“SCALING UP” INVOLVES ADAPTING A SUCCESSFUL LOCAL INNOVATION TO SECURE effective use in a wide range of contexts. In contrast to other sectors of society, the scaling up of successful programs has proven very difficult in education. Insights from changing operations at one fast-food location may easily transfer to every store in that franchise and perhaps to any comparable type of restaurant. However, a new type of teaching strategy that is successful with one practitioner often is difficult to generalize even to other instructors in the same school, let alone to a broad range of educators. Improving outcomes for students throughout the U.S. requires that educators learn how to adapt innovations that are successful under ideal conditions to the diverse and often unfavorable settings characteristic of many other schools.

Many researchers have worked extensively on ways to achieve scale for educational innovations. Recent examples include scaling reforms in high-poverty schools, highly rated middle school science curriculum units, and reading programs such as Success for All. Educational innovations that are scaled need not involve technology in either the intervention or the process of scaling. However, as strategies from other sectors of society illustrate, technology can assist in many ways in achieving scale.

The Power of Information and Communications Technologies in Enabling Scale

Outside the field of education, information technology has aided in bringing innovations to scale in two complementary ways—automation and individualization. Automation simplifies and standardizes a product or service so that tasks necessary to supply it require only preset routine actions by people or machines. Through automation, for example, a factory can use information technology coupled with machines to generate mass-produced products (e.g., identically
configured clocks) cheaply, efficiently, and reliably. Similarly, through automated processes and standar-
dized protocols for employee actions, a whole chain of re-
Staurants can simultaneously and successfully implement a new process for frying food. Typically, applied automa-
tion achieves scale via the lowest common denominator—
the one-size-fits-all design and implementation strategies.

In contrast, individualization produces variants of products tailored to a wide spectrum of styles and tastes. For example, many software applications allow users to customize the programs’ appearance, toolbars, features, and modes of processing. Information technology enables designers to embed ways for users to co-create the specific product or process they are seeking. Individualization achieves scale by meeting a spectrum of customer needs with a customizable product or service—often at some greater cost in terms of price, complexity of co-design, and challenges in usage compared to products or services mass-produced through automation.

Recent advances in technology are creating an emerging “fusion” option for scale, a design-and-implementation strategy that combines the virtues of automation and individualization. As an illustration, consider the global positioning system (GPS), a satellite-navigation system originally funded by the U.S. Department of Defense to aid military navigation, positioning, and time synchronization. Civilian GPS devices are mass-produced and use identical underlying technologies, leading to a steady decline in costs. However, the ways purchasers use their GPS devices are very individualized: navigation systems for motor vehicles, airplanes, and boats; locating capabilities for cell phones; and locational data for online geographic-information systems are all emerging uses. In the future, a variety of accessories will allow even more potential uses, as well as the ability to customize the look and feel of the GPS device.

GPS devices are an example of scalable information technology that is cost-competitive and produced through automation, but also is easily adaptable to a wide range of individual uses and styles. But to what extent is it possible to scale up innovations in education using information technologies?

**Scale and the Partners in Learning Program**

Through these authors’ research for the Microsoft United States Partners in Learning (PiL) Mid-Tier Projects, we are developing early findings on how they are fusing information technology with automation and individualization in order to take their promising educational innovations to scale [see sidebars]. Our goal is to identify factors that contribute to success.

To allow comparison of scaling strategies across projects with diverse audiences, goals, and outcomes, we have developed a conceptual framework based on dimensions of educational innovation that promote scalability. In the context of innovations in teaching and curriculum, Cynthia E. Coburn, assistant professor at the University of California Berkeley Graduate School of Education, defined scale as encompassing four interrelated dimensions: depth, sustainability, spread, and shift in reform ownership. Depth refers to deep and consequential change in classroom practice, altering teachers’ beliefs, norms of social interaction, and pedagogical principles as enacted in the curriculum. Sustainability involves maintaining these consequential changes over substantial periods of time, while spread is based on the diffusion of the innovation to large numbers of classrooms and schools. Shift requires districts, schools, and teachers to assume ownership of the innovation, deepening, sustaining, and spreading its impact.

Building on her work, a fifth dimension to extend Coburn’s framework is evolution, in which the innovation, as revised by its adapters, is influential in reshaping the thinking of its designers, creating a community...
Learning About Scale

Partners in Learning
Through its Partners in Learning (PiL) initiative, Microsoft works with government and nonprofit organizations and invests its resources—people, partnerships, services, philanthropy, and products—to stimulate 21st-century learning. This work helps to ensure an increasing standard of living for citizens and to improve countries’ competitiveness. To date, 101 countries are participating in PiL and 51,364,159 students have taken part in PiL programs.

The specific goals of PiL include:

• Digital literacy for all. Students have the capacity and skills to seek out, filter, and interpret information while collaborating with others using a variety of media sources.

• An educated, competitive workforce. Students have the capacity and skills to be lifelong learners in order to adapt to and evolve with changing work environments.

• Improved quality of life. Students appreciate the diversity and complexity of the world around them.

These goals are broad and challenging, and in order to attain them, Microsoft is committed to scaling up successful existing education innovations. There are three investment models available to fund public/private partnerships—national partnerships, state innovation partnerships, and the Mid-Tier Projects. The Mid-Tier learning community examines the power of technology to achieve scale. The company and education advisors selected nine grantees (see sidebar, page 7) that are charged with experimenting with scale strategies, examining technology as a scale tool, and documenting lessons learned. These strategies and lessons are found throughout this issue of Threshold.

School of the Future

“Throughout the United States, there are pockets of innovation that reveal true advancement and promise within education,” says Mary Cullinane, director of U.S. PiL. “Our challenge is to bring scale and sustainability to this work.” In 2003, the School District of Philadelphia (Penn.) and Microsoft embarked on an ambitious and purposeful task: to build a School of the Future. The Philadelphia School of the Future (SOF) opened on September 7, 2007, and was completed on a traditional budget. Microsoft provided professional expertise throughout the school’s development, execution, and day-to-day management process. Throughout the development process, leaders stated repeatedly: “If we can’t scale up what is happening inside the walls of this school, we won’t be successful.”

Some of the current SOF scaling strategies include establishing a comprehensive School of the Future website that describes all aspects of the school’s development; developing and disseminating SOF briefings booklets that document unique planning processes, such as the “6 Is Development Process”; creating an SOF film documentary and disseminating it to major schools of education throughout the U.S.; and establishing the annual World Wide Microsoft SOF Summit to get information about SOF to leaders throughout the world.

An important and scalable by-product of this project is the Microsoft Education Competencies. Administrators, teachers, students, and parents can use these to define a job profile, assess candidate competence, and plan for personal and professional growth. The competencies were created by educators for educators and reflect many of the same career competencies used at Microsoft.

Microsoft understands that the only way to uncover critical strategies to successfully scale up education innovation is to facilitate conversations between the public and private sectors and share PiL scaling stories with leaders throughout the world. By doing this, all stakeholders will have a better chance of successfully addressing the social challenges facing us in the 21st century.

—Allyson Knox

R E S O U R C E S

Building the School of the Future.
www.microsoft.com/education/schooloffuture.mspx

Microsoft Education Competencies.
www.microsoft.com/education/competencies

U.S. Partners in Learning.
www.microsoft.com/education/pilus.mspx

of practice that evolves the innovation. (This five-dimensional conceptual framework is portrayed in a graphic on page 16.)

We are testing the validity and utility of the framework by using these dimensions of scale to study Mid-Tier Projects in PiL. We are examining the progress of nine different projects, each with a focus on technology and 21st-century skills, yet each dramatically and dynamically different. These include efforts to improve professional development by working with education-school faculty and in-service and preservice teachers; a project engaged in creating challenging and motivating educational games for middle-schoolers; a project exploring how building decision makers’ capacity for evaluating educational technology programs can aid their success; and efforts that link schools around the world to share knowledge and experience. Each of these projects has its own unique approach to identifying what and how it can scale. Each has to marshal limited resources to accomplish its tasks. None is self-contained, and each may have to form partnerships to eventually reach its goals. Some are building on local or regional success and are seeking to extend their reach; others are beginning from
Microsoft U.S. PiL Mid-Tier Projects

The U.S. Partners in Learning Mid-Tier Projects are:

**Alabama Best Practices Center**
www.bestpracticescenter.org/21stcentury.htm

The Powerful Conversations project integrates the skills and tools used in 21st-century learning to deepen a school’s understanding of results-driven professional development and its use in addressing the specific learning needs of every student in the school.

**The Council of Independent Colleges**
www.cic.edu/projects_services/infoservices/j21.asp

The council’s Teachers for the 21st Century program aims to integrate 21st-century learning skills into courses offered by member institutions and into field experiences and practicums that take place in partnering K–12 schools. Through face-to-face workshops, online webinars, and dissemination of exemplary instructional materials, the council will enable faculty members in 20 private colleges and universities to strengthen curricula and pedagogical approaches in preservice teacher-education programs.

**Global Kids**
www.holymeatballs.org/p4k.htm

Global Kid’s youth-media project, Playing 4 Keeps, supports an innovative curriculum for engaging minority youth in the design, development, and dissemination of online games about important social issues. This four-year grant will produce one game each year and, when distributed through a major commercial gaming portal, have the potential to educate millions of youth and tens of thousands of educators. (Read more, page 29.)

**James Madison University**
coe.jmu.edu/netst

The JMU Partnership for 21st Century Skills is a multiyear statewide program to enhance Virginia teachers’ use of technology in teaching and learning in the K–12 environment. The program has two main components: a performance-certification program relative to the National Educational Technology Standards for Teachers (NETS*T) published by the International Society for Technology in Education (ISTE), and an initiative in support of the framework for 21st-century learning as set forth by the Partnership for 21st Century Skills.

**Lemon Grove School District**
www.lgsd.k12.ca.us/lemonlink

LemonLinK is a research-based 1:1 tablet program focused on transforming the teaching and learning environment through 1:1 computing to evaluate outcomes, document best practices, and provide a blueprint for others to use in developing more sustainable 1:1 computing models. (Read more, page 25.)

**National Commission on Teaching and America’s Future (NCTAF)**
www.nctaf.org/resources/demonstration_projects/tlinc

The Teachers Learning in Networked Communities project (TLINC) directly addresses the issue of teacher retention, particularly novice-teacher retention. NCTAF created TLINC to promote the use of communication technology by establishing professional learning communities composed of novice and experienced teachers. (Read more, page 11.)

**SERVE Center, at University of North Carolina at Greensboro**
www.serve.org/Technology/#SPICE

Studying Practices for Increasing Capacity in Education (SPICE) is a study of the scalability of a suite of education innovations, collectively called Capacity to Apply Project Evaluation (CAPE). It is designed to help schools develop the capacity to plan and conduct evaluations of their school initiatives and projects for the purpose of improving implementation and impact.

**TakingITGlobal**
www.takingitglobal.org/tiged

TakingITGlobal engages youth in local and global issues through an interactive online platform that exposes students to world issues and cultures, engages them through collaborative project-based learning, and develops their geography, language, and critical-reasoning skills.

**The Teacher Leadership Project**
www.tlp2.org

Developed in 1997, the Teacher Leadership Project (TLP) has trained more than 3,500 teachers in Washington State and Mississippi in using technology as a tool to enhance instruction. Through the U.S. Partners in Learning Grant, TLP condensed its 14-day, face-to-face training model into a four-day, face-to-face training followed by online follow-up training. This new model allows TLP to create a sustainable program that could spread to teachers across the nation. (Read more, page 22.)

—Allyson Knox
Mid-Tier Projects
Minimum Required Elements

Members of the U.S. Partners in Learning team and U.S. PiL National Advisory Board used the following criteria to select the Mid-Tier Projects grantees.

**Scalable**
- There is documented evidence that groups of people (organizations or governments) are strongly interested in expanding this project to a greater number of students and/or educators.
- There is evidence that the project is modifiable and adaptable to other learning environments.
- There is willingness to provide necessary intellectual property rights to allow Microsoft to replicate the success of the project with other educational entities across the U.S. and overseas.

**Innovative**
- The project clearly defines a problem and vividly outlines a new and/or improved strategy for solving that problem.

**Collaborative**
- There is evidence of existing collaboration among multiple organizations to achieve project success.
- There is a plan in place for increasing and deepening collaboration among existing and new organizations and leaders.

**Successfully Embraces 21st-Century Learning**
- There is evidence that the project strongly embraces the learning strategies and principles outlined in the Partnership for 21st Century Skills framework. (See www.21stcenturyskills.org for more information.)

**Sensitive to Issues of Equity**
- Project leaders support Microsoft’s commitment to funding projects that represent diverse ethnicities and geographies.

**Significant**
- The project addresses a significant problem in U.S. K-12 public education.

**Sustainable**
- There is evidence that the project will continue beyond the U.S. Partners in Learning Mid-Tier Projects Grants timeframe.
- There is evidence that at least one local school district, organization and/or foundation is considering investing in this project beyond the Mid-Tier Projects Grants timeframe.

Emerging. For example, we may find that questions of marketing, positioning, and branding are also critical to scaling efforts. The spectrum of Mid-Tier Projects gives us some confidence that our findings can be generalized to many innovations seeking to scale up.

**Factors That Empower Scalability**

**LEADERSHIP AND LEADERSHIP STYLE:** In the projects we are studying, effective leaders appear to be those who are flexible rather than dogmatic, diligent in gathering and using feedback from their project participants, and practical in getting the job done. That is not to say that a leader with an expansive vision cannot be successful, but in moving to scale, a leader who is good at adjusting to changing environmental conditions and being responsive to feedback and opportunity is also a realistic manager who can make the project work. A visionary can set the goals, but it takes a grounded, practical administrator to make the accommodations, adjust to new environmental conditions, apply new data to operational decisions, and make the most of limited resources. Without a vision, there likely would not be a project worth scaling, but without adaptive, innovative, and realistic leadership, the work would not get done.

**PARTICIPANTS:** Effective participants in projects are as important as effective leaders, and good projects can attract participants ready both to contribute and to gain from their involvement. Beyond this, there are other characteristics of participants that make moving to scale more likely. These include intrinsic motivation to participate, general comfort with technology, and a commitment to making a change. To succeed in scaling, some projects need participants who are able to follow instructions and who give due diligence to meeting project obligations; others require participants with the capabilities to work with ill-defined criteria and make adjustments as the program progresses. Sustaining participation is a critical concern to all the projects moving to scale. They each have had to develop strategies to recruit and retain participants, as well as find ways to further engage them over time. For some projects, this has been a difficult issue to resolve.

**COMMUNICATIONS:** For many of the Mid-Tier Projects, the effort to scale has caused participants to reconsider how they communicate their initiative to others. For projects that worked only in a district or a state, figuring out how to spread the word nationally and even globally was a new effort. Who might be interested and what do they need to know to consider adopting the innovation? Who is the key contact who will make the decision whether or not to participate? For some projects, marketing was an entirely new strategy. For other projects, marketing had been a familiar approach to generating participation, but conveying something new to their old colleagues while bringing in new participants meant rebranding their current activity. This rebranding strategy was complex because project leaders didn’t want to confuse existing clientele while presenting a different look to attract new
Private and Public Strategies for Scale

Scale “levers” exist in both the private and public sectors, though each brings different approaches to the challenges. To help achieve PiL goals, Microsoft explores the following tools and strategies used by each sector in scaling up an innovation.

Private Sector

The private sector has a variety of financial instruments available to fund expansion, such as public offerings, equity-based loans, and venture capital.

Through an acquisition, a company can quickly gain expertise, jump-start its presence in a new area, or eliminate a competitor.

A critical 21st-century scale tool is the Internet. In the past, software companies and other nontechnical businesses delivered products to customers through the mail or at retail outlets. But with the Internet, a customer can download software wherever he or she has a connection. This scale tool makes it easier and less costly to get products into the hands of more consumers.

Media is a powerful tool. In its TV commercials, an Australian gecko talks to viewers about why Geico’s car insurance is better than the rest. Geico gets it; the company created a lovable cartoonlike character and used media outlets to channel him and its product to millions of people.

Henry Ford’s development of the car-manufacturing line is an example of how a new business-development process can work to achieve scale. Ford’s company produced more cars, faster and cheaper than its competition. That’s scale.

Market research is another tool. Retail stores would never expand into a new community without a full analysis of the community’s demographics and competitors’ presence. This information is critical in deciding whether to spread products and services.

Public Sector

The public sector has the power to legislate. For example, in the 1800s, Congress legislated the establishment of one land-grant university in every state. This law helped local communities gain access to university research and expertise.

Similar to the private sector’s financing tool, taxation funds new or expanded public-sector programs. Medicare is just one example: Our taxes pay for a system to keep our elderly well.

Another public-sector tool is the bully pulpit. A person who holds public office has the power to amplify a message, idea, or program and affect the thinking or actions of millions of people.

The public sector often convenes stakeholders around a social problem and helps spearhead social-marketing campaigns to scale awareness and change behavior. For example, in the 1980s, the Reagan administration worked with Mothers Against Drunk Driving and brought together nonprofit and public-relations leaders to create a campaign to curtail drunk driving.

The government also can point citizens toward a unity of purpose, ultimately helping to build scale for an idea, action, or program. During World War II, the U.S. government encouraged citizens to build “victory gardens” in their backyards so as much of the U.S. agricultural supply as possible could be channeled to the military.

Private philanthropies straddle both sectors, because the dollars are private and yet they are often channeled toward public-sector efforts. In doing so, they expedite progress related to that problem.

—Allyson Knox

CONSERVATION OF RESOURCES: Achieving maximum impact with a limited set of resources was a common theme among successful projects. Even those projects bringing together a wealth of resources from a variety of funding sources found that the capacity to act was nonetheless finite and precious. During the first year, we saw many grantees make decisions to revise their initial plans, refocusing on using existing resources with little or minor modifications, rather than pursuing the development of new capabilities as initially planned. For example, several projects used the online professional-development service Tapped In as a resource for facilitating communication among participants rather than establishing a customized communications medium. However, these projects also realized that making the most of what they already have is only a temporary solution to long-term scaling challenges.

SUSTAINABILITY: Only time will judge the success each project will have in scaling and sustaining that scale once it is achieved. However, several indicators point toward long-term sustainability for many of the projects we are studying. For some projects, a high level of enthusiasm on the part of leaders and participants created considerable momentum in the first year that shows no evidence of slowing as they move into the second year.
However, while momentum may carry them for a while, scaling requires more than enthusiasm. For some projects, establishing a baseline of continuing resources is a stronger indicator of potential sustainability. These grantees gave thought to their longer-term models for continuing project activities and renewing project resources. Also, well-designed and well-implemented promotional plans seem to be another factor that will likely contribute to sustainability past the initial grant funding period. To the extent that a project can gather additional funders or build a financial model that self-funds further efforts, its ideas and programs will continue to grow and prosper.

**Feedback and Evaluation:** The more successful projects, at least in the early stages, use feedback from their participants and staff in making decisions. They have gone beyond “smiley-face” surveys to ask serious questions about what they were doing, what was or was not successful, and where their intervention stood the best chance of making a difference. They asked good questions in a timely fashion, so the data could be used in productive ways. Beyond this, successful project leaders were willing to make changes and had the drive and authority to do so. Their flexibility and willingness to collect and use data enabled effective mid-course corrections, as well as end-of-year changes that substantially modified the project to improve its effectiveness.

### Next Steps in This Research

The research on scaling will continue for the next year or two, with the hope (and expectation) that we will develop further findings on which project features yield scaling of various kinds. The facilitators of success may vary from project to project, but we believe that ideas from our research can inform initiatives across the field of education. In addition, we plan to learn from projects that do not reach scale. These less-than-successful attempts to scale can help focus efforts and resources on the relative leverage of various strategies.

At present, U.S. resources for scholarship are focused on the creation of scientifically based knowledge through clinical-intervention studies involving random assignment, a model for evolving educational effectiveness that captures only part of the research needed to effectively enable the scaling-up approaches discussed above. Clinical trials can aid in determining what to scale, but not how to effectively adapt that innovation to various local situations. Hopefully, this synthesis and related work will inspire public and private sources that provide the substantial, sustained support required to undertake these types of studies. ■ ■ ■

Christopher Dede and Saul Rockman are part of the Microsoft Partners in Learning (PiL) project team and are developing and studying the projects.

Dede is the Timothy E. Wirth Professor of Learning Technologies at Harvard’s Graduate School of Education. An expert in emerging technologies, policy, and leadership, Dede has served as a member of the National Academy of Sciences Committee on Foundations of Educational and Psychological Assessment, the U.S. Department of Education’s Expert Panel on Technology, and the International Steering Committee for the Second International Technology in Education Study. He was an editor of Scaling Up Success: Lessons Learned from Technology-based Educational Improvement (Jossey-Bass, 2005) and Online Professional Development for Teachers: Emerging Models and Methods (Harvard Education Press, 2006).

Rockman is president of Rockman Et Al, a research and consulting firm based in San Francisco, Calif. He and his colleagues study the impact of educational interventions and have conducted several major studies of 1:1 laptop projects. He is author of the article “It’s My Laptop” in the Winter 2007 issue of Threshold (www.ciconline.org/thresholdwinter07).

Allyson Knox is academic program manager for Microsoft U.S. Partners in Learning (PiL) and manages the PiL Michigan, Massachusetts, and Mid-Tier grants. She represents Microsoft on the Partnership for 21st Century Skills board and formerly worked at the U.S. Chamber of Commerce as a senior program manager in workforce development.