EDC Center for Children & Technology

IBM REINVENTING EDUCATION: Research Summary and Perspective

Introduction

People all over the world are obsessed with improving public education. During the last US election, Americans split historically over who would be the next president. But they were passionately united on the highest priority of the new administration: Fix education. In poll after poll, people listed poor student performance as the nation's greatest liability and its most critical need. Despite years of debate and scrutiny, worldwide comparisons like the Third International Mathematics and Science Study revealed the true extent of failing schools in the US. And while fixing public education tops our national agenda - and many public and private institutions have attempted to address the challenge - success stories are few and far between.

Compounding the problem is a changing world with growing emphasis on highly-skilled individuals. Today's expectations for schools - that ALL children will achieve at a level much higher than required in previous eras - demands much more than a quick fix or a cosmetic approach. Poorly trained teachers, unfocused curriculum, and the inefficient use of resources inevitably result in poor student performance and the inability to compete globally. For the US, the stakes have gone up dramatically.

People have also reached consensus on what public school reform looks like. It involves a radical shift from the status quo, with a new foundation built on standards, accountability, and dedication to the kind of profound change that becomes imbedded in the system. For schools to change, educators must do things very differently. In the process, they must rediscover the very substance of excellent teaching in a new world.

To many experts, what education reform needs is a long attention span and a sophisticated understanding of how to improve student achievement. As *Learning from Each Other*, a report published by Grantmakers for Education, remarks: "School reform is a messy, complicated, often frustrating challenge that requires patience and staying power. Equally important ... significant reforms are likely to endure only if the current system is changed in fundamental ways."

Fully aware that a sound public educational system is critical to the current and future success of the nation, some funders have embraced the daunting challenge of school reform - but only with mixed results. Other major funders have abandoned the challenge entirely. It is against this backdrop that the IBM Corporation launched its Reinventing Education program.

IBM's Reinventing Education Program

In 1994, IBM dramatically changed traditional corporate philanthropy by announcing it would invest the lion's share of its charitable dollars in a unique grant program called Reinventing Education. Today, the IBM initiative is a sweeping $45 million education reform program involving 21 school districts and states throughout the US, and eight international sites. It includes thousands of teachers and millions of students with documented success in both urban and rural areas.

At the heart of the program is the belief that business can and must contribute to profound and far-reaching changes in education, and that technology - which revolutionized business and industry - could have the same dramatic impact in public education by providing new tools for better teaching and higher student achievement. In 1998, the Center for Children and Technology (CCT) at the Education Development Center began a long-term study of the sites where the program was launched. Three years later, CCT has found that IBM's Reinventing Education program produced successful solutions that are dismantling long-standing barriers to public school reform -- barriers like how teachers are trained, how information is shared and used, and how learning is measured. But more, this evaluation revealed that the intense partnership process which distinguished Reinventing Education from other school reform efforts led to real change in the way schools went about the business of teaching children. The initiative proves that solutions, which worked well in one school district or state, worked equally well in another. What is unprecedented about Reinventing Education is the combination of scale, wise technology utilization, and comprehensiveness when the solutions are compounded. IBM's Reinventing Education has demonstrated results which include:

- Implementing programs that will serve as best practice models for other school reform initiatives;
- Developing new technology tools that improve teaching and learning;
- Documenting significant and positive improvements in student achievement;
- Establishing effective, ongoing programs for teacher professional development;
- Sustaining reform momentum after the life of the IBM grants; and
- Scaling reform within and among multiple sites.

The results of IBM's Reinventing Education program represent an important breakthrough for parents, teachers and education leaders and carries important policy implications for those who administer schools throughout this country and beyond. The results were achieved because IBM took a dramatically different approach to its grant partnership program. But to evaluate the magnitude of difference, it's important to first review more traditional routes taken by other major funders.

Technology in Schools

When computers were first introduced to K-12 education, corporate philanthropy by the technology industry largely consisted of equipment donations or funding specific technology programs. Other research and development efforts in education were limited to underwriting the development of discrete, stand-alone products that were thrust into school settings with little to no follow-up or corporate involvement. At best, the school setting was a proving ground for technology-based materials and programs developed elsewhere - a process unheard of in private industry. Largely, this remains true today.

Other corporate involvement projects in education, such as "Adopt-A-School" or "Join-A-School" programs, could be characterized as "feel-good philanthropy" that offered limited involvement of its employees with a specific school or program. While useful for the children directly impacted, these programs do not begin to address the larger educational problems, according to research by Harvard Business School, facing public education.

Radical Change

Reinventing Education called for a fundamental and radical shift in the way a private corporation (IBM) and representatives of public institutions (schools districts and state departments of education) worked together. It was immediately different in its assumptions, its patience, its structure, and its expectations.

IBM approached its school partners as valued business partners. IBM combined its active involvement in education reform with the strategic use of its vast research capabilities and information and communications technologies to guide organizational change and improvement.

IBM's goal was to create change that was systemic, institutionalized, and scalable to other organizations. Known for its commitment to raising the quality of public education and hosting the 1996 and 1999 National Education Summits, IBM was not naive about the challenge involved in large-scale school reform and was prepared for the long haul.Reinventing Education planned three-to-five-year partnerships with its grant sites, far exceeding the customary eighteen months in more traditional corporate philanthropy.

Technology as a Catalyst

Armed with the knowledge of other efforts at school reform and with an expert understanding of technology's capabilities and limitations, IBM did not expect advanced information technology alone to transform an organization as complex as a school district. History had already demonstrated that simply donating computers to schools would not raise the level of student performance. Instead, Reinventing Education focused on the core education processes that could be critical levers in school change, such as student assessment practices, continuous teacher improvement models, and teacher instructional planning.

Commitment to Partnership

Central to the success of Reinventing Education was the corporation's unyielding commitment to the initiative. Though it did make cash contributions, IBM went far beyond writing checks and donating inventory. With the goal of raising the quality of public education as a priority, it provided expert talent by recruiting and paying the salaries of full-time IBM employees from its research laboratories and consulting organizations. In turn, the IBM employees worked side-by-side with educators in the classrooms. The initiative was not an extracurricular activity, but the employees' actual work assignment. For IBM's award-winning researchers and consultants recruited to the program, Reinventing Education was part of their daily assignment -- and it was highly prized.

As Professor Rosabeth Moss Kanter of Harvard Business School points out in her Harvard Business Review article, *From Spare Change to Real Change: The Social Sector as Beta Site for Business Innovation*, "Tackling social sector problems forces companies to stretch their capabilities to produce innovations that have business as well as community payoffs. When companies approach social needs in this way, they have a stake in the problem, and they treat the effort the way they would treat any other project central to the company's operations. They use their best people and their core skills. This is not charity; it is R&D – a strategic business investment."

IBM used a Request For Proposal process to identify partners that were ripe for sustained, systemic change. The corporation deliberately selected school districts and states that:

- Were able to identify specific problems amenable to innovative technology solutions;
- Would make Reinventing Education an integral component of their reform efforts;
- Would face the challenge of scaling the successes of the program to other schools in the district and state.

In short, IBM wanted partners with a proven track record for innovation and improvement -- not necessarily the highest performers.

Moreover, IBM purposely sought out schools in tough educational environments. Most of the districts participating in Reinventing Education are large, urban districts with all the additional problems and complexities endemic to inner-city public education. Similarly, IBM selected rural state partners with their own set of difficult hurdles to overcome.

Progress Documented: Center for Children and Technology's Evaluation

IBM's Reinventing Education program has been in place for six years, with the earliest grantees working their solutions for over five. Throughout this period, the Center for Children and Technology at the Education Development Center documented findings at each grant site, monitoring progress and the impact of technology on improving and learning.

This report summarizes three years of research conducted by the Center and examines the implications of IBM's Reinventing Education initiative for those interested in the role of technology in improved teaching and learning. We hope that it will be equally meaningful to those interested in understanding education reform and public/private partnerships.

Over the next two years, CCT will continue to look at Reinventing Education's impact as the sites further mature in their use of the solutions developed.

A New Model of Grant-making

IBM's Reinventing Education initiatives went through two critical stages. The first was identifying the one or two specific systemic barriers in the district or state that were standing in the way of student achievement and defining the technology solution that could help address them. The second stage involved implementing the blueprint, getting it to take root in the institution, and then scaling them up to other schools. This was problem-solving on a systemic scale, creating a new paradigm in grant making.

- **Reinventing Education grants focused equally on new technological solutions to address systemic reform, as well as on process and organizational changes within the school districts and states.**

Each solution resulted in new technology to improve teaching and learning. Arriving at the solution involved an intense period of defining the problem, setting a goal, and planning how to reach it. IBM and the grant partners worked through a complex, year-in, year-out commitment to changing the culture of teaching and learning by building on the sustained involvement of people, rather than simply stressing technology without context. Experience had shown that involving personnel and changing structures are the only ways to have technology solutions become part of the institution and produce tangible benefits.

- **Reinventing Education supported solutions to overcome core barriers to learning.**

Reinventing Education targeted a spectrum of the hardest, most complex problems that have plagued education reform efforts, rather than single-variable issues. Each project was designed to overcome a specific barrier to student achievement, such as how teachers are trained, how learning is measured, or how language, math and science are taught. Collectively, the projects address a wide spectrum of education challenges, from home-school communications, to data management and analysis, classroom instruction, teacher training, and student assessment.

As a result, the solutions do not directly deal with student-computer software solutions. On the contrary, they focus on re-engineering from top to bottom: teacher and administrative practices, how instructional decisions are made within schools, and how those responsible for children's education – teachers, administrators, support staff, and parents – can work together more effectively.

- **Beginning with scientists and researchers at IBM Research Laboratories, the solutions were developed as operational partnerships with schools.**

IBM employees assigned to Reinventing Education worked side-by-side with grant partners in classrooms and in laboratories. The backbone of the initiative was based on these working partnerships, with each side responsible for maintaining focus on the identified educational barrier and working together toward solutions. This unique business/school collaboration resulted in more cycles of refinement as the tools were scaled up and tested - with new tools often resulting that were of even greater value to the educators. Not one of the solutions is the same as originally conceived. All benefited by the interactive learning process.

This level of involvement in the actual implementation and operation of the grants also significantly increased IBM's risk and exposure. In this case, partnership means sharing responsibility for difficulties in meeting challenges, and for failures as well as successes.

- **Each solution was given several years to evolve and gain traction.**

Business operates on a very different time frame than schools. The original Request for Proposals for the IBM initiative was open-ended. Once IBM made preliminary site selections, it expected IBM and site managers to focus on developing a common definition of what the site intended to achieve with its grant.

Measurable Results

The conclusion of the three-year study of IBM's Reinventing Education program was that the unique design of the grants were yielding some real accomplishments.

- **The unique Reinventing Education solutions are having a significant, positive impact on student achievement, including:**

Learning Village - a suite of Web-based communication and collaboration tools developed by Reinventing Education - includes an Instructional Planner, which is leading to more effective teaching and documented gains in student achievement. Learning Village was designed to enable teachers to create and share standards-based, online lesson plans that have been endorsed by a jury of course experts. In the site with the most mature implementation, we found teachers' use of the juried lesson plans in the core disciplines of mathematics, language arts, social studies and science resulting in significant gains in performance for students in grades 7 through 11 who were performing at below average levels. At the same time, higher performing students using these lessons maintained their performance edge.

Learning Village and the Instructional Planner are now being adopted by most of the other sites across the US and internationally as an extension of their own solution. They are also adapting the strategy of using this tool to target specific areas where student achievement improvement is needed. This focused use of the tool is likely to result in similar improvements, based on the West Virginia evidence.

Watch-me!-Read, another solution developed through the Reinventing Education program, also produced evidence of direct student impact. A study conducted by reading researchers at Vanderbilt University of the Watch-me!-Read solution used with beginning readers in first grade found significant and consistent improvements in reading level, word recognition and comprehension in comparison to similar students not using the application.

- **The solutions drove necessary organizational change within school districts that were fundamental to achieving reform.**

Reinventing Education solutions are not single applications but rather an enterprise-level platform and team of knowledgeable people who can use the platform to address specific issues or challenges facing the district or state. This combination of flexibility and experience enable the grant sites to continue leveraging their investment by increasing both the scale of their implementation in addressing the original issue and broadening the scope of educational issues to which they are applying the solutions. As a result, these sites are using technology to address specific issues related to educational reform and improvement.

According to a Reinventing Education case study by Professor Rosabeth Moss Kanter of Harvard Business School, “Innovations do not present themselves in neat packages that can be slotted into existing organizational boxes; they require many other changes. An infrastructure has to be in place to make it possible to use the innovation, but the newer and more different it is (which makes it more innovative), the less likely it is that all pieces will be in place to support it. Indeed, part of the IBM strategy was to use the development of new technology for schools as an occasion to provoke more fundamental change in every aspect of how a school system operates. This meant that the IBM projects bumped up against organizational issues that had to be resolved before project elements could be implemented."

- **Reinventing Education solidified the long-term commitment and relentless work by the districts/states and IBM to achieve true reform.**

IBM committed an unprecedented amount of time to each grant site. While the partnerships began with a detailed planning period, most took far longer than expected due to cultural differences between a for-profit private entity and a public school. They worked in different time frames and had different languages and different expectations for the process. After the planning period, the projects moved through an extended period of iterative development, feedback, refinement and testing, and eventually matured into a significant scale-up effort at the sites where the solutions became institutionalized. This phase took three to five years.

Even after the formal grant periods ended – and long past the point when the grant funds were exhausted - IBM remains involved with the sites and continues the partner relationships. This level of commitment is rare for school-based collaborations that are technology-oriented and is tangible evidence of the partnerships’ commitment to change.

The outcomes are partnerships based on mutual respect, the importance of listening to one another, and the value of giving everyone a say in the development of the solution. For many of the school districts and states, even those accustomed to receiving support from large corporate or private foundations, defining and driving the reform process was a whole new experience.

- **The grants drove significant change in their approach to teacher training and development.**

Continuous teacher training is central to higher student learning. All of the sites have evolved sophisticated ways of providing professional development for the teaching staffs in their schools. For some of the sites, this was the main focus of their solution. Others made professional development a part of the implementation process. All evolved professional development solutions that are characteristic of what recent research tells us are key qualities for effective teacher development - sustained opportunities that are imbedded in the regular teaching experience and immediately available to the teachers.

Numerous studies on both the policy level and the implementation level have consistently identified teacher development and change as a critical factor in changing schools. The Reinventing Education sites, by design and by being responsive to the schools' needs, have developed significant changes in their way of doing professional development. This is a significant impact not usually seen with typical technology adoption programs.

- **Technology provided an instrument to re-engineer the education institutions' overall communications and data systems.**

Technology developed at the RE sites is only part of each solution. All too often with technology-based efforts in any organization, there is a tendency to focus on technology as the only instrument of change and ignore the human development that must occur simultaneously for any organization to really change and take best advantage of new technology. At the grant sites, we observed that at the same time technology applications were piloted and tested, the project teams developed new roles for key people and new ways of working together to use these tools. The technology focused (and in some cases, forced) examination of practices related to professional development, to acceptable quality levels, and to acceptable time frames. For instance, teacher training in the use of many of the solutions moved from special “workshops” typical of most forms of teacher professional development to job-embedded teacher improvement practices where school teams or teacher partnerships took on the role of supporting the use of the solution. This practice has been identified by research as more productive. In turn, this examination resulted in changes in practice that directly addressed core areas affecting student achievement. While the technology served as the catalyst, the partnerships actively used their resources to leverage change.

· **Grant momentum is leading to full-scale implementation.**

The truest test of a successful reform effort is its ability to maintain momentum and scale when the grant funding has ended. The Reinventing Education solutions that have made it past the scale-up period share the relatively rare status of achieving a level of institutionalization from which we can expect to see further impact on the work of teaching and learning in their schools. To illustrate RE's continued impact, the sites are now adding staff members with specific job functions that support and extend the solutions. In addition, they are covering technical maintenance and support costs while also applying the solutions creatively to new areas beyond those originally targeted by the solutions. The end result is a new systemic process that will continue to improve teaching and learning well beyond the life of the IBM grant.

And IBM remains involved. Once the official grant period ends at each site - a period lasting from four to six years for the first phase of Reinventing Education and two to three years for the second phase - IBM continues to support reform through local corporate community outreach, by providing access to mature solutions from other RE sites, and by ongoing support to track progress as a site moves through implementation of its solution and combines it with other RE solutions.

Providing Sustained Value

Taken together, these results indicate that the RE solutions successfully moved from innovative experiments to core, systemic components of institutional operations and are having sustained value. The program, while taking somewhat longer than originally expected for large-scale implementation, is achieving its goals. IBM's Reinventing Education program provides important lessons for both funders and schools, and is a model worthy not only of examination but of replication.

Externally-funded grants in schools encounter significant barriers that often keep their solutions on the periphery and in a fragile state that does not continue in any significant way after the grant funding is completed. As noted in the recently published report "Learning From Each Other" (Konley, 2000) from the Grantmakers for Education, relatively few funders have engaged school districts in long-term change endeavors, and thus the crusade for better schools has been long and difficult, often frustrating and disappointing. Some funders have actually given up. The report shares lessons learned from some of the larger-scale reform efforts in school districts.

Within the context of educational reform in general, and technology-based innovation specifically, IBM's commitment of time and scale - and its level of success - is unusual. The Reinventing Education initiative thus adds another dimension to our understanding of what it takes to realize technology's ability for improving teaching and learning and improved student achievement. While many are excited about technology's potential for teaching and learning, IBM's Reinventing Education initiative makes strong points about what technology can do and how it needs to be utilized to live up to its potential.

Common Success Factors

Although many of the most compelling aspects of the Reinventing Education initiative stem from the uniqueness of the projects undertaken by the individual school districts or state departments of education, a number of common success factors run throughout several, if not all, of the sites.

- **Each site set out to break through a specific, serious obstacle to improving education.**
  The original problem had to be very important. The solutions, no matter how successful, require visible support and must be perceived throughout the organization as addressing a critical issue. IBM selected partners who identified a significant barrier to quality education and who demonstrated a clear commitment to work hard on the solution. IBM also required that a site demonstrate commitment through carefully structured advisory boards and public attention and involvement.

- **Both the education leadership and IBM recognized that no solution would be a silver bullet or would work on its own**.
  The expectations about the time, energy, and resources required of people to make a solution work were realistic. Broad indicators, such as improvements in student test scores, happen only after an implementation has matured. Thus, each district or state had to be prepared to make policy decisions about the organization's commitment to Reinventing Education so that solutions could be fully implemented to see a positive impact.

- **Key leadership leveraged Reinventing Education to serve various constituencies and goals; it didn't remain isolated.**
  For Reinventing Education to be a success, solutions must carry the ability to be replicated at additional schools. Though each solution was tightly focused on a specific barrier to school reform, the problems were universal to public education. All of the projects that are fully implemented have found ways to continue and extend the solutions. This has required leadership to thoroughly understand the solutions and how they can be adapted. Sites are matching IBM’s resources using federal Preparing Tomorrow's Teachers for Technology (PT3) grants, federal and state Technology Literacy Challenge Funds, and funds from other initiatives. All told, IBM's program leveraged significant additional investments in the hundreds of millions of dollars.

- **Explicit strategies were outlined and implemented for handling the inevitable changes in key personnel or leadership.**

When leaders change, projects stall and many die. Only one of the original Reinventing Education sites has the same Superintendent who originally signed onto the project. Nonetheless, IBM recognized that staff turnover would present a significant challenge at each site, and planned for the inevitable change in leadership. The use of advisory boards, outside agencies or intermediaries, and team approaches with cross-training of key personnel all helped to limit the impact of turnover.

Experience from earliest grant sites were applied and evolved at newer sites.

- **The RE1 sites as a group were able to refine their goals based on their pilot experience.**

All of the projects experienced some false starts or spent energy and resources on aspects that eventually were trimmed. As the solutions matured, so did the understanding of which aspects should continue and which were not necessary or directly relevant to the core solution. This required that the partnership learn from the early stages of the work and have the flexibility to hone the project definition to fit what really was essential to make the solution work.

- **RE2 sites as a group were able to capitalize and build upon the experience of the RE1 sites and develop more focused implementation plans.**

Sites selected for the second phase of Reinventing Education are benefiting from the work of their predecessors. Energy has been targeted to adapting the solution to a well-identified problem, significantly shortening the time needed to move from initial exploration to large-scale implementation. Driving the streamlined process is experience. IBM now has a better understanding of what to expect and the ability to prepare the site for an enterprise-level solution right from the start. This is due in part to the ability to stand on the shoulders of the earlier efforts of the first round of Reinventing Education grants.

This advantage also reflects the enormous evolution that has taken place over the last few years in networking technology, groupware, and enterprise-level technical systems. While the first round of grant sites had networks in computer labs or for relatively simple administrative chores, no enterprise-level network linked schools for instructional purposes. In fact, few teachers even had e-mail accounts at the sites. For the original grant sites, Reinventing Education brought in the first enterprise network, or the projects evolved as the first networks were developed in most of the schools. By comparison, RE2 sites were already well into network roll-outs at the school level. This trend indicates that the solutions will be more easily implemented and integrated in the future.

- **IBM dedicated high-level executives with substantive education experience to direct the Reinventing Education grant project**.

IBM Chairman and CEO Louis V. Gerstner, Jr. brought in executives with extensive experience in urban education to direct IBM philanthropy and the Reinventing Education grant project. In turn, IBM's high-level staff provided the overall strategy and management of the program, set its unique tone, maintained the focus on goals and managed the extensive team of IBM researchers and consultants involved in the complex and detailed partnerships that were breaking new ground in school reform.

Common Challenges

Just as the sites shared characteristics that helped guide their success, many of them also faced, and often overcame, common obstacles.

- **All of the original Reinventing Education solutions were new endeavors, even those that adapted IBM's experience in other industries. Many of the site personnel, especially the teachers, were not prepared for the iterative cycles of application prototyping, testing, and refinement that the projects have required.**

Taking an R&D approach often resulted in premature implementation. Repeatedly, project leaders and participating teachers voiced difficulties with the tools they were using. Tension arose from the consistent lack of understanding between what the teachers expected the tools would be able to do and what IBM researchers were producing for them. The partnerships failed to fully appreciate the difficulties around an iterative design model – that as partners, the schools were being asked to help develop and redevelop the tools and not merely implement finished products. Teachers never really understood that they were involved in an R&D process and that it would be several iterations before the tools had the look and feel, as well as the reliability, of a finished product.

- **Enterprise-level solutions placed burdens on district/state IT staff. Most districts/states had some lags resulting from difficulties filling positions in the competitive job market that exists in this sector.**

For many of the districts/states involved in the initiative, the nature of the RE project required a fundamental shift in the way they viewed and used technology. Some sites saw the shortcomings in the capabilities of their own Management Information Systems departments with respect to the integration of technologies into teaching and learning. In general, there was no culture of using e-mail or other communication tools on which to build or leverage. Furthermore, the applications developed for the solutions marked the first high-level use of networked communications technology. This meant that they had to work across departments, such as IT, Student Research and Assessment, and the Office of Professional Development. Reinventing Education required a level of coordination, planning, thinking, and support that was very different from what districts/states had experienced in technology-related endeavors.

For many of the RE classroom practitioners, the solutions were their first exposure to any use of the computer for communication, or in many cases, any use of the computer altogether. As a result, technology literacy had to occur simultaneously to the solutions' introductions.

In addition, trained, reliable IT staff were difficult to recruit and retain. While nearly all sites had to replace essential personnel when key staff left the projects, several had difficulty recruiting and retaining data management and IT professionals. Those skilled in information and communications technologies can command much higher salaries in the private sector than in school districts and departments of education. Project leadership had to keep this in mind as they engaged in long-term planning, making sure they built

into their plans efforts to grow people internally. In the case of the data warehousing projects, the job mentoring and shadowing offered by IBM to the district or state personnel assigned to work on the projects allowed sites to maintain continuity in job functions. Working side-by-side provided individuals with training and augmented their skills. The sites may want to consider how to offer additional professional development opportunities to IT personnel.

- **Embedding technology understanding and use into overall professional development — rather than isolating computer skills — remains a challenge.**

Many of the RE projects have forced districts to confront their understanding of professional development with respect to technology integration. This takes several dimensions.

The first is logistical: training of teachers must be closely coordinated with availability of hardware and application software in schools. For many of the RE1 sites especially, there were some disconnects in the timing of training and the opportunities by those trained to immediately put into practice their new learning.

The second dimension is pedagogical: teacher professional development in technology often emphasizes encouraging the practitioners to use new tools from a technical standpoint, but not a pedagogical one. Once teachers become accustomed to using computers and other technologies and gain technical literacy, they are eager to learn how they can use these tools to enhance their classroom practice in meaningful ways. So often, it is all about using technology to support what they are already doing, rather than as a catalyst for changing how they teach.

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Conclusion

In 1994, when IBM launched its Reinventing Education program, the World Wide Web did not exist. While IBM was positive technology would ultimately transform schools in the same way it transformed business, the IT revolution was still in its infancy. In fact, remarkable technological breakthroughs over the last few years were barely dreams when IBM sent out its Request For Proposals for the first round of Reinventing Education grants. As technology matured, so has the substance, scale and value of the technology solutions now improving teaching and learning for millions of children. In many ways, Reinventing Education grew with the technology revolution and has been enriched by the industry's innovations.

But Reinventing Education was never only about technology. Experience had demonstrated that bringing truckloads of computers to schools anywhere in the world did not raise the level of student performance. Because of its long history as a technology solutions provider, IBM instinctively understood that technology must be focused on something specific - a real problem - before technology would respond with an answer. Bringing the right groups together to identify the core barriers to better teaching and

learning, providing sustained leadership, and working thoughtfully toward the goal of improved student performance represents the real contribution of Reinventing Education. For example, if the goal is higher achievement and enough effort is placed on creating new lesson plans online that relate directly to state standards - and teachers are trained to use the lessons effectively in class - students are bound to know more and score higher on tests.

IBM also understood that reform is not a success until it becomes established in the community and can sustain itself without extraordinary outside intervention. Reinventing Education has demonstrated tangible improvements in teaching and learning and the unusual ability to establish strong roots in a handful of schools as it multiplies to others. There is still much to learn about school reform, but that cannot scare us away from tackling the problems. Public education is too important to put off action, and IBM has given us a successful model to build on.

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