. Furthermore, teachers who attend weekend workshops, rather than summer ones, report significantly less enthusiasm and confidence with developing problem-based curricular units. These teachers must often rely on their more experienced peers to develop technology-rich classroom strategies, and can act as a drain on already limited technical support resources. With adequate upfront and ongoing professional development, all teachers would be free to focus on deeper, more meaningful, and more sustainable uses of technology in their classrooms.

preliminary findings are available (and, where noted, supplement the findings presented here), the full study has not yet been released.

*Metrics:*

Though measuring the gains reported by schools and districts implementing one-to-one is critical for securing ongoing funding beyond the life of the grant, few schools and districts in Indiana have yet developed new metrics for doing so.

In the meantime, however, 100% of educators interviewed shared some observational or anecdotal evidence about the success of one-to-one. The following is a list of the most commonly cited observations:

- Increased student *and* teacher engagement
- Deeper, cross-disciplinary knowledge
- 21<sup>st</sup> Century Skill development (particularly higher order thinking and problem solving; use of real-world tools; collaboration; technology and information literacy)
- Improved academic achievement (as evidenced by improved grades – especially in writing)
- Improved attendance

Though few of these gains can be directly tied to ubiquitous computing (as no rigorous quantitative studies have been completed to date), it is a common belief among participating teachers and administrators that one-to-one has at least something to do with the gains. In some cases, educators are having trouble identifying ways to measure the gains they see.

*“We see our students possessing the skills they need to successfully transition into the world of work.”*

-- School Administrator, Indianapolis Public Schools

*“Teachers are teaching differently because of the laptops.”*

-- District Administrator, Crawfordsville Community School Corporation

**Example – Technology and the STAR Writers of Buddy 2:**

Rockman et al. was commissioned by the Corporation for Educational Technology (CET) to conduct a 4-month study of control versus active students in the Buddy 2 STAR Writers program (both groups got instruction in the writing process, but only STAR participants were provided with access to technology at home in the form of desktop computers). The point of the study, conducted in 1995, was to determine if using technology *“makes you a better writer.”* Evaluators looked at pre- and post- scores on the ISTEP writing assessment, and found that the group with access to technology at home indeed saw greater improvements. Achievement gains among the 300 or so STAR students, as measured by the test, even surpassed NCLB expectations. Based on these results, the CET concluded that, *“technology makes you a better writer.”*

It must be noted, however, that the students who are active in the STAR program (and thus have access to the home computers) submit four writing samples per year *“that are just like what they see on the test.”* Those writing samples – essentially practice tests – are graded by ISTEP scorers. So while their home technology access from *does* distinguish these students from their peers, so does the fact that they write more and get more feedback – especially as it relates to the very test used to compare the two groups. While it is likely that technology played some role in students’ success, it is equally plausible that the quality of their practice may also have an impact on their improved test scores.

Though it is not known to what degree the technology itself creates positive gains among students, it may be said that access to technology can at least indirectly impact student learning. This is a “finding” that is borne out in the research that does exist (see sidebar).

*Technology Literacy:*

Technology literacy is the one area in which the original Buddy Project had an impact. Parents, teachers, and students were uniformly in agreement that the program did prepare students—and often parents as well—for the world of work in a Digital Age.

The 1994-95 evaluation report from Rockman, et al. reported that, *“Parents, teachers, and administrators believe that the Buddy Project is preparing Indiana’s children for the workforce of the future. Participants see that a working knowledge of technology as a tool for doing meaningful work will lead to increased productivity, increased access to information and the ability to apply it, and increased opportunity.”*

#### 4. What funding mechanisms support ubiquitous computing in Indiana?

##### Funding:

###### *State Level:*

The Indiana General Assembly has supported the Buddy Project since 1998. Since its inception, state funding for the program has been around \$3 million per biennium, except for 1994-95, when that number jumped to \$6 million. Due to the economic downturn in 2002, the funding for the 2003-2004 biennium was reduced to \$X. The program has also had funding and resource contributions from other entities. In the early stages of the program, Apple Computer contributed banks of computers and training, and the Lilly Foundation supported the purchase of IBM computers that originally were slated for donation from IBM.

*"We don't necessarily need more revenue to keep this going. We just need to think differently."*

-- District Administrator,  
Indianapolis Public Schools

###### *School and District Level:*

Awarded to the collaborative between Indianapolis Public Schools and Crawfordsville Community School Corporation, the Tech-Know-Build program is funded by a 5-year, \$9.8 million Challenge Grant. Indianapolis Public Schools currently receives about \$900,000 per year. In both districts, the money is earmarked for technology purchases and professional development as it relates to enhancing problem-based learning.

###### *Direct and Indirect Costs:*

The \$9.8 million federal Challenge grant fully funds the one-to-one programs in Indianapolis and Crawfordsville. Though both districts have used some eRate money to finance their network infrastructures, a pre-existing commitment to professional development (for teachers and administrators) meant they did not incur additional, unexpected costs as a result of one-to-one. Instead, these costs were written into the grant up front. Furthermore, corporate partnerships, such as with Time-Warner/Brighthouse for home Internet access and university partnerships, such as with IUPUI for professional development, also keep costs down.

*"With our state's current financial crisis, one-to-one might not seem like the most sane thing right now, but when you look at the results, it really makes sense. We need to raise that consciousness at the state level. In a perfect world, Indiana would become a one-to-one state."*

-- District Administrator,  
Indianapolis Public Schools

###### *Sustainability:*

The drawback to a program fully funded through a limited source, such as a grant, is that the funding will eventually dry up. This is the case in both Indianapolis and Crawfordsville, and to date no real sustainable alternatives have been located. There is a vague sense that the state should "pick up the ball" with one-to-one, but as the end of the grant period draws near, this is not looking likely.

## 5. What is the impact of ubiquitous computing on local school policies in Indiana?

### Local Impact:

#### *Specific Subjects and School Populations:*

Because the grant is focused on project-based learning across the curriculum, few stakeholders point to any one subject or student population that especially benefits from one-to-one. Instead, the emphasis in Indianapolis and Crawfordsville is on standards-driven, interdisciplinary units that are based on authentic, relevant problems faced by students and their communities. As a result, all students *“demonstrate a greater capacity to investigate, solve problems, collect and analyze data, conduct surveys and interviews, and exhibit higher-level presentation and communication skills. In other words, students of all stripes are being better prepared for the 21<sup>st</sup> century.”*

#### **Example – A “Healthy Lifestyles” Unit in Indianapolis, “the Fattest City in the U.S.”**

Prior to beginning this 3-week unit, students are surveyed to see what they know about diet and exercise, including possible side effects of living an unhealthy lifestyle. During the unit, students’ science classes focus on the effects of living a healthy versus an unhealthy lifestyle, while social studies classes emphasize cultural views about diet and health. Math classes concentrate on nutritional labels and calculating caloric intake; language arts classes keep journals that record student feelings as they learn more about healthy daily living.

Once students have a good research base, they develop and conduct surveys of students in other grade levels. Using the data from that survey, they begin to formulate a definition of diet. They also graph responses from the survey in math class, and explore key components and implications of diet and health in others. Finally, they visit the National Institute for Fitness and Sports in Indianapolis, where they are exposed to elements of exercise science and the role that exercise plays in people’s daily lives.

At the end of the unit, students create PowerPoint presentations, offering recommendations to the questions they pose at the beginning. These are presented to their classes, and in some cases, to administrators and other stakeholders as well.

#### **Example – The “New” P.E. in Crawfordsville:**

Surprisingly, the most compelling uses of laptop technology at the high school level tend to come from non-core teachers. In physical education, for example, the emphasis has shifted from competitive sports to overall wellness and lifelong fitness, and the laptops are used for measuring heart rates, setting an individualized “personal best,” and distance learning via partnerships with a local hospital. Thanks to changes in grading from subjective measures to data-driven ones, students are encouraged to stay healthy and share their findings with the community through health fairs, equipment demonstrations, and more.

One exception here is the use of word-processing in writing. According to student surveys conducted by Rockman et al., students enjoy writing more when using their laptops rather than traditional paper and pencil. In addition, teacher focus groups suggest that students are more engaged in the writing process when it is enhanced with technology. Research on technology use in writing supports these conclusions.

### **Professional Development:**

Through Tech-Know-Build, not only did the two districts spend much of their first year grant money on up-front teacher professional development, they also conducted summer workshops and as-needed training sessions throughout the year. As noted above, the districts have formed collaborative partnerships with IUPUI and CILC to help create professional development offerings that support the integration of technology into a problem-based curriculum.

Though many teachers in both districts “*had to undergo a major shift in terms of how they deliver content,*” which means they had to “*make a big commitment and investment,*” even the reluctant ones “*are phenomenal*” now that they understand the power of this kind of teaching and learning. In this area as well, continued support from district leadership is critical for fostering the kind of school culture where teachers feel comfortable trying something new.

#### **Example – Administrator Professional Development:**

Educators in Indianapolis Public Schools opted to take advantage of Apple Computer’s professional development offerings in conjunction with their iBook purchases. Though the district currently relies on Apple for troubleshooting and training on hardware, they have a technology plan which stipulates that, for every dollar spent on hardware, a similar amount must be spent on professional development. To support one-to-one, they knew they had to start at the top, so they collaborated with Apple to develop a 6-day model for leadership. This model was customized for each school’s school improvement plan, and was tailored to their data-driven decision-making, PL221, and NCLB needs. Apple integrated every one of the hardware and software components on the wireless carts so that IPS administrators would walk away having used every piece of it. They also put together seminars like, “Problems Encountered with Teachers Integrating Technology” so that they could collaboratively pilot solutions in that area. 52 of the 55 administrators in the district have now completed all six days of professional development.

#### *Local Opinion: How Indiana Should Measure Success:*

With the one-to-one programs in Indianapolis and Crawfordsville so closely tied (through the grant) to standards-driven, project-based learning, there is less of a “disconnect” between what is measured at the school or district level and what is considered important at the state level than is often the case. In fact, the emphasis on improved teaching and learning – as opposed to simply the addition of technology – is one of Tech-Know-Build’s strongest advantages.

Still, here as elsewhere there is a sense “on the ground” that state and federal policymakers don’t really “get” gains like increased student engagement or more involved families. More than 80% of school and district interviewees in Indiana assume that policymakers are focused far more on

students' test scores than less tangible – but no less important! – gains. As in other states, there is a desire in Indiana to develop ways to measure and report the impacts that many educators feel are precursors to improved test scores.

In fact, though students are increasingly meeting state standards across several disciplines as a result of this program, “they often don’t even know they’ve done so because they’re so engaged by the project.” That, educators say, is why it’s so important to “think differently” when it comes to what measures of success. As Rockman et al. reports, a growing number of teachers (71% of second- and third-year teachers, compared to 49% last year), insist that increased motivation and interest leads students to greater depths of understanding, which in turn may help them improve on more traditional measures of success.

*“I’m not a big fan of looking at test scores. I can see when I walk into a building the difference this makes, but it just amazes me that some people still don’t get it. This is the world these kids live in. If you give them the tools, there has to be a positive response. The test scores are only useful as a way to prove to people that this is really working.”*

-- District Technology Coordinator,  
Indianapolis Public Schools

*State Response:*

The state sees great potential in ubiquitous computing, but only in the context of school improvement plans that focus on academic achievement. IndianaNEXT, the Indiana technology leadership academy funded through the Bill and Melinda Gates Foundation and the Christel DeHaan Foundation, is in its fourth year. It provides five days of intensive professional development for administrators on new visions for technology and learning. Administrators walk away from IndianaNEXT with a new understanding of the urgency for technology in schools, the ways in which technology adds value to school improvement efforts, and new professional competency with the technologies.

The IndianaNEXT Kickoff sessions for administrators immerse them in a wireless laptop environment in which they share a laptop with a fellow administrator. At literally every one of the eight Kickoff sessions held to date, administrators have complained about having to share a laptop. They experience first hand the power of ubiquitous, one-to-one computing at those sessions.

## 6. What were the unintended consequences, negative and positive, of the laptop initiatives in Indiana?

### The Good:

According to the educators interviewed for this study, three major surprises have been the result of the Tech-Know-Build one-to-one initiative thus far:

- Student-teacher relations are improving
- Parents and community members are getting more involved with students and schools
- Teachers are increasingly engaged and enthusiastic – school cultures are changing

#### *Student-teacher relations are improving*

Even where no formal evaluation data has been collected, observational and anecdotal evidence, including that collected by Rockman et al., suggests that improved student-teacher relations is a major outcome of the laptop programs represented here. This translates into more than just improved attendance or time on task; teachers report expecting more of students and finding increased ownership of learning as a result. Even better, students and teachers are becoming more collaborative as they plan and execute engaging learning activities. In some cases, students assume the role of temporary classroom teacher. In others, they act as trainers for teachers unfamiliar with peripherals or particular software applications or serve on student “tech teams,” offering first-line support. In fact, 83% of participating Tech-Know-Build teachers report that students’ technical expertise is an important element of support for classroom technology use.

#### **Example – the S.A.L.T. Program:**

In Indianapolis middle schools, Tech-Know-Build principals select seven or eight 8<sup>th</sup> graders for the district-wide Student Assisted Laptop Technicians, or S.A.L.T., program. The students are given one period per day (in lieu of study hall) to work with their building media specialists, conducting training sessions and fixing laptops so the district can save on sending the machines out for repairs. Students aren’t paid, but the sense of pride that stems from the role reversal spurs lifelong learning.

#### **Example – the Teach Academy:**

At the high school level, students learn early to become teachers, earning college credit as they do so. They build technology-based lesson plans and participate in e-mentorship programs, and will soon become involved in technology training with 6<sup>th</sup> grade students just receiving their iBooks.

#### *Parents and community members are getting more involved with students and schools*

Educators at all levels in both Indianapolis and Crawfordsville report that parents, in particular, are becoming more involved in their children’s educational lives. In participating schools in Indianapolis, for example, more the 70% of parents – an almost unheard of number for inner city families – now regularly attend educational events, and 83% report expecting deeper parent-

teacher relationships to result from the new technology access. Furthermore, when high-speed Internet access is provided, involvement skyrockets; households without previous access to technology and electronic communications are brought into the 21<sup>st</sup> century through the use of laptops. And students act as mentors to parents, siblings, and other community members, helping these groups to increase their own digital literacy as students hone theirs. In fact, throughout the two districts, programs such as “Tech Days” for local senior citizens are cropping up as a result of the newfound access.

**Example – Project-Based Learning Communities:**

One annual event associated with Tech-Know-Build is the formal presentation of selected student projects to the community. About 170 influential community members, parents, and business leaders attended the most recent year-end event, gathering for an interactive dinner where students offered their problems and solutions via PowerPoint, iMovie, or other presentation technologies. The event was even broadcast via cable to those unable to attend.

With community access now increasing as a result of interaction with students, Tech-Know-Build leaders are searching for ways to develop monthly presentation forums for community-based research projects. Parents or other stakeholders, in other words, would identify and research their own problems, presenting their solutions to students. It is believed that such ongoing interaction would serve dual purposes: to leverage common issues as a way of maintaining community involvement in learning, and to generate sustained interest in the use of technology within the two districts, possibly leading to additional (local) sources of funding.

*Teachers are increasingly engaged and enthusiastic – school cultures are changing*

Participants – from district administrators to classroom teachers – report that positive changes in the educational environment as a result of one-to-one are leading to increased teacher engagement and enthusiasm. Part of this is a natural outcome of the support provided by administrators for risk-taking in the classroom; Tech-Know-Build’s emphasis on improved teaching and learning encourages growth and change. As teachers become more familiar with the basics of project-based learning using technology, including classroom management, they are learning to incorporate increasingly complex software applications and technology tools into their lessons. Examples include spreadsheet and productivity tools, interactive video, and virtual field trips or Webquests. Furthermore, teachers are establishing informal peer support structures, where second and third year laptop teachers act as mentors to new hires and trainees.

*“This is not about computers. It’s about changing the whole environment – changing teaching and the learning that goes with it. It certainly doesn’t make teachers’ jobs any easier. In fact, it was pretty hard for us to get used to and prepare for this new environment. But we have a lot of teachers who have become a lot more engaged in their work as a result. Even the ones who started out reluctant just love this!”*

--Teacher, Crispus Attucks Middle School

## Remaining Challenges:

In addition to the positive “unexpecteds” they reported above, educators in Indiana found the following to be areas in need of improvement:

- Insufficient technical and curricular support
- Sustainability beyond the 5-year grant
- Entertainment-related uses of technology by students during school hours

### *Insufficient technical and curricular support*

By and large, technical and curricular support in Indianapolis (on-demand) and Crawfordsville (on-site) is competent and responsive. Unfortunately, with more to do and no more staff to do it, it can also be spotty, and teachers are dependent on such support to successfully plan and implement higher-order applications of technology.

In evaluation studies of Tech-Know-Build conducted by Rockman et al. 61% of participants report that the lack of consistent technical support is “*sometimes*” or “*often*” a barrier to effective technology integration, and 63% report that the lack of consistent curricular support can be a barrier as well. This problem can be compounded when teachers believe that their own lack of technology skills or integration strategies further inhibit effective use.

### *Sustainability beyond the 5-year grant*

Though district leaders in Crawfordsville seem to have some idea about alternate (local) funding sources to support one-to-one beyond the grant period, neither district has a formal plan in place. Furthermore, with state education agencies facing severe budget cutbacks, technology programs are often among the first to be scaled back, increasing competition for future grant opportunities.

### *Entertainment-related uses of technology by students during school hours*

As is the case in most schools, students involved in the Tech-Know-Build program aren’t always staying on task. Given most contemporary students’ familiarity with gaming and communication technologies outside of school, it is no surprise that laptop use, according to educators in the two districts, falls into two categories: education and entertainment. Unfortunately, less structured classroom activities provide students with opportunities to spend time at school surfing the Web for music, playing games online, and emailing or instant messaging friends. Rather than resorting to “locking down” the laptops, teachers need better classroom management strategies to combat this issue in sensible ways.

## 7. What are the next steps for Indiana?

### Next Steps:

It seems ironic to Indiana state policymakers that their vision of 1988 for ubiquitous computing is now coming to life in other states—just not in Indiana.

While a few pioneering districts are finding resources that enable them to put computers into the hands of all teachers and students, these are the exception rather than the rule. With the reduction in funding for technology at the state level reduced to zero in the 2003 session, schools will be scrambling to maintain current installations and uses of technology in schools.

The points of light are those highlighted in the report:

- The Technology Literacy Challenge Fund in Crawfordsville and Indianapolis School Districts
- The ubiquitous computing pilot for 11<sup>th</sup> grade English Language Arts in three high schools
- One competitive NCLB Title II Part D grant
- The Buddy<sup>2</sup> Program

The position of state level administrators in technology is that ubiquitous computing is a worthwhile goal: it just isn't affordable in Indiana due to economic challenges.

## Advice to Other Educators:

### *State Level:*

State level interviewees in Indiana offered the following “words of wisdom” to others contemplating one-to-one programs:

*“It’s about more than just technology, its about teachers, curriculum, and learning. Put together a team that brings together expertise in curriculum, learning, school change, and technology. Focus on getting teachers ready to use the tools in powerful ways for learning.”*

-Dean Evans, former State Superintendent,  
Indiana Department of Education

*“Think long-term. Ensure impact by ensuring that the mundane aspects of the project (maintenance, upgrades, insurance, replacement of equipment) are planned and supported.”*

-Nancy Miller, Director  
Buddy<sup>2</sup>

*“The key to effective, one-to-one computing rests with local school districts. Create opportunities that enable them to incorporate technology into their school improvement plans. Create pilots that link affordable one-to-one computing to higher academic achievement and economic opportunities for students.”*

-Phyllis Usher, Associate Superintendent  
Indiana Department of Education

*Local Level:*

In Indianapolis and Crawfordsville, the advice to other educators was:

*“Take your time. Plan. Communicate. There will be problems along the way, but they’re worth it!”*

*“You can learn a lot from watching the kids.”*

*“This is one of the best things that’s come to our school. I love it!”*

*“Support and encouragement combats resistance.”*

*“With support from the school and district, teachers are able to see how the use of technology transforms the kids, so they make the effort.”*

*“The program really changes the classroom landscape so much.”*

*“The lessons are so powerful. We are just mesmerized by the results – everything we expected from the technology came true.”*

*“We see our students possessing the skills they need to successfully transition into the world of work.”*

*“This doesn’t change what you have to do; it just makes it better.”*

*“This isn’t so much about funding: it’s about changing attitudes. If the right attitude is there, the funding will follow.”*

*“These students are being well prepared to compete with their counterparts in other districts.”*

*“The technology is a draw for kids and their parents.”*

*“This is the hardest job I’ve ever had, but it’s the most rewarding thing I’ve ever done.”*