
Microsoft Innovative Schools

# The Microsoft Innovative Schools Program
# Year 1 Evaluation Report

May 2009

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Partners in Learning

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# Executive Summary

## *Introduction*

Through its Innovative Schools Program, Microsoft seeks to promote innovative teaching and learning, with the goal of providing models of effective instruction that help students build the necessary skills for success in the 21st century. From 2007 to 2009, 12 pilot Innovative Schools in 12 countries have been working together with a local Microsoft partner and the worldwide community of Innovative Schools to design and implement new and locally relevant approaches to education.

Specific goals for teaching and learning vary across the schools, but they typically include elements such as learning activities that encourage students to construct knowledge and solve real problems, opportunities for students to collaborate with their peers and experts, and innovative uses of technology in the classroom. Toward these ends, the Innovative Schools Program provides models and resources for school change, training and expertise (in the form of virtual and face-to-face meetings, an international team of mentors, and local staff from Microsoft), and a forum for global community among the schools.

The program is being evaluated by an international research team coordinated by SRI International. The evaluation provides a global picture of the program's progress and outcomes as well as formative feedback relevant to each school. The Year 1 Evaluation Report is the second in a series of annual reports. It describes the schools' progress and challenges in their first full year of participation in the Innovative Schools Program.

The Year 1 Evaluation Report uses several types of data collected by evaluators in 11 countries.[1] Evaluators visited the schools in early 2008 and conducted a series of interviews, focus groups, and classroom observations. They also collected and analyzed samples of the assignments that teachers gave and the work that students did in response, a method used to characterize the teaching and learning that is taking place in the classroom.

This report presents findings in three areas: change processes and culture at the whole-school level, school-level strategies for creating improved learning environments, and early progress toward planned changes in teaching and learning within classrooms.

1 One of the 12 countries, Qatar, is not participating in the global evaluation. The Innovative School in Finland is a new school that is currently in its design phase. Interviews were conducted with individuals developing the Finland school's plan, but Finland is not included in classroom-level data collection or analyses.

## *Organizational Learning and Change Processes*

Transformation of teaching and learning is the ultimate goal for every Innovative School. To lay a foundation for significant change, Microsoft emphasizes the importance of instilling a supportive schoolwide culture for reform, including strong and supportive leadership, collaboration among teachers, ongoing professional development, and embedded self-evaluation of the progress of reform. Some highlights of the progress of these efforts follow:

- *Implementation strategies.* The paths to reform chosen by each school team are strongly shaped by the diverse national and local educational contexts in which schools operate and the starting point of each school. Across the pilot schools, implementation trajectories ranged from centrally driven whole-school reform to staged or opt-in strategies that started with a subgroup of the school's staff and allowed teachers to experiment with new instructional practices at their own pace. Additional supports such as professional development, incentives, and a school culture supportive of experimentation were key to encouraging more reticent teachers to take on the challenge.
- *Leadership of reform.* In general, widespread teacher participation was experienced in schools where school leaders communicated a clear and consistent vision, provided visible support for new teaching approaches, and served as proactive mentors to staff.
- *Professional community.* Many of the pilot schools took steps in their first year to develop an active teacher professional community with a collective focus on instructional improvement and student success. One prerequisite for developing such a community was common planning time for teachers to meet together; some schools accomplished this by rearranging the school schedule, providing release time for teachers to observe each other's classes, or adding staff. The second challenge, and another deliberate focus of activity in some of the schools, was development of processes and trust so that teachers could use their common planning time productively.
- *Teacher professional development.* Most of the Innovative Schools provided teacher professional development related to technology skills and readiness to use technology. Fewer schools provided in-depth training on innovative uses of technology for teaching and learning or on innovative pedagogies. These are areas in which many teachers feel the need for increased support. Some schools successfully embedded peer-to-peer coaching and formal training offerings into the ongoing practices of the school, supporting teachers to try out and discuss new tools and pedagogies so that learning was integrated with actual classroom practice.
- *Self-evaluation.* Regular reflection on what is working so far and on next steps for continued instructional improvement is still early in development at many of the Innovative Schools. Nevertheless, examples of strong self-reflective practices can be found, including regular surveys of school stakeholders (students, teachers, and parents) and engagement of teachers as "action researchers" studying their own practice.
- *Infrastructural supports for change.* In their first year, each of the pilot schools moved forward with plans for essential infrastructural improvements to support school change. For some, this included adding flexibility to physical learning spaces. Most began or continued upgrades to their technology infrastructures with the aims of increased access and increased reliability.

## *School Strategies for Creating Better Learning Environments*

In addition to their focus on planning and leadership in Year 1, most of the pilot Innovative Schools also began efforts to change their instructional environments to support more innovative teaching, learning, and assessment. Common features of the learning environments that most of the schools envision include the following:

- *Project-based learning.* Most of the pilot schools hope to incorporate projects into the curriculum, as a way to allow students to pursue their own interests, make decisions, and connect to the community outside the classroom as they seek answers to a question or create complex products.
- *Collaborative work.* The ability to work in teams is an essential skill for the 21st-century workplace, and the pilot schools are beginning to encourage students to work together in increasingly sophisticated ways.
- *Student autonomy and self-regulation.* Students learn to regulate their own learning by planning, monitoring, and revising their work, processes that some pilot schools are encouraging in their classrooms.
- *Use of technology tools.* Many of the Innovative Schools are focused on integration of technology into the classroom, incorporating it into projects, student collaboration, and other student-centered teaching practices.

The context of education in each country is a significant force in shaping instructional changes of this magnitude. Teachers are often challenged to find ways to innovate within the confines of traditional education requirements, which commonly drive the content and pacing of instruction and may leave little flexibility for new instructional practices. Some of the pilot schools are able to make school-level changes such as longer class periods to support more student-centered approaches to instruction. Others are experimenting with new forms of instruction in particular grades or parts of the school day that allow more flexibility.

Some of the Innovative Schools are also experimenting with new assessment practices that emphasize higher-level skills, rather than the factual recall that is commonly measured by traditional assessments. Some pilot schools have developed schoolwide rubrics to assess cross-curricular skills or a technology-based tool to track students' skill development across their project work. Assessment is an area that many schools have described as an ongoing challenge and an important focus of continued development.

## *Measures of Teaching, Learning, and Assessment in Innovative Schools*

To quantify the changes to teaching and learning being made in Innovative Schools, national evaluators observed classrooms and collected samples of the learning activities that teachers assign and the work students do in response.

Evaluators observed classes taught by 64 teachers from 10 Innovative Schools, looking for evidence of particular aspects of innovative teaching, such as connecting learning to the real world; working on extended/in-depth projects; giving or receiving feedback; and student choices about tools, resources, and topics of study. The number of these aspects of innovative teaching and learning observed in a single observation period was used as a scale measuring innovative teaching practice. Results show a great deal of variation in teaching practices across classes, and that many teachers are just beginning to experiment with innovation at this early stage in the initiative.

- In a majority of classes, students received feedback on their work, but they rarely had the opportunity to revise their work based on the feedback.
- Students often had opportunities of some kind to relate what they were learning to the real world but less frequently worked on extended projects or made choices about the content or tools for their work.
- Students used technology in 31 of the observed classes (48 percent).
- During 9 of these observations, students' use of technology was entirely basic in nature: they used ICT for drill and practice, to look up factual information, to do word processing, or to create text-based presentations.
- During the other 22 observations, students' use of technology included at least one use classified as higher-level, such as the analysis or organization of data or information, online collaboration, or the design of a multimedia product.
- Teachers tended to offer more varied and innovative learning opportunities when students were using technology. A comparison of class sessions in which students used technology in higher-level ways with sessions in which students did not use technology or used it only for basic purposes found that the first of these involved more of the practices included in the innovative teaching scale.

To provide a second source of direct evidence concerning teaching, learning, and assessment, evaluators collected 289 learning activities from humanities and science teachers in 10 Innovative Schools. The characteristics of the activities were judged on dimensions of innovative teaching, using rubrics developed by SRI. After just one year of schools' participation in the program, it is not surprising that this analysis describes instruction that, on average across the 10 schools, has room to become more innovative:

- The typical learning activity required students to do some knowledge construction, but most of the activity could be completed by reproducing information that students had read or heard.
- The typical learning activity allowed students to do some of their work together but did not require collaboration, specialized roles, or interdependent products in which each student's product had to be designed jointly with those of other students.
- The typical learning activity did not give students choices about how to address the assignment or require them to implement a solution in the real world.
- Learning activities incorporating technology offered more innovative learning opportunities than those without technology.
- Although these averages show that many schools are currently at an early stage on their paths to transformation, there were examples of activities that were highly creative, engaging, and challenging for students.

Evaluators also rated samples of student work on evidence related to four dimensions of innovative learning. Overall, there is a less consistent association of technology use with the rated quality of students' work than there was with the rated quality of learning activities. Perhaps not surprisingly, students' work displays more evidence of 21st-century skills when the students' teachers offer more innovative learning activities.

## *Summary and Reflections*

Significant educational change typically requires far more than a year to implement, particularly for those schools that are working within traditional national systems of education. Nevertheless, some of the pilot schools—including schools that were already on a strong path to reform when the Innovative Schools Program began, but also some schools for whom reform is a newer goal—were developing instructional approaches that could serve as models for like-minded reformers. Some of the schools are also implementing promising strategies to address common challenges of reform, including supports for teachers as they begin to enact educational change and practical ways to create time for common planning and individual practice.

# Chapter 1: Introduction

> Success in the slowly changing worlds of past centuries came from being able to *do well what you were taught to do*. Success in the rapidly changing world of the future depends on being able to *do well what you were not taught to do*.
>
> —Papert & Caperton, 1999

> If you could design and build a school from the ground up, using research-inspired learning principles and best-in-class technology, what would YOU create?
>
> —Microsoft Innovative Schools Program, 2007

The Microsoft Innovative Schools Program seeks to support school leaders and teachers around the world as they transform traditional schools into providers of innovative learning experiences that prepare students for the 21st century. In its first two years, the program is working with 12 pilot schools in 12 countries, with plans for expansion beginning in 2009. These schools are engaging with their local Microsoft affiliate, educational experts, and the worldwide community of Innovative Schools to develop and implement new locally relevant strategies for innovative teaching and learning or, in several cases, to further the reforms already in progress when they joined the program. This evaluation report, the second in a series of annual reports, describes the early progress of the schools in their first year of the pilot program. It is based on data collected by national evaluators in 11 countries during the 2007–08 school year.[2]

The 12 schools share the goal of using innovative teaching to engage students in school and prepare them for success in the 21st century. Common features of the learning environments that most of the schools envision include personalized, student-centered approaches such as project-based learning; integration of information and communication technologies (ICT) as a tool for teaching and learning; and work that inspires students to solve problems, think critically, work collaboratively, and communicate effectively. This broad vision is represented in different ways across the pilot schools, as each school is encouraged to select reform goals that are appropriate for its students, families, and local or national educational system. The reforms being pursued by each of the 12 schools, along with some basic descriptors of the schools, are summarized in Table 1. The diversity of the pilot schools and their initiatives offers a unique opportunity to learn from the process of school reform across many varied national and educational settings.

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2 In this report, we refer to school years as they are commonly represented in the northern hemisphere, because this presentation represents the majority of school schedules and the common timing of the evaluation. In fact, the school years in Chile and Brazil are more similar to calendar years.

**Table 1-1. Microsoft Innovative Schools**

| Country | Location | Number of Students | Age Range of Students | Reform Description |
|---|---|---|---|---|
| Brazil | São Paulo | 70 | 2–15 | A fairly new school conceived with a vision of nontraditional learning, Instituto Escola Lumiar uses multidisciplinary, multiage projects in lieu of classes. As part of the Innovative Schools Project, the school is developing the Digital Mosaic, a software-based learning management system that will allow staff, students, and parents to map students' growth in a variety of competencies. |
| Canada | York, Ontario | 1250 | 5–18 | Literacy@School is a districtwide literacy-focused professional development program rather than an individual school. A growing number of "demonstration teachers" participate in professional development and work together to develop strategies for technology-infused, student-centered literacy teaching. Other teachers are invited to visit their classrooms, either physically or virtually, and to discuss ways to use these ideas to improve their own literacy teaching. |
| Chile | Santiago | 450 | 9–18 | The Innovative School in Chile, Centro Educacional Erasmo Escala Arriagada, is working to integrate technology into teaching and learning. As first steps to instruction that is more student-centered within a school characterized by traditional pedagogies, they have supplemented the regular curriculum with a projects course and a course focused on artistic expression. The school seeks to develop not only students' academic learning, but also "habits of heart" that will allow them to be motivated, active citizens. |
| Finland | Oulu | 700 | 7–16 | The Finnish Innovative School, Ritaharju Yhtenaisperuskoulu, is still in the design phase. Expected to open its doors to students in 2010, Ritaharju is envisioned as a "future school," where learning will be integrated with technology, and the school will be an active and central part of the community of the city district Ritaharju. Currently, reforms are being piloted in other schools in Oulu; the outcomes of those pilots will shape the ultimate design of Ritaharju. |

**Table 1-1. Microsoft Innovative Schools, continued**

| Country | Location | Number of Students | Age Range of Students | Reform Description |
|---|---|---|---|---|
| France | Amiens | 150 | 6–12 | At École Chateaudun, reform is focused on three areas: technology infrastructure, school organization, and interactions among teachers, students, and parents. One particularly visible change has been in the structure of the school day: students spend the morning in traditional classes and part of the afternoon pursuing project work in ability-based teams, using technology as appropriate to the projects. |
| Germany | Munich | 1400 | 10–18 | Gymnasium Ottobrunn has a number of reforms under way: a statewide reorganization of the final years of secondary school, a statewide change in the number of years of schooling, technology integration, and use of Chris Gerry's learning plaza model for learning spaces. Through these reforms and other efforts, the school is working to introduce more student-centered pedagogies such as project-based learning. |
| Hong Kong | Sheung Shui, New Territories | 620 | 6–12 | At Fung Kai Innovative School, the focus of the reform program is called the "e-school bag." Under this umbrella, curriculum, assessment, and staff development are being changed to integrate the use of one-to-one computing. Students are issued laptop computers, and teachers are working collaboratively to develop a curriculum and assessments that take advantage of this new tool for learning. |
| Ireland | Dunshaughlin, County Meath | 850 | 12–18 | Dunshaughlin Community School is focusing on the integration of technology into teaching and learning, with the goal of gradually transforming instruction to be less didactic and more engaging. An important enabler of the reform is a program of professional development and mentoring that supports teachers as they experiment with new digital tools in the classroom. |
| Mexico | Hermosillo, Sonora | 670 | 13–15 | At Escuela Secundaria Técnica Estatal No. 12, the Innovative Schools program works in concert with a national secondary school reform effort to enable technology integration, the growth of teacher professional community, and connections between the school and the outside community. The reform is introducing project-based learning, in which students investigate topics, often using technology for their research, and present their findings in exhibitions open to the community. |

**Table 1-1. Microsoft Innovative Schools, continued**

| Country | Location | Number of Students | Age Range of Students | Reform Description |
|---|---|---|---|---|
| Qatar | Doha | 480 | 14–16 | Al Bayan Educational Complex for Girls seeks to promote the development of digitally literate Arab women who are empowered as 21st-century learners through the use of innovative pedagogies and ICT, and to integrate use of a web portal for communication among parents, students, and teachers. The school also encourages teachers to develop professional skills by participating in teacher professional communities and conducting their own action research. |
| Sweden | Nacka | 920 | 6–16 | The Björknäs School aims to become an anytime, anywhere school through the development of a school web portal. The function of this tool is to facilitate communication between teachers, students, parents, and other stakeholders in the community, and to make school material available for students to access at any time. The school has a history of technology use and is working to integrate it further into teaching and learning. |
| UK | Huyton, Knowsley | 640 | 11–16 | Bowring Community Sports College has been working for several years on a major reform to the curriculum for Key Stage 3 (years 7 through 9 of schooling). The goal is to develop a student-centered program of studies that supports students' development of "personal, learning, and thinking skills" in addition to content knowledge. Teachers plan collaboratively, and learning takes place in flexible spaces to support more active and fluid learning activities. |

To catalyze the schools' varied paths to innovative teaching and learning, Microsoft is providing supports in the form of professional development, global community conferences, and mentorship. Schools are invited to participate in regular teleconferences, or "Virtual Universities," to discuss their process and challenges with one another and to hear the ideas of education experts such as Michael Fullan. They also attend in-person meetings twice per year, at which they access outside expertise and discuss reform both within and across country teams. Schools are each assigned a mentor from the Innovative Schools Program Advisory Board[3] who can guide and encourage their progress. In addition, Microsoft subsidiary offices in each country provide an Academic Program Manager (referred to as an APM) who is dedicated approximately half-time to working with the schools. These APMs provide localized support in each country.

3 Advisory Board members include Bruce Dixon, Anytime Anywhere Learning Foundation; Chris Gerry, New Line Learning Academies; Sam Houston, North Carolina Science, Mathematics, and Technology Education Center; Anne-Marie Bardi, Ministry of Education, France (retired); Ernesto Laval, TIDE; Erik Huesca, Consultant; Tommy Lopez, Asian Institute of Management; Philip Wong, National Institute of Education, Nanyang University; Robert Hawkins, World Bank Institute; and Ellen Savitz, School District of Philadelphia (retired).

Microsoft is also providing a series of tools to help guide the schools' paths to reform. Both the in-person meetings and Virtual Universities are grounded in two models for school reform that Microsoft has developed. The first, the 6i process (shown in Figure 1), is based on a model developed during Microsoft's work with the School of the Future project in the United States. It is intended as a "framework for decision making that guides each school in finding the right answers for that particular school."[4] Each "i" refers to a step in the reform process: introspection, investigation, inclusion, innovation, implementation, and insight.

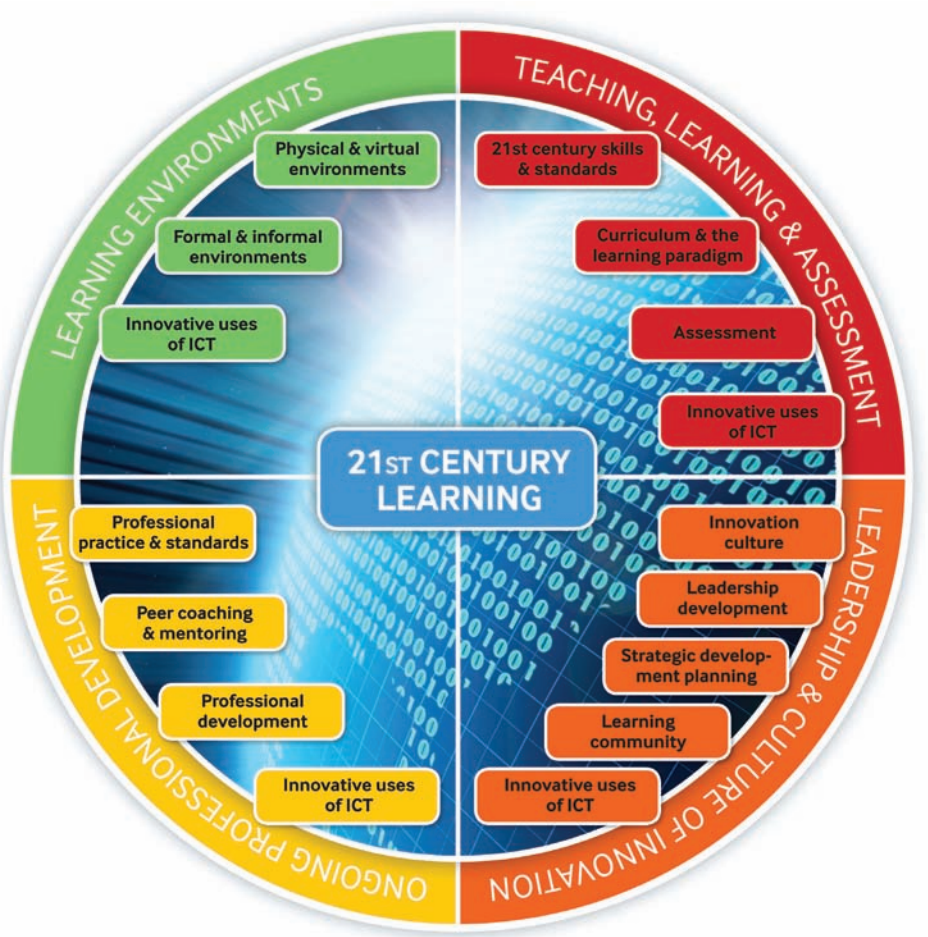
**Figure 1-1. The 6i Process**


Source: http://www.microsoft.com/education/pil/ISc_6iDevProcess.aspx.

While this process is intended to be cyclical and overlapping, meetings of the Innovative Schools Program community have focused on each step in turn. During the period described by this report, the 12 Innovative Schools were in the "implementation" phase. Another Microsoft tool, the Innovation Framework (shown in Figure 1-2), is intended to guide schools through the range of tasks and issues they must consider for coherent implementation of whole-school reform. Based on the work of researchers Michael Knapp, Michael Copland, and Joan Talbert (2003), the framework describes important areas of focus in four parts: leadership and culture of innovation; ongoing professional development; learning environments; and teaching, learning, and assessment.

4 Microsoft, 2007. *The Innovative Schools Program 6i process paper 01: An introduction*. Retrieved January 12, 2009, from http://download.microsoft.com/download/f/5/9/f59c6542-a22b-4ab2-b3f6-c115b696c8cb/6i%20Process%20Whitepaper%201_Introduction.pdf.

**Figure 1-2. Innovation Framework**




Source: Adapted from Knapp, Copland, & Talbert, 2003, Center for Study of Teaching and Policy.

Neither of these frameworks is intended to require the pilot schools to reform in particular ways; schools choose the reforms that they want to pursue based on the needs of their students, local and national requirements, and beliefs about teaching and learning. In some cases, the schools' reform efforts were already under way when they joined the Innovative Schools Program (as described in last year's Baseline Report), and they are using use their participation in the Innovative Schools Program as an opportunity to reflect on and deepen their reform work.

A final component of the Innovative Schools Program comes in the form of evaluation. In each country, local evaluators work with the schools to provide feedback that they can use as they implement and iterate on their reform plans,[5] within a framework coordinated by SRI International to enable global synthesis of results and lessons learned across the program. Data collected across countries include interviews with teachers, school leaders, and Microsoft Academic Program Managers (APMs); focus groups with students; observations of classes or learning activities; copies of assignments or learning activities given by teachers and students' work done in response to these activities; and extant data such as achievement test scores or attendance records. All of these inputs are used in this report with the exception of the last; extant data will be used in the Year 2 report, when data are available for multiple years, enabling an examination of change over time. Evaluation methods are explained in more detail in the relevant sections of the report.

5 A list of the research organizations engaged as country-level evaluators can be found in the acknowledgments section of this report.

This report synthesizes the findings of evaluators in 11 of the pilot countries.[6] It is divided into two main sections, based on the premise espoused by program leaders that whole-school and cultural supports to reform are essential as enablers of changes to teaching and learning. In the first section (Chapter 2), we discuss these school-level efforts, including aspects such as change processes, organizational learning, and professional development. In the second section, we discuss teaching and learning at the schools, including whole-school learning environments (Chapter 3) and classroom-level changes to teaching, learning, and assessment (Chapter 4).

This report is the second in a series, based on data from late 2007 and early 2008, when most schools were early in their process of reform. It describes the schools' early steps toward implementation of reform. The Baseline Report, published in 2008, provides more detailed information about each school's plans for reform and the contexts in which the schools work. The Year 2 report will look at changes that the schools have made over the time period of the Innovative Schools Program and reflect on lessons learned over the 2 years.

All direct quotations in this report come from interviews of participants in the schools or people involved with the Innovative Schools Program unless they are specifically attributed to another source. To preserve anonymity when dealing with sensitive issues, many of the quotations in this report are not attributed to the country reports from which they were drawn.

Also note that the use of terminology to describe teaching and learning in this report is necessarily imperfect. Not all schools have "classes" or "classrooms" in their new models, and not all use the term "teaching" as a descriptor of the ways in which they encourage students to learn. This report will use these words because they are still the most common terms in schools worldwide, but the intended meanings are broad. In this report, the term "classroom" refers to any place of learning, and a "teacher" can be any adult with responsibility for facilitating learning.

6 One of the 12 countries, Qatar, is not participating in the global evaluation. The Innovative School in Finland is a new school that is currently in its design phase. Interviews were conducted with individuals developing the Finland school's plan, but Finland is not included in classroom-level data collection or analyses.

# Chapter 2: Organizational Learning and Change Processes in Innovative Schools

Transformation of teaching and learning is the ultimate goal for every Innovative School in the program. Deep instructional change, however, can only be brought about successfully with a thoughtful implementation process, a culture that is supportive of reform, and teachers who are invested in reform and prepared to change their practices. These whole-school aspects of implementation are the focus of this chapter.

Throughout this report, it is important to remember that each pilot school in this program has a different starting point and operates within a different educational context. For example, schools vary in the age level and background of students they work with, their surrounding culture, and the level of government involvement and regulation. As a result, the schools' implementation processes, progress, and struggles are each expected to be unique: there is no one right way to implement significant educational change. Instead of providing detailed specifications for a reform model, the Innovative Schools Program promotes a number of common features that are important for success: a coherent vision, clearly communicated; a deliberate implementation plan; a community engaged around instructional improvement; teachers prepared for new ways of educating students; and appropriate schoolwide supports for change. For the schools participating in this program, this chapter will describe the following:

1. Implementation process and strategies
2. Reform leadership and vision
3. Learning communities
4. Professional development
5. Cultures of self-evaluation
6. Infrastructural supports

**METHODOLOGY**

The data in this chapter come from site visits that the 11 national evaluators conducted at the pilot schools in their countries. In most cases, these visits took place between February and May of 2008. The evaluators used protocols developed by SRI to interview adults at the school (including the school leader and eight teachers) as well as the Microsoft Academic Program Manager (APM), observe classrooms of the eight selected teachers, and conduct three student focus groups with six to eight students each. National evaluators wrote reports of their findings according to a common reporting template. These reports were then coded and analyzed by SRI.

## *Implementation Process and Strategies*

Ultimately, most of the pilot schools in the Innovative Schools Program have a goal of instructional change among all teachers throughout the school. Depending on the size of the school, its tradition of instruction, and a host of other factors, schools may make different choices about the planned pace and trajectory of progress toward this goal.

**Table 2-1. Whole-school or staged-implementation models**

| | |
|---|---|
| Whole-school | All teachers are asked to participate in the reform from the beginning. |
| Staged by year or level | The reform begins in one or more years or levels, and new years or levels are added over time. |
| Staged by subject | The reform begins with teachers of one or more academic subjects, and additional subjects are added over time. |
| Staged by teacher | The reform begins with selected "early adopters," who model innovative instruction for other teachers and encourage their participation. |

One important decision is whether to implement the reform all at once across the whole school or to implement it in stages. Planning teams might choose a staging strategy to allow new reforms to be piloted in a smaller teacher group, in order to constrain the immediate need for new curriculum development or to build momentum among hesitant teachers. Commonly, schools may choose to begin with particular years or levels of schooling (for example, the United Kingdom [UK] reform was operating in Years 7 and 8, or ages 11 to 13, in 2007 to 2008) or particular subjects (in Hong Kong, the reform began with teachers of English, science, and math in the second year [7-year-old students]). In Finland, where the Innovative Schools team is designing and building a new school rather than reforming an existing one, new ideas are being piloted in local schools prior to becoming part of the Innovative School's design (as described in the box on the next page).

Another common way to pilot practices and generate buy-in is to begin with a set of individual teachers who are selected because of master-level skills or who opt in because they feel ready, and to let those teachers try out new techniques and then coach other teachers. At least 7 of the 11 schools in the evaluation used some sort of early adopter strategy in their implementation. In Canada, the Literacy@School program uses this design: the districtwide literacy program is implemented through a set of "demonstration teachers" at multiple schools who receive training and other supports and, in turn, open their classrooms—either in person or virtually—to visiting teachers to demonstrate how new technologies and pedagogies can work in practice. At other Innovative Schools, early teacher-participants in the reform were those who felt more comfortable with technology or who were experienced teachers with an interest in updating their teaching practice. Schools that used this approach report that many teachers who were initially hesitant gained confidence in reforming their practices by seeing new ideas work well for their colleagues. Some

*Schools that used an early adopter strategy report that many teachers who were hesitant gained confidence in reforming their practices by seeing new ideas work well for their colleagues.*

schools using a staged implementation strategy reported initial feelings of jealousy from teachers who were not selected for the extra training, tools, and attention; these feelings were sometimes mitigated, however, when teachers became more familiar with the value of the program.

Another difference in implementation strategies exhibited by the various Innovative Schools relates to the source of the momentum for change across the organization. Some schools followed a "top-down" implementation model with a centrally defined plan for reform; this model relies on strong leadership and a compelling vision to generate buy-in among all teachers and to maintain progress at a uniform pace. In other schools, the change process could be described as "bottom-up" or "opt-in": teachers could choose whether to take advantage of professional development and other supports, and could proceed at their own pace to make instructional changes within their classroom. Some schools that took this latter approach found that the first year of reform proceeded slowly, as teachers who were reluctant or lacked confidence in new technologies had no requirement to participate. In several schools where changes in practice spread more successfully from teacher to teacher, deliberate cultures were in place that benefited from central supports such as formal training, peer mentoring, and consistent encouragement from school leadership.

**PILOT IMPLEMENTATION STRATEGY IN FINLAND**

Finland's Ritaharju School does not yet have students or teachers, but some of what may occur in its classrooms is currently being tested in other local schools. Ten schools in the town of Oulu, selected on the basis of their views of learning and commitment to innovation, are piloting a wide range of new approaches to teaching and learning. One school is testing a one-to-one computing program, while another is working to improve community spirit in the school. Yet another has students creating their own TV program, released weekly for the school community to view. These and other pilot efforts represent the broad scope of innovative approaches to educational reform in the municipality. The results of the pilots will not only shape the design of Ritaharju but allow students and teachers across the community to take part in reform.

## *Reform Leadership and Vision*

Whichever strategies schools pick to implement their reform, vision and leadership are essential components of success. In several schools, evaluators credited strong and charismatic school leaders with moving the reform forward and inspiring teachers to try new methods. In each of these schools, the reform is enjoying widespread teacher participation, even in countries that operate within highly traditional educational contexts. The boxes on the next page contain descriptors from country evaluation reports of the personal qualities and functions of school heads who are perceived as strong leaders of their schools' reform efforts.

As this list of roles and characteristics implies, the leadership of a comprehensive school reform is a complex and challenging task; it is also one that some school leaders in the program are taking on for the first time. Leadership challenges faced by schools in

*Leadership challenges include school leader turnover, local policy restrictions that limit authority, and the need for more experience and models for reform.*

### CHARACTERISTICS OF STRONG REFORM LEADERS

- "Committed and charismatic"
- Shows "dedication and determination"
- "Inspirational"
- "A good diplomat"
- "Excellent mentors"
- Savvy about novel pedagogies and instructional uses of ICT

### FUNCTIONS OF STRONG REFORM LEADERS

- Manage and monitor reform strategy
- Communicate the vision clearly and consistently
- Provide visible support for new teaching approaches
- Make training, technology, and release time available to staff
- Facilitate an open and collegial professional environment
- Invite teachers to participate in professional development and motivational events
- Invite teacher input on reform decisions
- Coach and empower staff
- Celebrate successes

Note: Quotations and other content in these boxes are taken from country evaluator reports.

the program include school leader turnover (experienced in 3 of the 10 active schools in the sample during the 2007–2008 school year), local policy restrictions that limit decision-making authority, and simply the need for more experience and models for doing something this new. At the end of the first year, schools in several countries were still experiencing a lack of agreement among stakeholders on the specific mission and local goals of the Innovative Schools reform; not surprisingly, this lack of consensus limited both early implementation progress and teacher commitment to the reform.

One approach that at least five of the Innovative Schools either have implemented or are considering implementing is to spread the task of school leadership through a distributed model that engages multiple staff in leadership roles. Research suggests that distributed leadership can help schools achieve a common focus on reform by utilizing teachers' expertise and engaging them in a cycle of inquiry targeted at practical changes and instructional improvement (Camburn, Rowan, & Taylor, 2003; Copland, 2003; Elmore, 2003; Harris, 2004). In some countries, plans for distributed models of leadership include a reform leadership team that includes teachers or administrators that are distributed across school staff. Most of these changes to leadership structures and culture were still early in their design in the pilot schools' first year of implementation.

Recognizing the challenges of reform leadership, Microsoft's Innovative Schools Program staff seek to support school leaders and leadership teams through both global and local means. Well-known outside consultants like Michael Fullan and John Bransford provided Virtual University trainings and facilitated discussions among the schools, and Fullan and other experienced school reformers provided occasional one-on-one coaching to the schools. School teams in about half the countries reported that they benefited during the program's first year from a local Microsoft Academic Program Manager (APM) who actively provided strategic support, thought partnership, and essential connections for the school leader. According to some school leaders, the APM in their countries "challenged our thinking and spurred us to extend our horizons" or "generated a climate of work and commitment to the program" and facilitated the involvement of all teachers in the reform effort. Partnerships between school teams and the Microsoft APM have worked best in countries where there has been consistent staffing of the APM position over time and agreement on vision between Microsoft and school-based reform leaders.

## *Learning Communities*

To improve and transform education, experts have argued that schools should operate as strong learning communities, developing innovative structures and processes for building the professional capacity to learn, examine, and reinvent practice to respond quickly and flexibly to ever-changing environments (e.g., Cochran-Smith & Lytle, 1999; Fullan, 1993; Mitchell & Sackney, 2000). Many of the Innovative Schools are working toward becoming communities of learners, engaging teachers in learning from one another's expertise, connecting students in new ways to their school experiences, and building bridges to parents, community members, and other schools. For most of the schools in the program, developing active teacher professional learning communities has been a focus this year. This section describes developing learning communities at the schools on several levels: community among teachers, engagement of students and parents, and participation in communities of reform within the region, country, or international Innovative Schools community.

### Teacher learning community

Most of the Innovative Schools have made some progress toward developing a professional environment that is collaborative and that allows teachers to learn from one another. The schools' efforts are beginning to show results in the form of teacher reports of improved community, but deep implementation of teacher community has been achieved in only a few schools so far.

In five of the pilot schools, efforts at developing professional learning communities have included peer-to-peer teaching, mentoring, or the use of master teachers. These approaches are often used to support teachers in their use of technology in the classroom, which is one aspect of reform that requires a steep learning curve for many teachers. In one country, a teacher plays an ICT support role for colleagues, and in another, the existing culture of teachers helping one another has expanded to include small groups meeting to focus on technical skills and learning new technologies. This collaborative work can include both formal and informal efforts. Examples of formal collaboration include Germany, where some teachers participate in the Microsoft Peer Coaching curriculum, with coaching practices that focus on project-based and student-centered learning; Sweden, where teachers are participating in a "lesson study" model of working together that includes regularly scheduled discussions of challenging teaching moments and pedagogical methods; and Hong Kong (described in the box on the right), where teachers provide feedback on

**TEACHER PROFESSIONAL COMMUNITY IN HONG KONG**

At Fung Kai Innovative School, teachers participating in reform efforts meet twice a week in collaborative groups, organized by subject area. Their teaching loads have been reduced to allow this flexibility in their schedules. In these meetings, teachers discuss topics such as lesson content, teaching strategies, student strengths and weaknesses, and how to address student misconceptions. Teachers brainstorm teaching strategies and learning activities and make joint decisions about how ICT should be integrated into the lessons. Once a month, a curriculum officer from the Education Bureau attends their meetings, and teachers also have the support of a subject expert who gives professional advice and feedback. The school's collaborative spirit has shaped other efforts to develop teacher capacity as well. Teachers in charge of curriculum development observe other teachers' lessons in order to consolidate ideas about best practices, and teachers participating in reform efforts have been videotaped to allow them to reflect on their own teaching practices.

## COMMUNITY BUILDING IN MEXICO

At Escuela Secundaria Técnica No. 12 in Hermosillo, the movement to reform teaching and learning involves nearly all staff at the school. Teachers are kept informed about the school's direction through periodic meetings, and they work with the administration to make decisions about ICT purchases and improvements to learning environments. With the help of a translator, teachers engage in the Innovative Schools Virtual Universities and participate in the completion of the school's "homework" for these online meetings. Teachers work together on the transformation of the student learning experience, meeting in "grade academies" to plan interdisciplinary projects. Even the service and janitorial staff are included; they are invited to take part in technology courses, allowing them to benefit from the school's reform efforts. One teacher characterized the climate at the school: "There is more openness on the part of management, [there is more focus on] institutional harmony, [and there is] more teamwork and more communication."

## TECHNOLOGY AS A CATALYST FOR TEACHER COMMUNITY

Teachers report using technology to:

- Share lesson plans, teaching processes, and evaluation strategies
- Serve as a repository for curriculum
- Plan classes collaboratively
- Communicate with one another

observations of each others' teaching and meet in same-subject teams for collaborative lesson planning. Informally, teachers in several countries report that they approach knowledgeable colleagues for support when particular needs arise.

Another model of collaboration used in several Innovative Schools is cross-disciplinary collaboration, in which teachers of different subjects work together. In Brazil, projects used to be primarily single-subject-focused, but now teachers have a weekly common planning time that they use to plan interdisciplinary projects that focus on students' development of competencies. Similarly, in Mexico, teachers of the same year meet in "academies" to plan interdisciplinary work, exchange information, and support each other in achieving common instructional goals. Mexico's community-building efforts are described in the box at left.

As a result of these methods of collaboration, teachers in many Innovative Schools report that positive changes to their professional environment are emerging. One teacher said, "Being part of the program has accelerated my learning because I constantly think about and articulate why I am doing things in my program to [other] teachers." Other teachers report more confidence in trying new strategies in their classes, a sense of unity and improved communication among teachers, and increased interest in sharing knowledge and materials.

In some cases, technology is acting as a catalyst for teacher collaboration. The box on the left describes some of the ways in which Innovative Schools are using technology to encourage teacher community. Teachers find technology to be both useful and transformative: One said that "technology is critical" for sharing lesson plans and teaching strategies with teachers in other schools, enabling them to compare and collaborate with one another. Another said that using e-mail has "changed our communication lines and links between… management and teaching staff," allowing for quicker distribution of information.

However, development of a culture of collaboration and learning is not without challenges. Not all teachers reported positive change in the professional environment at their schools, and most countries are finding that it is initially difficult to make fundamental changes to the way that teachers work. Lack of sufficient time for collaborative work is first in the list of challenges; school schedules are often difficult to rearrange to accommodate common planning times for teachers. Further, the amount of time required for deep collaborative work is not trivial: one leader noted that now, "the planning and preparation take far more time and effort than in a traditional lesson." Not all schools in the program have yet been successful at rearranging schedules, but some have made this a priority and created at least some common planning time for teachers. The box at right describes some of the methods schools are using to allocate time for collaborative planning.

**METHODS OF ALLOCATING TIME FOR TEACHER COLLABORATION AND PROFESSIONAL DEVELOPMENT**

- Rearranging work schedules to allow time for teachers to meet in teams for planning
- Designating particular days, sometimes outside the regular work schedule, for professional development and teacher collaboration
- Providing release time for teachers to observe one another's classes or plan new projects
- Overstaffing to allow for reduced teaching loads and flexibility in scheduling common planning time

*Once the challenge of finding* time *for collaboration has been met, the next step is to build a* culture *of collaboration.*

Allocating time is a necessary but not sufficient prerequisite for developing a collaborative working environment. In at least one school, although teachers have an assigned common planning time, evidence suggests that it is rarely used for productive, collaborative work, implying that once the challenge of finding time has been met, the next step is to build a culture of collaboration. As one teacher noted, this type of change represents a major shift in perspective for teachers: "The cooperative and collaborative environment implies a shared responsibility…it breaks our schemes and represents a crisis for some teachers." This challenge has been widely noted in research (e.g., Fullan, 2008). To function as a "community," school staff need shared norms and values as well as a collective focus on student learning (Louis, Marks, & Kruse, 1996; Newmann & Wehlage, 1995), and at times, they need to confront conflict in their professional beliefs and practices to collectively develop greater capacity for change (Achinstein 2002; Rousseau, 2004).

Several of the pilot schools have focused on developing the shared norms and trust that are essential for successful collaboration. In Canada's Literacy@School program, demonstration teachers have been trained not only in use of technology in the classroom and literacy teaching techniques, but also in how to "talk about the reasons behind why they do what they do." Demonstration teachers open their classrooms to visitors and host follow-up discussions, and it has at times been challenging for them to hear questions that sound evaluative or critical in tone. The program leaders have worked with participants to rephrase those questions in a way that allows for open discussion, rather than making teachers feel they must defend their practices. Teachers report that this training has been beneficial, both in helping them to engage in a positive professional community and in structuring a forum to reflect on practice.

## Student engagement in the school learning community

Since the learning process is not only individualistic but also social, it is important for students to have a sense of belonging to the school community and develop interpersonal skills rather than individualism and competition. Research has shown that a sense of belonging and empowerment as part of the school community has great impact on students' motivation, behavior, and self-concept as a learner (e.g., Osterman, 2000).

Although meaningful student participation in the schools' learning community culture is not yet widespread in the pilot schools, there are signs in several cases that students are working with teachers on improving the learning process. In some countries, student projects have included development of content for younger students, or opportunities for students to review planned coursework and make recommendations to teachers or to give input to the design of the school's physical learning environment. In the UK pilot school, a "student research" program allows students to research important issues in the school environment, such as student bullying or use of ICT to support learning. Elsewhere, students participate in the school community through their technology expertise, helping their peers or teachers when they have trouble with computers or other technologies. The school in Germany has a program called "Students Help Students," a coaching program in which students can seek help on assignments from other students or consult a student-moderated online forum. While these new roles for students are not yet common, their emergence in some schools suggests that students are beginning to engage in more powerful ways in their school community, and that relationships between adults and youth may be shifting to introduce greater levels of mutual respect and collaboration than are typical in traditional school models.

## Parent and community engagement

Another way of developing the school as a learning community is to engage parents and community members. Several of the Innovative Schools are working on ways to communicate with these groups and connect them to the school and its reform process. Such effort is particularly important, as schools that strive to be innovative and unconventional sometimes may be seen by parents and fellow professionals as being unlike "real schools," a perception that may undermine sustainability of those schools over time (Giles & Hargreaves, 2006).

### REACHING OUT TO PARENTS WITH TECHNOLOGY

Schools are using technology in a variety of ways to include parents in their children's educational experiences:

- E-mail communication between teachers and parents
- Online access to class projects and student work
- Electronic newsletters
- Online access to student information through web portals

In some schools, teachers have found that technology offers a new tool for involving parents in their children's education. Schools are reaching out to parents through e-mail, web portals that provide allow parents to see what students are doing at school, and other mechanisms described in the box on the left. One teacher said e-mail was particularly useful in communicating with parents of students with special needs, allowing her to communicate frequently with them about their children's progress. One parent, she said, "drop[s] me a

line…every one or two weeks to see how [his son is] keeping up." Sweden's development of a web portal for communication among the larger school community is described in the box on the right.

In the first year of school reform, several schools worked to educate parents on planned changes and engage them in the effort. Some parents were hesitant about having their children use computers, or expressed concern about students having to carry heavy laptops or their own difficulty in helping students with homework when technology is involved. In Hong Kong, parent meetings have been held to educate parents about the project, and plans are in place to train parents to use the "netbook" PCs so that they can engage more deeply in this new way of learning.

Schools are also engaging the broader community in the work they are doing. Five countries reported significant levels of community involvement. For example, schools have sought out corporate sponsorships, associations with publishers for new curriculum development, partnerships with local universities for research or teacher training, and community involvement in student projects. The representation of town members on the school's steering committee or planning team is a way that some pilot schools allow community input in school decisions.

### DEVELOPING A SCHOOL WEB PORTAL IN SWEDEN

The Björknäs School in Sweden has been focusing on using ICT technology to bring together teachers, students, administrators, and parents in a shared space—the school web portal. Still under development in 2007–08, the portal is meant to function as a "hub" for teachers, students, parents, and administrators, encouraging and enabling new forms of collaboration among teachers and integrating pedagogy and technology. It is also meant to facilitate the school's vision for 24/7 learning by making sure students have access to learning materials and to peer communication technologies anytime, anywhere. One teacher at the school said that teachers hope this will improve the quality of teachers' lessons, since they now will be visible to other teachers and to parents, making teaching more public and thereby giving teachers an incentive to show their best. Development of the web portal, which is based on Microsoft technologies, was driven by the Björknäs School, but it will be implemented across the entire school district.

## Building communities of schools

Participation in the Innovative Schools community adds another dimension to the schools' learning communities. The pilot schools are connected through a website, online meetings, and twice-yearly face-to-face conferences. Participants in international meetings expressed that, while they appreciate the educational experts who are brought in to work with them, they also value opportunities to collaborate with peers. Peer collaboration includes both the chance for the school teams to collaborate and reflect internally, something that is hard to find time to do as a group at home, and international dialogue. In fact, international information sharing and the opportunity to learn what the other Innovative Schools are doing were the most commonly valued outcomes of these meetings, mentioned by participants in at least eight schools. Participants also found it comforting to learn that others were facing the same challenges. One school leader said she got "reassurance and confidence that others are struggling with similar issues and solutions," and another said, "For our own professional development,

*International information sharing and the opportunity to learn what the other Innovative Schools are doing were the most commonly valued outcomes of the face-to-face Innovative Schools meetings.*

## SCHOOL NETWORKING IN GERMANY

The Innovative School in Germany is taking steps to implement project-based learning and other innovative pedagogies within the confines of a content-driven national education system with little local autonomy for innovation. For inspiration, they have found it valuable to draw on models from other national contexts. A visit to a school in the UK, a collaboration arranged through an Innovative Schools Program mentor, proved to be particularly important as a way to demonstrate new possibilities. The UK school features a project-based curriculum, flexible learning spaces, student research opportunities to support school design, and other innovative ways to serve students from a low-income community. Strategically chosen participants in the school visits included skeptical teachers, who became strong supporters for reform once they saw innovative ideas in action, and ministry officials whose policy-level support would be needed to implement change. Said the school leader, "We finally found a school that serves as a model for us....This doesn't mean that we copy everything, but this school is ahead with certain developments and inspires us." Back home, important challenges for the school team included finding ways to implement elements of the desired model without the budget flexibility and other autonomies common in the UK.

it's important to meet others and to learn, to take lessons learned and to see what they've done really well."

Building on the connections made between schools during face-to-face sessions, some schools have arranged other ways of collaborating. A few have had the opportunity to visit other Innovative Schools or mentor schools in the program; they have found these visits to be very beneficial. Stakeholders in Germany said that a visit to a mentor school helped them to understand that school's practice and to inform decisions about what to implement in their own school; their experiences are described in the box on the left. Some pilot schools have also collaborated on classroom projects: a teacher from Canada planned a cooperative online writing project with the German Innovative School, and students at the French and Brazilian schools used video and interactive whiteboards to record personal introductions to exchange with one another.

Participation in the international Innovative Schools community is one way that the pilot schools are beginning to share the innovative practices and strategies they are developing. The majority of the schools are also beginning to engage in efforts to scale practices locally. For example, in 2007–08, pilot schools hosted or conducted visits with other local schools; held local events in which teachers demonstrated and described their new practices for participating educators, community members, and policymakers; worked actively to serve as a model within local, state, or national reform movements; or planned to offer the innovative technology they are developing for broader use within their local area. Each of these efforts helps to broaden the school's learning community to facilitate the exchange of innovative ideas in the region, an effort that is expected to expand in many countries as the innovations in these pilot schools mature.

## *Professional Development*

As discussed above, an important way that teachers are building their abilities to work with students in innovative ways is by learning from one another in professional learning communities. Teachers in the pilot schools are also participating in other types of professional development to build their capacity to effect change in the classroom. The professional development provided includes opportunities offered by Microsoft as well as those from a variety of other sources.

Technology use is an important focus area of professional development in most of the schools. Teachers in many of the pilot schools are new to technology use in the classroom and therefore lack the technology skills and confidence using technology that they need to be able to integrate new tools into their teaching practice. In most countries, professional development in 2007–08 included basic technology skills for teachers. In some countries, professional development went further, focusing to varying degrees on strategies for the meaningful integration of technology into curriculum and pedagogy or introducing teachers to other aspects of innovative pedagogy, including project-based learning, questioning strategies, and methods of assessing 21st-century skills.

*Teachers from multiple countries said they needed specific strategies for integrating technology into their classroom practice in ways that added value for student learning.*

Strong professional development is an area for growth for many of the pilot schools. Teachers from multiple countries said they needed specific strategies for integrating technology into their classroom practice in ways that added value for student learning, or help in better understanding the concept of 21st-century learning and translating that understanding into action. Research suggests that for these purposes, one-time formal training is often insufficient. Teacher learning is a process of increasing participation in a new practice of teaching (e.g., Borko, 2004), and informal learning that is embedded in teachers' day-to-day practice is at least as important as formal professional development courses and workshops (Ball & Cohen, 1999; Bransford & Darling-Hammond, 2005; Fullan, 2008). Following these approaches, the Irish pilot school's integration of professional development into the ongoing practice and community of teachers is highlighted in the box on the right.

### A CULTURE OF PROFESSIONAL DEVELOPMENT IN IRELAND

At Dunshaughlin Community College, according to the school leader, change is being driven not from the top but "at the microlevel of what [teachers are] doing in their own classrooms." Supporting the shift from traditional teaching to ICT-enabled innovation is an ongoing, teacher-focused program of professional development that combines workshop offerings with on-demand peer-to-peer support for individual teachers when they feel ready, curious, or inspired to try new practices. Professional development partners at St. Patrick's College began by asking teachers about their needs, interests, and experiences, and then designed a tailored set of offerings that supports a variety of levels of teacher development and readiness. Teachers are encouraged to explore, try out, and discuss new ideas so that learning is rooted in their own classroom practice. The program also provides a path to accreditation that is not time-bound in order to fit with the practical constraints of teacher schedules. Some teachers at Dunshaughlin were conducting action research on their own teaching practices as part of this program in 2007–08, with additional teachers planning to sign up in the following school year.

As schools increasingly focus on technology for the content of teacher professional development, they are also turning to technology as a support and a delivery mechanism for it. In Canada, demonstration teachers invite others into their classrooms both physically and virtually. For virtual visits, participants use two-way videoconferencing software and equipment so that teachers and administrators from around the region can observe and then discuss the lesson. In Mexico, teachers can take computer-based courses in the Community Learning Center located at the school.

## *Culture of Self-Evaluation*

Establishing a "culture of self-evaluation," in which reform is seen as an ongoing cycle, is a key element of the learning community culture promoted by the Innovative Schools Program, and is widely recognized in the literature as a key enabler of reform (Fullan, 2008; Newmann, King, & Youngs, 2000). Making sure that teaching and learning environments continue to serve students requires ongoing data collection, reflection, and refinement of reforms. These processes can take place at the school level and can also be an activity for individual teachers who seek to improve their own teaching.

Most of the schools in the program are at an early stage of establishing processes for self-evaluation. At least two of the schools have conducted surveys of teaching staff or students and used the results to inform their thinking, and at least one school's reform leadership team is responsible for evaluation. A particularly strong self-evaluation process has been implemented in Canada, as described below. The Literacy@School program has built ongoing feedback into their program improvement processes and trained participating teachers as reflective practitioners and "action researchers."

### CULTURE OF SELF-EVALUATION IN CANADA

The Literacy@School program encourages teachers to evaluate their own practice. Demonstration teachers were trained in action research, learning to formulate research questions, collect data, and determine criteria for success. They use data to inform instructional decisions, and several expressed the belief that the program was increasing their reflective capacity. One teacher said, "Learning about contemporary ideas in education has helped me to stay tuned to theory and connect it to my practice." Teachers who visit demonstration classrooms are also encouraged to self-assess by thinking about and articulating that which they saw in the demonstration class that they will take back to their own classes. They later report to Literacy@School program leaders about what they tried and how well it worked.

In addition, several schools reported that participation in the global Innovative Schools Program evaluation, in particular the collection and coding of teacher assignments and student work that will be described in Chapter 4, provided constructive input to their discussions of instructional change. Some evaluators provided workshops explaining to teachers the evaluation's rubrics on dimensions of innovative teaching and learning, and teachers reported that the workshops were helpful for understanding what a 21st-century assignment looks like and what learning outcomes they should target. Seeing the rubrics also helped develop an understanding of the magnitude of the change they are attempting; one school leader said the workshop helped her understand the "depth of development that is needed before teachers can begin to change the learning environments they design for students."

As a result of these and less formal self-evaluation practices, some of the schools are rethinking elements of their goals or strategies based on a year's experience. One school learned that the role of digital curriculum development was too time-consuming for teachers to take on to the degree initially planned, so they now plan to adopt existing curricula to the extent possible. Other schools have added more parent outreach than originally planned to help parents understand the changes to pedagogy and tools, or modified their professional development strategies to better support teacher capacity building.

## *Infrastructural Supports for Change*

Most of this chapter has described aspects of school culture that are important enablers of innovative teaching and learning. Another essential component of schools' implementation plans is upgrades to the physical environment of schools. The Innovative Schools Program places particular emphasis on classroom facilities, because schools are often designed with small rooms and immobile desks that are not conducive to student collaboration, and on technology infrastructure, which must be readily available and in working order if it is to be used seamlessly in learning activities.

The majority of the Innovative Schools are moving forward with plans to improve their physical facilities, taking large or small steps as dictated by the constraints of national regulatory controls or budgets. Three of the pilot schools have plans to construct new school buildings designed to facilitate specific learning interactions. In Finland, new school design is sparking challenges within the town of Oulu to existing beliefs about teaching, learning, and learning spaces. In the UK, where a new school building to open in the fall of 2009 is supported by a significant national investment in facilities, the existing school has furnished a test classroom that enables teachers and students to experiment with different furniture in order to find designs that are most adaptable and suitable for various learning tasks. Nevertheless, many schools continue to struggle with external regulations that limit infrastructural improvements, and are initially making do with specific remodeling projects.

All Innovative Schools currently provide teachers and students with at least some access to computers and the Internet, and the majority reported increases in access to hardware as well as to a broader range of software in 2007–08 (see the box at right for details). Still, the availability and reliability of computers and the Internet varied within schools and across countries. Most Innovative Schools must schedule student access to pools of shared resources (for example, computer labs or mobile laptop carts), which limits their spontaneous and organic use as tools for learning. While at least six of the Innovative Schools have provided a laptop for every participating teacher, which in some cases has enabled substantial changes in teacher instruction, only two provide a laptop

*Three of the pilot schools have plans to construct new school buildings designed to facilitate specific learning interactions.*

**IMPROVEMENTS TO TECHNOLOGY INFRASTRUCTURE**

- Computers and other hardware (such as digital cameras and microphones)
- Computer labs and multimedia rooms
- Wireless Internet access
- Web portals for communication between teachers, parents, and students
- E-mail for communication between staff members
- Availability of technical support

**STRATEGIES TO FUND TECHNOLOGICAL INFRASTRUCTURE IMPROVEMENTS**

- Selecting lower-cost computers
- Asking students, families, or the parent association to shoulder a portion of the costs of computer purchases
- Obtaining special financing packages wherein the school pays only a percentage of the cost of computers each year
- Obtaining corporate sponsorships in various forms—monetary, material (for example, furniture), and service/support

*All Innovative Schools currently provide teachers and students with at least some access to computers and the Internet.*

for every student in the year or class targeted for reform. The limited availability of one-to-one computers is due to their high costs as well as the need for technical support and maintenance. To address these challenges, schools are employing innovative strategies to lessen the financial burdens associated with improving technology and other facilities, as described in the box at left. In one school, for example, students helped finance the purchase of laptop computers and will retain full ownership of the computers at the end of a two-year school program. The Swedish school is participating in a municipal pilot program in which students will get access to tablet computers and Microsoft technologies over the next few years.

Challenges that have come with increased access to technology include unreliable Internet connectivity and difficulty in scheduling the use of shared resources. Teachers said they sometimes hesitate to plan for technology use because of its unreliability; one said, "When you do not trust the Internet access over the wireless connection in the school because of temporary failures or slowdowns, you end up not planning the use of technology." Most schools are making an investment in tech support staff to facilitate the setup and operation of technology, using both in-house and external resources. In at least five countries, schools added tech support staff in 2007–08 or adjusted staff members' roles to include technical support. The role itself varies; in some cases, the function is primarily technical, while in others, pedagogy and technology support are combined. For example, in one country a "director of e-learning" works with teachers as they plan for using technology in their practice. Despite additions of staff, adequate ICT support remains a challenge for many.

## *Conclusion*

This chapter described the first-year progress of the pilot schools in the areas that constitute whole-school foundations for classroom-level change, including both cultural and infrastructure supports. Predictably, the pace of progress has varied among the schools, but as a set, the schools suggest a number of important strategies that can promote cultures of innovation even in traditional educational settings. For example, deliberate and supported "early adopter" strategies can seed innovation and model new practices for more hesitant teachers; learning communities both within and beyond the school can surface and propagate new ideas and provide peer support and motivation; and ongoing professional development that is embedded in the daily practice of teachers can help make new ideas relevant and accessible. The early experiences of the Innovative Schools also suggest a number of challenges that are persistent in a variety of local settings, including the need to create flexibility within rigid school schedules for busy teachers to collaborate and experiment with new tools and pedagogies, and the difficulty of funding and supporting ICT infrastructures that allow the seamless use of technology as a tool for learning.

The next two chapters turn to the main intent of the Innovative Schools Program: changes to teaching and learning. Chapter 3 describes the types of learning environments that the schools are beginning to implement, and Chapter 4 evaluates how far the pilot schools have come toward those learning environments in the first year of the program.

# Chapter 3: School Strategies for Creating Better Learning Environments

The Innovative Schools share a common goal of making instruction compatible with the 21st-century world into which their students will graduate. In most cases, the envisioned pedagogies are more student-centered than those of traditional classrooms. Most schools have begun to take steps toward the implementation of learning environments, with some of the features of innovative teaching and learning shown in Table 3-1.

**Table 3-1. Features of innovative learning environments**

| **In innovative learning environments…** |
|---|
| Learning activities are student-centered and interactive |
| Students work on extended projects with multiple components |
| Activities emphasize understanding and preparation for future learning (depth) more than curriculum coverage (breadth) |
| Complex projects draw upon multiple disciplines |
| Students assess their own learning during the project or unit |
| Students have input into what they will learn |
| Curriculum topics are related to the real world and include issues of global interdependency |
| Students use technology tools for communication, research, presentation, and analysis, and to support their understanding of abstract concepts |
| Students work in groups with differentiated roles and interdependent products |

This chapter uses qualitative data to describe the range of innovative practices observed in the Innovative Schools and the challenges they are facing related to the implementation of innovative learning environments. The next chapter will use data from classroom observations and the analysis of teacher assignments and student work to evaluate how prevalent these practices are across the schools.

### INNOVATIVE LEARNING MODELS IN BRAZIL

The Innovative School in Brazil, Escola Lumiar, has always had a nontraditional model of instruction. Instead of teachers, students work with "masters," who guide students in particular academic areas, and "tutors," who are responsible for the personal and academic growth of a group of students. Students sign up for learning projects, which are multidisciplinary and done in groups, with students of different ages working together. Students select projects based on their interest. With Microsoft's support, Escola Lumiar is working to develop the Digital Mosaic, a software tool that will enable individualized planning and student assessment. The Digital Mosaic is intended to allow masters, tutors, students, and parents to track students as they develop a set of competencies that the school has identified as important. Competencies will be developed across projects, and the Mosaic is expected to enable more effective planning: it will be easier to guide students to projects that will develop them in the areas where they need it most. Version 1 of the Digital Mosaic was still in development and not yet in use in early 2008.

### COUNTRY-BASED PROJECTS IN FRANCE

In the mornings, classes at Ecole Chateaudun look much like the traditional form of instruction that is common throughout France. But as part of the Innovative Schools Program, some students' afternoon programs have been fundamentally redesigned. For a couple of hours each day, groups of students, organized by ability rather than age, work together on projects on topics related to their study of the countries in the Innovative Schools Program. Some teachers are working to embed technology into the activities, although access to ICT remains limited in some classrooms. Observed student activities included practicing Chinese acrobatics and using a computer-based video program and an electronic whiteboard to record English-language introductions of each student for exchange with students at the Innovative School in Brazil. One of the goals is to extend students' awareness and understanding to the world.

## *School-Level Strategies*

Implementation of the general vision of teaching and learning described above is shaped by a great many local factors as each school selects specific goals and strategies that are both tailored to the students they serve and practical within its educational system. Implementation is also shaped by current instructional practices and cultures of innovation and improvement. Some countries and communities have long offered teachers freedom to innovate, while in others, accepted teaching practices are extremely traditional. The schoolwide efforts described in the last chapter are important facilitators of reform, but the appropriate pace of change remains a decision that is made locally. As a result, initial progress for some schools comes in the form of wholly redesigned learning environments, while in others progress takes the shape of an experimental class within an otherwise traditional curriculum or a blend of innovative practices with good traditional teaching. This variety of views of reform in the first year of the Innovative Schools Program is illustrated in four examples, along with descriptions of some of the challenges that commonly accompany school-based programs of innovation.

Curricular changes are a significant undertaking, requiring a major shift from traditional curriculum and forms of instruction. Such shifts conflict with other aspects of the education system. A major challenge is the extensive time required for some types of student-centered learning such as project-based learning, which often clash with required curricula, schedules, testing, and other regulations. Teachers need time to plan, implement, and manage authentic learning, but face competing pressure to cover the mandated curriculum content and prepare students for traditional testing. In the Innovative Schools in four countries, teachers talked about conflicts between innovative instructional

practices on the one hand and the national or state-mandated curriculum, testing, and other regulations on the other. Some teachers expressed helplessness in the face of these demands. As one teacher put it, "We are still in a school-book-driven era. You can't take a chapter of a book and turn it into a project. Basically, you follow the content of the book to reach the objectives of the school year." A teacher in another country brought up the issue of depth of content versus breadth: while a technique like project-based learning enables in-depth learning of certain content, it does not work well for covering the full scope of the curriculum within a short time period.

Many Innovative Schools are facing these challenges by experimenting with new types of instruction in areas of the curriculum or school day where there are fewer obstacles. For example, in several countries, innovation has begun at the levels that are least affected by required testing and curriculum standards. For the UK school, these are students' early secondary school years, and for Ireland it is the Transition Year—an optional year that comes after the third year of post-primary school and is largely outside the mandated curriculum. These schools have now begun to expand their reforms, using the experiences and teacher acceptance gained through their initial experiments. In Chile, the school adopted project-based learning in a newly developed course, rather than incorporating it into regular subject area courses, as described in the box above. Similarly, in Germany, much of the initial focus of instructional reform is related to a Bavaria-wide program that integrates project work and a focus on skills learning into the curriculum for the final two years of secondary school.

Another school strategy for supporting innovative teaching and learning is changing the typical school schedule to include longer class

### THE "PROJECT SPACE COURSE" IN CHILE

The Chilean Innovative School, Centro Educacional Erasmo Escala Arriagada, is adding project-based learning to its school schedule through a specific course designated for that purpose, entitled "Espacio de Proyecto" (Project Space). The goal, said one stakeholder, is "producing innovations. [The new courses] look at enriching our curriculum using different tools and at making sense of the learning for students, giving them a wider vision of the world." Project Space is offered to students in the 9th and 10th grades, and allows students to design projects that are based on their own interests and on the real problems they face. The teacher gives students a way of structuring their projects—they must define a justification, objectives, and specific activities, for example—but otherwise, the content is chosen by the students. Students use technology and work with peers to carry out their projects, which often end with implementation in the real world.

### CURRICULUM TRANSFORMATION IN THE UK

At Bowring Community Sports College in the UK, the focus of innovation in the 2007–08 school year has been on the curriculum for Year 7 and 8 students. The new curriculum focuses on student-centered learning, including extensive use of projects. Students estimated that they are involved with three projects each week. With the exception of several subjects that teachers chose to keep traditional to better serve underprepared students, classes are no longer divided by traditional disciplines, but rather into blocks such as "Challenge Time," "Team Time," and "Discovery Time." Students take on new roles during their classes, often getting to play what would normally be the role of the teacher. For example, in a physical education class, students are instructed in how to coach one another and then take over training of their peers. These classes, as well as student assessments, are driven by a set of schoolwide "personal, learning, and thinking" skills that the school hopes students will build during their time at Bowring.

periods or sections of the school day devoted to innovative instruction. Longer blocks of instructional time give teachers the flexibility to prepare students for project-based or collaborative work and have them do the work on the same day.

In the remainder of this chapter, we provide a description of some of the innovative practices reported by local evaluators for six aspects of innovative teaching and learning: project-based learning, group work and collaboration, real-world relevance, student autonomy and self-regulation, new forms of assessment, and the use of technology as a tool for learning. This section will illustrate each of these aspects of innovative instruction with examples of learning opportunities from Innovative Schools as well as a discussion of challenges that the schools have encountered in their efforts to provide those opportunities.

## *Classroom-Level Strategies*

The Innovative Schools are working to change teaching and learning using a variety of techniques. We describe six strategies in use at the schools in the sections below.

### Project-based learning

The majority of Innovative Schools give students at least some opportunities to work on extended or in-depth learning projects. Projects promote learning through the process of answering a question or creating a product over the course of several class periods, rather than in a series of short, isolated, teacher-centered lessons. Projects can allow students to pursue their own interests and questions and require them to make decisions and find answers and solutions, empowering students and encouraging them to be active learners (Means, Penuel, & Padilla, 2001).

At the Innovative Schools, the majority of projects involve students creating a product, such as a documentary or presentation. Project-based learning is often supported by a variety of technology tools and web-based resources. For example, in one classroom, students created a music video as part of their music and literacy curriculum; for this project, students developed storyboards, choreographed dance moves, and edited the digital video.

In some cases, project-based learning takes place outside the regular classroom or involves participants and audience other than the teacher and students. These projects connect students with the world beyond the school to provide authentic learning opportunities. For example, in Brazil, students collaborated with students from another school and created a documentary about the living conditions of São Paulo, using technology as a tool to tell the stories of people in their community. In Germany, students developed a newspaper edition in cooperation with a major newspaper company. A teacher talked about the motivational value of including external partners: "Students believe much more what external partners say than what the teachers say." In Mexico, the school organizes an exhibition every two months to showcase students' project work to parents and community members. According to teachers, the exhibitions promote parent interest in what their children are doing in school and allow parents to become more involved with the school community.

*The majority of Innovative Schools give students at least some opportunities to work on extended or in-depth learning projects.*

Some projects require students not only to create a product but also to find and implement creative solutions to real-world problems. For example, in Chile's Project Space course, students chose "How to save electricity at home" as a research topic, searched for information on the Internet, and created a report and PowerPoint presentation summarizing their findings on electricity consumption and energy conservation strategies. During this process, students had choices in how they defined and approached the problem. At the end of this 4-week project, students implemented the energy saving strategies at home. An Irish project to create online resources for use in teaching Irish is described in the box to the right.

Teachers and students at Innovative Schools are generally positive about project-based learning. Some teachers reported that student engagement increased and that some students are becoming open, confident, and eager to participate in learning. Students in many schools stated that projects are more fun and interesting than traditional classroom activities. Moreover, students in some schools reported that projects help them learn better because projects require them to be active and independent learners. As one group of students put it, "[In a project], because you're doing it yourself and you're not listening to someone else telling you about it, it means you're learning more."

**IRELAND'S CREATIVE PROBLEM-SOLVING PROJECT: WEBQUEST "AS GAEILGE"**

In this 6-week project, students were tasked with designing a Webquest "as Gaeilge" (in Irish) to be used by their teacher next year in classes for first-year students learning Irish. In completing this project, students tackled a real-world problem that was a concern for the Irish teacher: lack of Irish resources on the Internet for secondary-school students. The teacher also chose to use modern technologies to counter the perception of Irish as a "dead" language. Students had choices in their topic, team members, and approach to designing a Webquest (for example, some students included a podcast, video images, or language learning activities in their Webquest). Next year, students will present their work to the first-year students—the real-world audience. At the conclusion of the project, students reflected that the project not only was fun but also helped them learn Irish vocabulary, IT skills, and teamwork. As one group put it, "Most importantly, we greatly improved our Irish by using it more frequently in a creative environment." According to the teacher of this use of technology, "They're learning in a fashion that suits them.... They seem to enjoy doing it better, and I honestly do feel they turn out better work at the end of the day."

*Some projects require students not only to create a product but also to find and implement creative solutions to real-world problems.*

Important challenges of implementing project-based learning include the extensive time required for both teachers and students and the difficulty, described above, of covering all that is required by the curriculum. In addition, teachers often find it challenging to assess students' work, especially when they work in teams, and some teachers and students noted a tendency for teachers and students to focus on engagement rather than learning. In the words of one teacher, students experienced a "desire to do" rather than a "desire to learn," and learning goals may receive less than the necessary focus. Strategies to ensure integration of project work with learning requirements and assessment strategies are described in the assessment section that follows later.

## Group work and collaboration

Collaboration skills are essential in today's workplace. Individuals are expected to know how to work effectively in diverse teams and to be helpful and make necessary compromises to accomplish a common goal. Innovative Schools see group work and collaboration as one of the key facets of 21st-century learning. Nearly 70 percent of the teachers observed in these schools were having students work in pairs or small groups during class. Interview data also indicate that group work is a common instructional practice in Innovative Schools' classrooms.

However, the nature of group work varies. A simple form of collaboration, and the most commonly observed across the pilot schools, is a temporary grouping of students to work together on an activity within a single lesson. For example, in a Visual Arts class, the teacher gave each pair of students a picture of a drawing and accompanying questions about the picture, such as, "What is your first impression of this drawing?" or "What kinds of painting style are used in this picture?" Students were asked to discuss their ideas about these questions for about 10 minutes and report back their discussions to the whole class. Similarly, in a geography class in another country, pairs of students watched a video about Egypt and then answered a number of questions about the country using an online collaboration program.

A more sophisticated form of group work requires students to coordinate their work with one another and produce complex, interdependent group products that take more than a single class period to develop. Each student's work is part of a larger whole. This type of group work requires students to collaborate with one another more formally, sometimes with predefined roles, for solving problems or creating novel group products. This is the type of group work that characterizes 21st-century workplaces.

While this more advanced type of collaborative group work was less frequently observed or reported than simple group work, some Innovative Schools are providing such opportunities in the context of learning projects. For example, in one of France's project-based courses, students were observed planning a film that they would produce as a group, necessitating the sharing of ideas and negotiation of designs. A student in another school described the communication required when working on a group product: "You're working with other people. You're talking to [other students in the group] all the time. You've [got] to talk constantly about what you're doing." Elsewhere, students reported that some teachers let them make decisions about who gets what role within the group, and they rotate the roles and level of responsibility they have for projects. An example of collaboration from Mexico is described in the box on the next page.

*A simple form of collaboration, and the most commonly observed across the pilot schools, is a temporary grouping of students to work together on an activity within a single lesson. A more sophisticated form of group work requires students to coordinate their work with one another and produce complex, interdependent group products that take more than a single class period to develop.*

In a few countries, students reported that technology was helping them to collaborate better. One student explained, "You can have a copy of what you have and then you can send it to your friend on their laptop, and you can both have it and you can both be looking at the same thing, whereas if you have it on a sheet, you're passing it between you." Similarly, a student

who uses software that supports group work reported, "I can control the screens of my fellow students and show them what I like, and I can comment on their work." Technology also facilitated teachers' roles in leading group work; for example, in some schools that use ability grouping to assign student teams, teachers found technology to be an effective aid to differentiating instruction and assignments, allowing them to give each group a resource or task appropriate for the students' level.

Students and teachers are generally positive about group work. Students enjoy the group process, and some specifically said that certain things are explained better by their peers in a small group than by the teacher lecturing to the whole class. However, students and teachers also described challenges with working in teams. Some students reported that they felt they lost time when they worked in groups because of the time spent helping the others in the group. Similarly, some students expressed concern about getting a lower group grade because of a few students' poor performance. Students and teachers in a couple of schools that used multiage teaming reported that lack of respectful peer behavior can be a challenge, either for younger students or those who are less advanced in skills.

For teachers, assessing group work can be a major challenge. Teachers in some countries reported difficulty in simultaneously assessing four or five groups working on different things for their projects, or said that national grading policies did not allow them to assign "team" grades for classroom activities, driving them to assign less group work. Teachers at the Innovative Schools have tried a number of strategies for assessing group work, as shown in the box at right, although many requested more help in this area.

### STUDENTS WORKING TOGETHER IN MEXICO

Students in a language arts class in Mexico worked together to develop moderated panel discussions on a variety of topics of interest, including "Linguistic Diversity" and "Multiculturalism." Within each group, students selected subtopics and developed their own presentations. The group focusing on linguistic diversity, for example, discussed laws related to indigenous languages, multilingual schooling, and rights of indigenous peoples. To present their work to the class, the students selected a moderator from their group who introduced the topic and each individual speaker, asked the speakers prepared questions, moderated questions from the audience, and concluded the discussion.

### STRATEGIES FOR ASSESSING GROUP WORK

Teachers in the Innovative Schools used the following strategies to assess work that students did collaboratively:

- Allowing student teams to allocate points within the team
- Grading group work using rubrics that take both group and individual performance into account
- During group presentations, asking questions of individual students to gauge how well each student knows the topics
- Taking assessment notes on how students respond to one another's questions and how they interact in groups

## Increasing relevance of schoolwork to students' lives

For students to be successful at school and beyond, it is important for them to believe that schoolwork makes sense for their current interests and future goals, and to work on classroom activities that are intrinsically motivating (Bransford, Brown, & Cocking, 1998). Observations in the pilot schools revealed five instructional strategies that teachers use to increase the relevance of schoolwork to students' lives. These five strategies are shown in the box below. The two most commonly reported strategies were incorporating students' interests and cultural background into learning, and teaching knowledge and skills applicable to everyday life or to life after school. For example, in five countries, students have some opportunities to choose topics of interest for their research. In one classroom, a teacher was observed incorporating student cultural background into a whole class discussion by asking a few students who self-identified themselves as having a Native heritage to talk about what that heritage meant to them.

With regard to teaching knowledge and skills applicable to everyday life or to life after school, technology skills were a commonly cited example. Students in five countries explicitly indicated that they value learning how to use technology, often because such learning prepares them for careers. As one student put it, "This project is preparing us for our future jobs because we will have to use computers and Internet there."

*Teachers are increasing relevance of schoolwork to students' lives by incorporating students' interests and cultural background into learning, and teaching knowledge and skills applicable to everyday life.*

**INSTRUCTIONAL STRATEGIES FOR INCREASING RELEVANCE OF SCHOOLWORK**

- Incorporating students' interests and cultural background into learning
- Teaching knowledge and skills students can apply to everyday life or to life beyond school
- Anchoring learning in students' prior knowledge, experiences, and/or everyday examples that students can understand and to which they can relate
- Involving outside partners or outside organizations (for example, museums) to make learning more realistic
- Making the learning process closer to the technology-rich lives students live today

Another commonly reported strategy was anchoring learning in students' prior knowledge, experiences, and/or concrete examples or scenarios that students can easily relate to. Four countries explicitly mentioned this strategy. Teachers at one primary school reported that they make conscious efforts to connect abstract concepts with examples from students' daily life, for example, in a course called "Let's Take Care of the Earth" that presented concrete strategies for the 3Rs (Reuse, Recycle, and Reduce). Another teacher asked students to apply their persuasive writing skills in a real-world situation that mattered to them: they wrote letters to convince the school leader, who was against a school trip, not to cancel the trip. They needed not only to articulate their opinions in writing but also to construct arguments with clear and logical reasoning.

Some Innovative Schools are involving outside partners or outside organizations (for example, museums) to make learning more realistic. For example, in one school, several teachers conducted regular visits to local museums to add authenticity to students' learning. In another

school, students conducted learning projects involving outside partners such as a newspaper company and students at a local university. A few schools are focusing on making the learning process closer to the technology-rich lives students live today. For example, teachers in one school reported that they incorporated technology in the learning process so that it would be in line with how students operate "digitally" outside school. The teachers made notes and resources available electronically on SharePoint, and communicated with the students by e-mail regarding assignments and classroom work.

## Student autonomy and self-regulation

One of the goals of innovative teaching is to help students take ownership of their learning process and become independent learners. Students begin to set goals and to monitor, regulate, and control their own learning in the context of longer-term assignments with multiple stages or parts. Regulating one's own learning or "learning how to learn" is an important skill for 21st-century workplaces that expect staff to work with minimal supervision and to plan their own work and monitor its quality.

A teacher shared what this aspect of 21st-century learning means to her: "If I just tell the students to do this and that, this kind of teaching is still on the level of spoon-feeding. I think our students need to explore and construct knowledge.... In this learning process, students learn not only the subject knowledge but also the methods of learning how to learn."

One way that teachers help students develop self-regulation skills is by having students revise their work based on self-reflection or feedback received from the teacher or other students. This practice helps students evaluate their own work and improve its quality, especially when students and teachers use rubrics that provide a range of criteria rather than a single numerical or letter score, helping students to think more deeply about how their work will be evaluated. Often students need assistance from a teacher to develop the ability to evaluate themselves and their peers; an example of peer evaluation supported by a teacher is given in the box below. In four Innovative Schools, student revision of their own work appears to be a regular part of classroom practice. At some Innovative Schools, technology is being used to facilitate both students' self-revision processes and feedback between the teacher and students or between students. In Ireland, for example, students reported that they typically send their project work electronically to their teachers and team members and receive immediate feedback via e-mail at various stages of the project. They commented that the availability of technology makes this frequency of formative input possible. In Canada, some teachers have found that technology motivates students to do more revision of their writing, leading to an increase in the quality of student work. As one teacher put it, "They [students] are much more eager to move paragraphs around on the Smartboard Notebook program than they are on paper."

### STUDENTS ASSESSING STUDENTS IN MEXICO

Students in a class in Mexico were asked to assess themselves and their peers' performance on presentations. Before any presentations were given, the teacher led the class in determining criteria for evaluation: presenters, students said, should be well-prepared, show confidence, speak coherently, and know how to deal with counter-arguments. Audience members should show interest in the presentations. Later, they self-evaluated: one student suggested that a presenter keep his voice loud throughout his talk and another said that all presenters should know their topic well and should try not to be nervous. The teacher supplemented the students' comments with recommendations of her own.

## New forms of student assessment

When curriculum and instruction become more innovative and student-centered, assessment practices also need to change. Traditional assessments reward memorization and recall of facts, while assessments of 21st-century learning emphasize students' abilities to apply knowledge and higher-order thinking skills. It is important for teachers to frame assessments not just as test scores and grades, but also as information that helps them to identify student misconceptions and adjust their instruction accordingly (Pellegrino, Chudowsky, & Glaser, 2001). In other words, in 21st-century classrooms, assessment becomes an integral part of instruction, and its results are used formatively to give students insights into how their learning can be improved.

Changing assessment practices in such fundamental ways is challenging for many teachers and requires time and support. Traditional testing can be an important constraint. One teacher said, "To a vast extent, these [grading] regulations demand reproduced and comparable knowledge. This is why I simply can't give a student credit for creativity, because this is not part of the grading regulations for exams."

*New forms of assessment are being developed on a schoolwide basis at several Innovative Schools, and some individual teachers have started exploring new forms of assessments in their classrooms.*

New forms of assessment are being developed on a schoolwide basis at several Innovative Schools. In Brazil, as part of the Innovative Schools Program, the school has been developing Digital Mosaic software that will record individual students' competencies and track student growth over time, as well as support planning of student competency development across multiple projects. In the UK, the school has developed a set of rubrics to assess students' cross-curricular 21st-century skill development, as described in the box on the left.

In addition, in five Innovative Schools some individual teachers have started exploring new forms of assessments in their classrooms. Many of these teachers are exploring the use of technology as a new means for assessing student understanding. For example, teachers in Canada's Literacy@School program have found that technology provides students, particularly those with disabilities, with alternative modes for demonstrating their writing ability. In two schools, students take computer-based exercises and quizzes that provide immediate feedback. One of the teachers observed in Ireland uses SharePoint to give students differentiated

### ASSESSING STUDENT SKILL DEVELOPMENT IN THE UK

Bowring Community Sports College, the pilot Innovative School in the UK, has placed an emphasis in its curriculum redesign on a set of defined skills that it hopes students will build. These Personal, Learning, and Thinking skills, or PLTs, are defined in a rubric that is mapped to national standards. This multipart rubric measures students' development as "creative thinkers," "effective participators," "independent enquirers," "self-managers," and "reflective learners." The rubric has begun to be used both by teachers and by students, for self- and peer-assessment purposes. It prompts students to think about the criteria on which their work will be judged and provides them with language to talk about the quality of their work as well as that of their peers. As the rubric is used formatively to guide student skill development, lines between teaching, learning, and assessment become blurred. School staff reported that the use of the PLTs Assessment Rubric is now the driver of learning at the school rather than merely an addition.

assignments and individualized feedback; in doing so, she can provide private and tailored support to weaker students without drawing others' attention to their difficulties.

While schools and teachers have made some progress toward more innovative assessment practices, their initiatives are still in early stages, and three of the pilot schools reported that no new assessment practices had yet been implemented. Some school leaders and local evaluators explicitly pointed to assessment as one of the most important areas in which schools need to focus in the future.

## Use of technology as a tool for learning

Innovative Schools see technology integration as a key strategy for facilitating innovative teaching and learning. As we have seen in earlier subsections, innovative uses of technology are emerging at some schools. The focus and extent of tech integration vary across schools and even among teachers within the same school. Table 3-2 summarizes different ways in which technology is being used at the schools to enable more innovative teaching and learning practices.

**Table 3-2. Technology use at the Innovative Schools**

- Facilitating student research, investigation, presentation, and product development
- Motivating higher-quality work (for example, through writing tools that make editing easier and the writing process more engaging)
- Facilitating student collaboration (for example, through the use of e-mails and screen sharing programs)
- Making course content more engaging and more connected to the real world (for example, through digital curriculum or the use of the Internet in teacher presentations)
- Giving students "a wider vision of the world" (for example, communicating with students in other Innovative Schools countries)
- Differentiating instruction for students of varying abilities without calling attention to their differences (for example, through the use of SharePoint to distribute tailored assignments)
- Reaching out to students with disabilities (for example, keyboard and word prediction software help students with difficulty in writing)
- Providing immediate formative feedback and new avenues for assessments (for example, through online quizzes and teacher review of e-mailed drafts)
- Facilitating communication between teachers and students, or among students (for example, through e-mails, blogs, and discussion boards)
- Streamlining classroom administration (for example, taking attendance and distributing grades)
- Making learning materials and notes available for students and sometimes parents (for example, web-based curriculum and portals)
- Sharing curriculum and teaching resources among teachers

*Many teachers voiced a need for more training and support for integrating technology into their practice in ways that would transform instruction and support student higher-level learning.*

In some countries, teachers' practice is on a path toward seamless integration of technology in instruction. For example, the leader of Canada's Literacy@School program reported: "Technology is no longer an event in teachers' classrooms." This observation was echoed by the country's national evaluator. Teachers in Canada explained that involvement in the Literacy@Schools increased their technology access by providing additional hardware and training on how to use the software that is available in their schools. The program leader observed increases in teachers' capacity not only to integrate technology into the curriculum but also to communicate the rationale for their choice of technology tools to achieve certain pedagogical goals.

The pilot schools have increased the use of technology by teachers and students to varying degrees since the Innovative Schools program began. In one school, teachers and students reported that they now use technology weekly, a big step forward for a school where technology was not previously used at all in the classroom. Another school had only a few computers a year ago but now has about 80 computers, enabling students to work on technology-based projects. A teacher in charge of technology observed change in the nature of technology use: "The computer was only used for recreation and research a year ago. Now students produce more with technology. The Smartboard is used every day."

While technology is becoming more commonplace in the classroom, in some Innovative Schools its use has not yet been transformative. Both interview and observation data reveal that teachers tend, at first, to use technology as a more efficient replacement for an existing tool (for example, a PowerPoint presentation projected onto the whiteboard instead of notes on the chalkboard) rather than as a means of changing pedagogy. Many teachers voiced a need for more training and support for integrating technology into their practice in ways that would transform instruction and support student higher-level learning. As one teacher noted: "We need guidance in developing capacity to distinguish between uses of technology for its own sake and uses of technology that add value in terms of student learning."

In addition to the need for more training and support, some of the most frequently voiced challenges are technical: unreliable Internet connections, long setup or boot-up times, network problems, drained batteries, and missing keyboards. These difficulties make teachers hesitant to plan activities that rely on technology; it is a great deal of work to create a backup plan for every lesson in case the technology fails. Additionally, as more teachers within a school start using technology in their instruction, schools are faced with a greater demand for technology resources; as a result, coordinating technology sharing across teachers and classrooms becomes more difficult and more time is required for planning, updating web information, and getting technical support.

## *Conclusion*

The Innovative Schools have begun taking steps toward student-centered, innovative teaching, including increased use of projects for student learning, more opportunities for students to collaborate, integration of technology with teaching, and attempts to reform ways in which students are assessed. These efforts are in their early stages in many of the schools, and examples of deep changes to teaching are not yet widespread, but models of important aspects of innovative instruction are beginning to appear. In the next chapter, we will further examine teaching and learning in the Innovative Schools, using data from observations and collected samples of work done at the schools to describe learning environments and to inform future directions for reform.

# Chapter 4: Measures of Teaching, Learning, and Assessment in Innovative Schools

Like the previous chapter, this chapter presents information collected from the Innovative Schools with respect to the Teaching, Learning, and Assessment portion of the Innovation Framework. The main data sources for this chapter are observations of selected classes within each school and analysis of samples of learning activities and the work that students produce as part of those activities. We use these data to examine the depth of implementation of the types of innovative teaching and learning practices described in Chapter 3. Because this chapter contains a more detailed presentation of data than the previous ones, we begin with a summary of key findings and then move on to more detailed data and discussion.

In interpreting the results presented here, it is important to remember that the pilot schools have varying histories of reform and that, for some, these data were collected in the first year of their concerted efforts to change instruction. As a result, progress is expected to vary widely across the schools and to be limited in depth at this early stage of the initiative.

## *Summary of Teaching and Learning Results*

In class observations, evaluators looked for evidence of 10 teaching and learning practices that research suggests are characteristic of effective innovative instruction. While most classes included 3 or 4 of the 10 practices, these observations suggest that there is room for most teachers to experiment with a wider variety of innovative types of instruction. In a majority of observed classes, evaluators saw 2 of the recommended practices: students received feedback on their work from a peer or teacher, and students had opportunities to relate what they were learning to the real world. However, the other 8 recommended practices were seen in less than half the observed classes. Four of these 8 practices were present in less than 25 percent of observed class sessions.

In about half the observed classes, students used technology to support their work. In general, we found that in classes where students used technology, more of the innovative teaching and learning practices also were present. This relationship was particularly strong in classes where students were using technology for higher-level purposes such as analyzing data or designing a multimedia product. These data suggest that student use of technology is associated with learning environments that are more innovative, particularly when students are using technology in ways that support higher-level learning.

The second approach to examining teaching and learning in these schools was based on samples of the learning activities that teachers assigned to students and the work that students did in response.

Trained, independent raters within each country analyzed the learning activities looking for evidence that the activities encouraged students to develop 21st-century skills in five areas: knowledge construction, collaboration, problem solving and innovation, self-regulation, and use of global tools and perspectives (including ICT). While learning activities in the Innovative Schools varied from very innovative to very traditional, a typical assignment in Year 1 had the following characteristics:

- Required some knowledge construction, but that was not the main focus; most of the activity or assignment could be completed through reproduction of information that students had read or heard.
- Allowed students to work in groups but did not require it; students produced individual products rather than products that were interdependent.
- Required problem solving but did not give students choices about how to address the activity or require them to implement their solution in the real world.
- Required only one aspect of global tools and perspectives (use of technology, multiple academic disciplines, or information or perspectives from multiple cultures or countries).
- Required only one aspect of self-regulation (extended duration with multiple parts, assessment criteria given to students in advance, or receipt of feedback in time to revise their work).

Similar to findings from classroom observations, we found that learning activities that involved technology were more likely to encourage students to develop other 21st-century skills, especially collaboration and self-regulation.

Raters also examined the work that students did in response to these learning activities. We found that when a learning activity calls for knowledge construction, problem solving, or the use of global tools, students' work is likely to demonstrate the corresponding quality.

The remainder of this chapter contains a more detailed presentation and discussion of the data summarized here.

## *Classroom Activities in Innovative Schools*

National evaluators observed a sample of classes at each school, looking in particular for the degree to which elements of innovative teaching and learning were in evidence. To the extent possible given the school's size and structure, national evaluators were asked to observe eight classes: three in the humanities, three in the sciences, and two that best represented the school's innovation efforts. At each of the 10 Innovative Schools in the evaluation, national evaluators were able to observe four to eight teachers' classrooms. With several exceptions, each teacher's classroom was observed once. A total of 65 teachers and 73 classrooms were observed.[7]

Classes were observed according to a protocol that examined aspects of instruction related to items in the Innovation Framework, taxonomies of 21st-century skills (Partnership for 21st Century Skills, 2007), and research on how people learn (Bransford, Brown, & Cocking, 1999). For each observed classroom, national evaluators recorded whether each of the 10 aspects of innovative teaching and learning listed in Table 4-1 was in evidence during the observation period. Note that these innovative teaching and learning practices are intentionally phrased in a way that does not include technology.[8] In a later section of this chapter, we will examine the relationships between the use of technology and these innovative teaching practices.

**Table 4-1. Innovative teaching and learning items by frequency**

| | ***N* = 64 teachers** | |
|---|---|---|
| **During the observed lesson, students . . .** | **Count** | **Percent** |
| Gave feedback to peer or received feedback from peer or teacher | 44 | 68.8 |
| Had opportunities to connect learning to the real world | 38 | 59.4 |
| Revised own work based on feedback or self-assessment | 30 | 46.9 |
| Worked on an extended/in-depth project | 28 | 43.8 |
| Were prompted to assess own learning | 24 | 37.5 |
| Had choices about tools or resources for learning | 23 | 35.9 |
| Had choices about topics of learning | 14 | 21.9 |
| Had opportunities to develop cross-cultural understanding | 12 | 18.8 |
| Engaged in performance assessments or portfolio assessments | 9 | 14.1 |
| Were exposed to issues related to global interdependency | 7 | 10.9 |

Note: Data were missing for one teacher.

7 When interpreting the data that follow, it is important to keep in mind that in most cases, not all of a school's teachers were observed and that the one class observed for each teacher might not have been typical of that teacher's instruction. As a result, while these observations provide a useful snapshot of each school's teaching and learning activities, the data may not represent the full range of instructional innovation at these schools.

8 Use of technology is part of the Implementation Wheel but was excluded from the innovative teaching measure to permit an empirical test of the relationship between technology use and other aspects of innovative practice.

*In over 68 percent of teachers' classrooms, students gave feedback to peers or received feedback from them or the teacher, and in almost 60 percent, they had opportunities to connect what they were learning to the real world.*

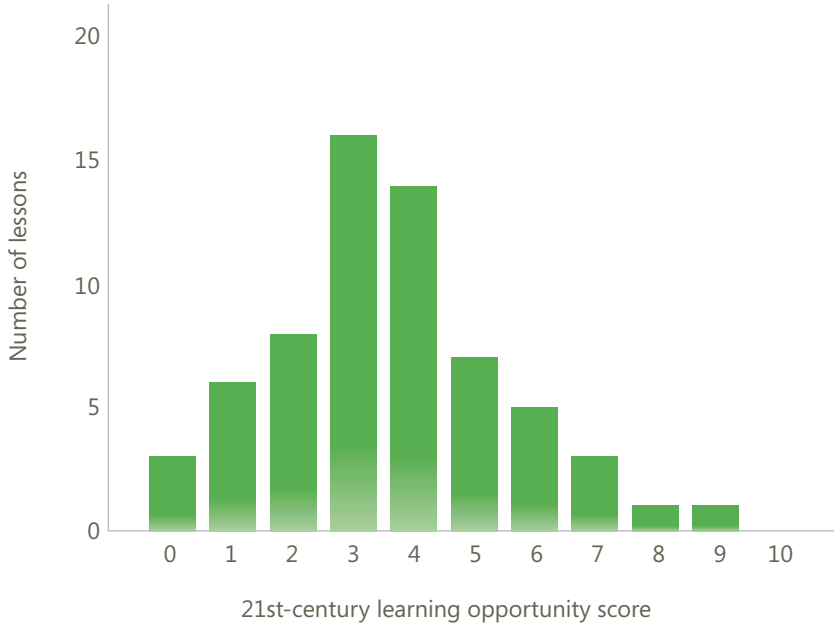
Table 4-1 shows some of the aspects of innovative teaching and learning that were commonly observed in the Innovative School classrooms. For example, in over 68 percent of teachers' classrooms, students gave feedback to peers or received feedback from them or the teacher, and in almost 60 percent, they had opportunities to connect what they were learning to the real world. Some other types of learning opportunities were less commonly observed. For example, opportunities to develop cross-cultural understanding, engagement in performance assessments, and exposure to issues related to global interdependency were observed in less than 20 percent of teachers' classrooms.

To get an overall sense of the strength of innovative teaching and learning in these classrooms, an "innovative teaching practice" scale was developed by combining scores for each of the 10 items shown in Table 4-1. Each item was given a score of 1 if it was observed. The maximum score for the innovative teaching scale was 10 and the minimum score was 0.

Figure 4-1 shows the distribution of the innovative teaching practice scores across 64 teachers from 10 countries. It shows that while several teachers incorporated many aspects of innovative teaching within their lessons (as many as nine in a single lesson), the majority of lessons typically included three or four of the innovative practices listed in Table 4-1. This suggests that most pilot school teachers were using some of the innovative teaching practices. While it is unrealistic to expect teachers to use all of these practices in any single observation period, the findings suggest that, for most teachers, there is room to experiment with more varied innovative instructional practices.

*The majority of lessons included three or four innovative teaching practices. For most teachers, there is room to experiment with more varied innovative instruction.*

**Figure 4-1. Distribution of innovative teaching scale scores**




The mean (average) scores of the schools on the innovative teaching scale ranged from 0.75 to 5.63, with a program average of 3.33, suggesting that the Innovative Schools vary widely in how innovative their teaching is, likely because of their different starting points and national and local contexts. Although schools had different average innovative teaching scale scores, there was also significant variation among teachers within the school in 9 out of 10 countries. Most schools had at least a few teachers with high scores (that is, five or more aspects of innovative teaching) on the innovative teaching scale. This finding is in keeping with our earlier description of reform strategies: many of the Innovative Schools are starting their reform efforts with teachers in particular years or subjects, or with teachers who are "early adopters" of the new ideas being tested, rather than trying to implement them schoolwide from the very beginning.

## Classroom characteristics associated with innovative teaching

To determine if there were any patterns that might explain where innovative teaching practices occur, we looked for classroom characteristics associated with higher scores on the innovative teaching scale. Our analyses show that classrooms with the following characteristics had statistically higher mean innovative teaching scores:

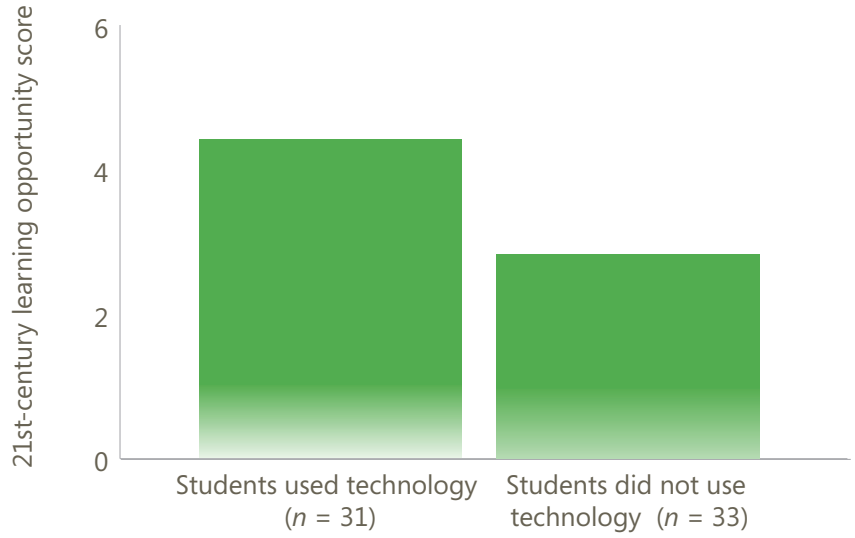
- Student use of technology
- Younger students (11.5 years old or younger)
- Mixed-ability class

We present findings on each of these characteristics below.

### *Student use of technology*

In about half the lessons observed, students used technology. Figure 4-2 displays the mean innovative teaching scores for classrooms where students used technology during the observed lesson and classrooms where students did not use technology. The mean score is higher for teachers whose students used technology (4.39) than for those whose students did not use technology (2.82). This difference in means is statistically significant.[9] This indicates that while innovative teaching and learning can be provided without the use of technology, teachers tend to offer more varied and innovative learning opportunities when they have students use technology.

**Figure 4-2. Mean innovative teaching scale score, by student use of technology**

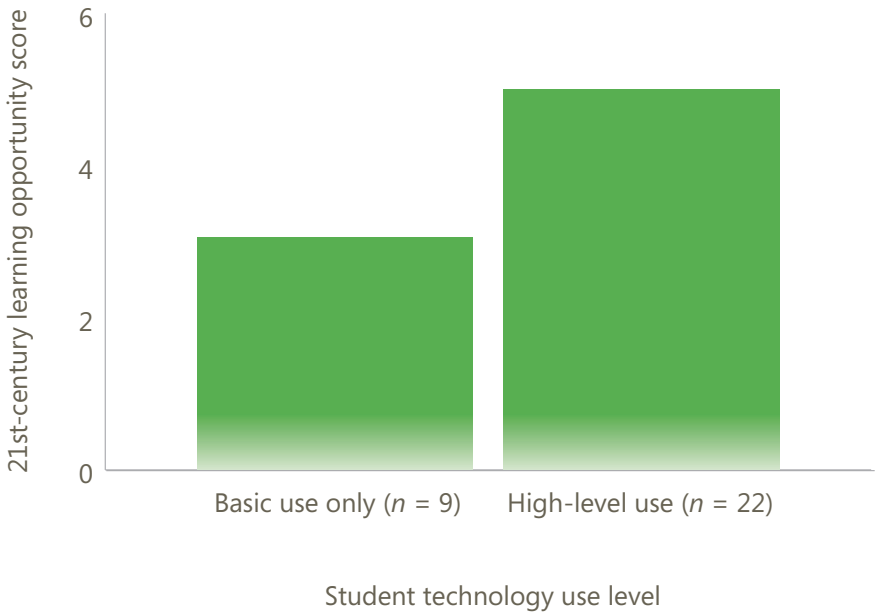



9 "Statistically significant" means that it is unlikely that the differences in innovative teaching scores across the two groups are due to random chance in the sampling of schools and teachers.

*Of the 31 lessons observed in which students used technology, 71 percent showed high-level uses of technology.*

Not all types of technology use are likely to be associated with innovative teaching, however (Means, Penuel, & Padilla, 2001). For example, using technology for drill and practice is probably not strongly related with the innovative teaching practices in Table 4-1. We tested this hypothesis by comparing the mean (average) innovative teaching scale score for teachers whose students used technology for higher-level tasks (such as organizing or analyzing data, designing a multimedia product, collaborating or communicating online, assessing progress, or managing learning) with the innovative teaching score for teachers whose students used technology only for basic tasks (such as drill and practice software, word processing, or researching information on the Internet).[10] Of the 31 lessons observed in which students used technology, 71 percent showed high-level uses of technology. Figure 4-3 shows that the mean innovative teaching score is higher for teachers' classrooms with high-level technology use (4.95) than for those with a basic level of technology use (3.00). This difference is statistically significant.

**Figure 4-3. Mean innovative teaching scale scores, by level of student technology use**

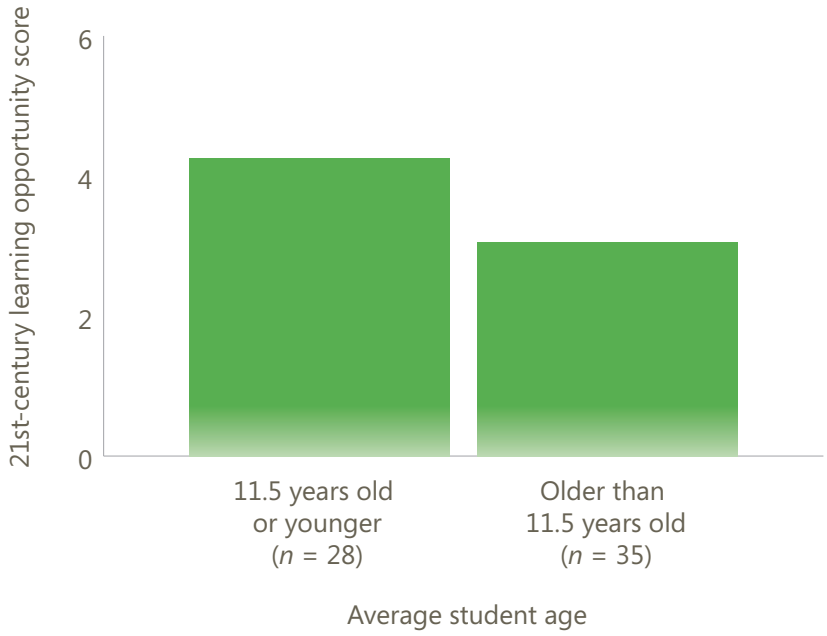



10 Researching information was considered as basic use because classroom descriptions provided with the classroom observation data revealed that students generally used the Internet to look up information quickly in lieu of employing a dictionary or encyclopedia, rather than using the Internet as part of a complex research task.

### *Younger students*

Student age is another classroom characteristic associated with innovative teaching. Teachers were categorized into two groups on the basis of their students' average age: (1) teachers with younger students (the average student age for the class was 11.5 years or younger) and (2) teachers with older students (the average student age was older than 11.5 years).[11] Figure 4-4 shows that the mean innovative teaching scale score is higher for the teachers with younger students (4.25) than for those with older students (3.06). This score may be a result of the fact that, in most countries, teachers at primary levels have more flexibility to experiment with new, innovative teaching practices in their curriculum than do those at secondary levels. They also typically have students in their class for more minutes in the day (because younger students often stay with a single teacher for most of the day) and are often less pressed with mandated testing than the upper-level teachers.

**Figure 4-4. Mean innovative teaching scale scores, by class average student age**

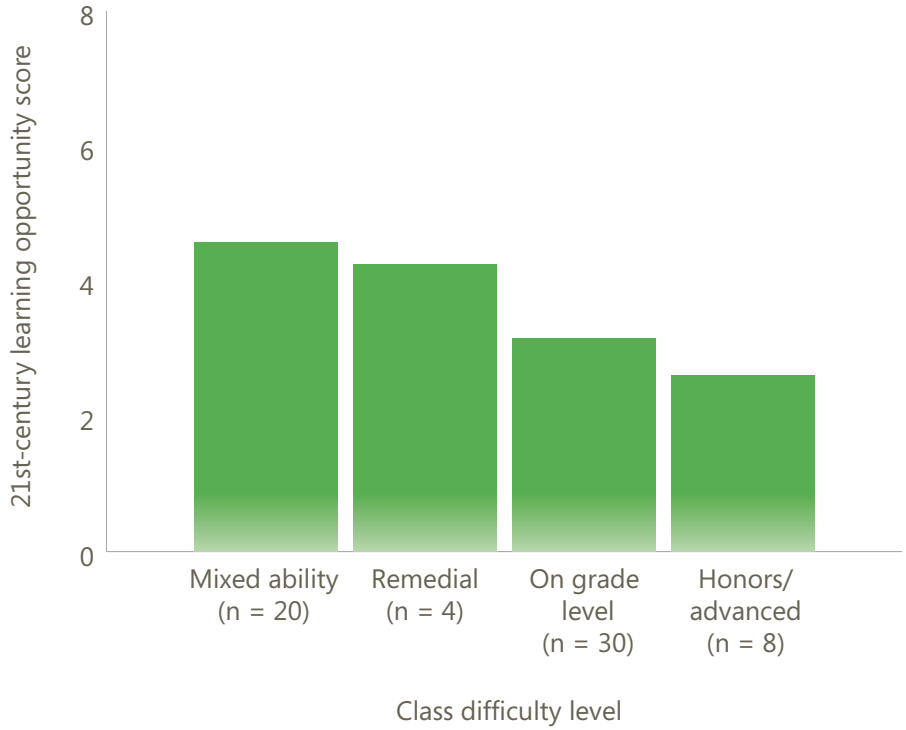



11 For the entire sample of classes, 11.5 years was the median student age. For this reason, a class median of 11.5 years was used to divide the sample into two groups of equal size.

### *Class ability levels*

The mean innovative teaching scale scores were also compared by the reported student ability levels for the observed classrooms, which observers rated as either year level, honors/advanced, remedial, or mixed ability. Figure 4-5 shows that the mean innovative teaching scale score is highest in mixed-ability classes (4.55) and lowest in honors/advanced classes (2.63). The differences in means among the four groups is statistically significant. The Honors/Advanced classes are all from secondary schools. These classes are among those most likely to be driven by test preparation and therefore content coverage, a context that many teachers find challenging if they are trying to introduce innovative learning opportunities. These results should be interpreted with caution, however, because of the very small number of cases of Honors/Advanced classes (*n* = 8 teachers) and of Remedial classes (*n* = 4 teachers).

**Figure 4-5. Mean 21st-century learning opportunity scores, by class difficulty level**



## *Learning Activities and Student Work*

In addition to the classroom observations described above, the evaluation team examined teaching, learning, and assessment within the Innovative Schools by collecting samples of the learning activities that teachers assigned to students and the work that students did as part of those activities.

### Research approach

It was important to ensure that the learning activities and student work from the Innovative Schools were evaluated by educators familiar with the relevant subject areas and expectations for that year of schooling. To make this possible, we selected two broad subject areas for this research: humanities and science. In addition, each country was asked to choose a focus age level, collecting learning activities and student work in the sciences and the humanities for either 10-year-olds or 15-year-olds.

After picking the age group most appropriate for their school (primary or secondary), national evaluators were asked to select six teachers to participate in this portion of the evaluation—three in the humanities and three in the sciences. From each teacher, they were asked to collect a total of six learning activities, three that the teacher used during the period between October and December 2007 and another three during the period between February and May 2008. For each teacher, one of the activities used between October and December and one used between February and May were to be selected for the collection of student work samples. For each of these activities, the evaluator was asked to collect the work produced by a random sample of 10 students.

#### *Sample*

Evaluators in each country carried out these instructions to the degree they were able, but samples varied according to what evaluators could collect from teachers and in some cases according to the design of the program or school. For example, the Innovative Schools in France and Chile are small enough that they do not have six teachers at the same level, and in some countries the Innovative School is focusing on a specific age group that differs from the requested 10- or 15-year-old samples. Table 4-2 shows the samples of learning activities and student work used in the analysis.

**Table 4-2. Learning activity and student work samples**

| | Elementary Age 10 | Secondary Age 15 | Total |
|---|---|---|---|
| Countries | 5 | 5 | 10 |
| Schools | 7 | 5 | 12 |
| Teachers | 28 | 27 | 55 |
| Students | 379 | 477 | 856 |
| Learning Activities | 130 | 142 | 272 |
| Work Samples | 422 | 477 | 899 |

Note: Some school-provided assignments that involved neither the humanities nor the sciences were dropped from the sample.

### *Dimensions of innovative teaching and learning*

The purpose of collecting samples of learning activities was to determine the extent to which students in Innovative Schools are given the opportunity to acquire the skills needed to become innovative learners. Samples of the student work provide a window on the extent to which students are actually developing these skills. To make these determinations, SRI developed a set of rubrics for innovative teaching and learning, drawing on input from the Innovative Schools provided during a November 2007 meeting in Oulu, Finland, as well as on prior research (Bryk, Nagaoka, & Newmann, 2000; Matsumura & Pascal, 2003; Mitchell et al., 2005).

Learning activities were examined and characterized in terms of five dimensions:

- *Knowledge construction.* The activity calls on students to combine new information with what is already known to generate ideas and understandings that are new to the learner.
- *Collaboration.* The activity requires students to work with others, either face-to-face or through technology, and produce products that are interdependent.
- *Problem solving and innovation*. Students are asked to design a complex product with a set of constraints or address a significant issue or solve a problem for which they do not know the answer or a set procedure; have choices about the problem to address and how to address it; and are asked to innovate when they put their problem solving into practice to provide benefits for an audience other than the teacher as grader.
- *Self-regulation*. The activity extends over a period of a week or more and has multiple stages or parts; students are given assessment criteria in advance so that they can assess their own work; and students receive feedback from the teacher or from other students that can be used to revise their work and gain insight into how to do better work in the future.
- *Global tools and perspectives*. The activity resembles the 21st-century workplace in that a wide range of resources are used, involves knowledge and methods from multiple academic disciplines, incorporates data or perspectives from multiple countries or cultures, and is supported with technology tools.

The qualities looked for in student work were:[12]

- *Knowledge construction.* The work moves beyond the reproduction of information to demonstrate that the student has created or explored information or ideas through investigation, interpretation, analysis, synthesis, or evaluation.
- *Problem solving and innovation.* The work demonstrates problem solving by addressing a problem or an issue with no known answer or by designing a product that meets a set of constraints, is creative in that it makes unexpected connections across ideas or is original in design, and qualifies as innovation because it has been implemented in the real world.
- *Skilled communication*. The work contains extended writing or reporting that is well developed, contains sufficient relevant evidence to support a theme (for secondary students) or topic (for primary students), and is coherent and well organized.

12 Student work was not coded on quality of collaboration or self regulation simply because these processes can not be discerned from students' products.

- *Global tools and perspectives*. The work reflects the use of knowledge and methods from multiple academic disciplines, incorporates perspectives or data from multiple cultures or countries, and reflects the use of technology tools.

Learning activities and student work were coded on each dimension on a scale of 1 to 4, with 1 as the lowest code (used if the activity/work did not reflect the dimension) and 4 as the highest (used if the activity/work reflected the dimension to a high degree). The process used for coding student work in terms of these dimensions is described in detail in the box below.

### Coding learning activities and student work

Learning activities and student work samples were coded in a way that provided consistency across the countries in the sample as well as sensitivity to local context. For each dimension on which learning activities or student work would be coded, SRI developed a four-point rubric with associated definitions for each point on the scale. These rubrics were disseminated to national evaluators through detailed coding guides and face-to-face training sessions, led by SRI and attended by national evaluators from each country. At these 2-day training sessions, national evaluators became familiar with the rubrics and definitions to be used in coding and practiced coding samples of learning activities and student work themselves. After this training, national evaluators from countries where instruction is not in English translated the rubrics as necessary.

National evaluators recruited teachers of the same subject matter and age levels as the teachers who provided the sample learning activities and student work to code these materials.[a] Evaluators were asked to recruit these "teacher-coders" from schools other than the Innovative School, to make it easier for coders to be impartial.[b] Primary school teachers evaluated the work of primary school students, for example, ensuring that they would be able to effectively judge the level of work appropriately given the age of the student. Similarly, science teachers were responsible for coding science activities and work, and so on.

Coders were trained to use the rubrics to evaluate the learning activities and student work in a manner that would be consistent with the international process but that also would reflect the expectations of teachers in that country. In conducting coding sessions, a national evaluator would train coders on a dimension, such as knowledge construction, and have them code every assignment for just that dimension before moving to training and coding on the next dimension. All of the learning activities and a portion of the student work samples were double-coded; in other words, two teacher-coders looked at the same activity or work sample so that agreement between coders could be calculated. National evaluators reported the codes to SRI, where the data were checked for completeness and analyzed.

Coders evaluating the same learning activity agreed on a code 68 percent of the time and were within one point of each other 92 percent of the time. Coders reached perfect agreement on student work scores 82 percent of the time and were within one point of each other 95 percent of the time. When two coders differed in their evaluation, the average of the two coders' scores was used for analysis.

a In one country, it was not possible to recruit teachers as coders, and all coding was carried out by the national evaluators.

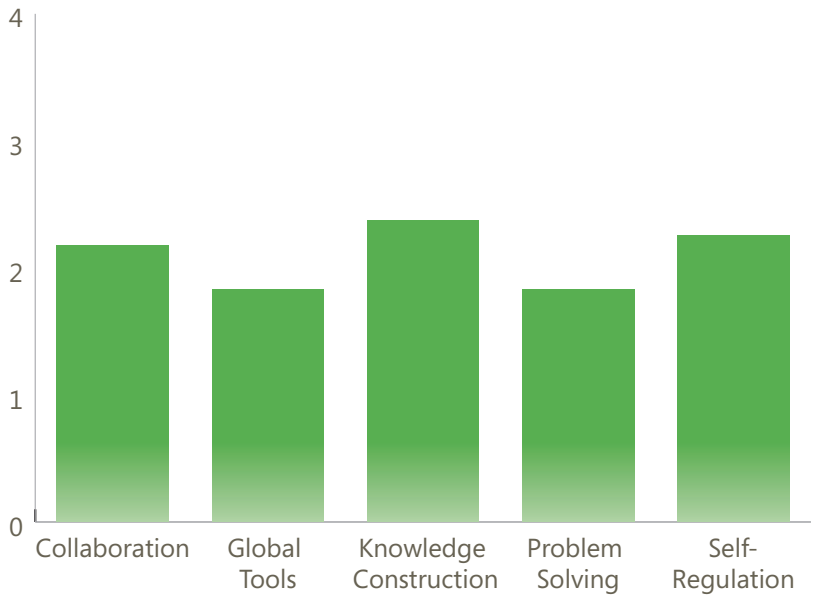
b In one country, the coding process was used as a professional development opportunity for teachers at the Innovative School.

## Learning activities in Innovative Schools

The codes for learning activities and student work collected in 10 Innovative Schools were analyzed to provide a portrait of teaching and learning in the Innovative Schools during the first year of the program and to explore factors that influence the extent to which teachers give their students opportunities to acquire 21st-century skills.

Learning activities in the Innovative Schools showed some of the dimensions of innovative teaching and learning. Figure 4-6 shows the overall results for all 131 coded learning activities. This display contains the mean rating for each of the five dimensions. As the figure shows, the average code across all countries, both subject areas, and all ages was close to 2 for all five dimensions.

**Figure 4-6. Bar chart of average learning activity codes**




These scores show that in the first year of the Innovative Schools Program, learning activities typically had the following characteristics:

- Required some knowledge construction, but that was not the main focus; most of the activity or assignment could be completed through reproduction of information that students had read or heard.
- Allowed students to work in groups but did not require it; students produced individual products rather than products that are interdependent.
- Required problem solving but did not give students choices about how to address the activity or require them to implement their solution in the real world.
- Required only one aspect of global tools and perspectives (use of technology, multiple academic disciplines, or information or perspectives from multiple cultures or countries).
- Required only one aspect of self-regulation (extended duration with multiple parts, assessment criteria given to students in advance, or students received feedback in time to revise their work).

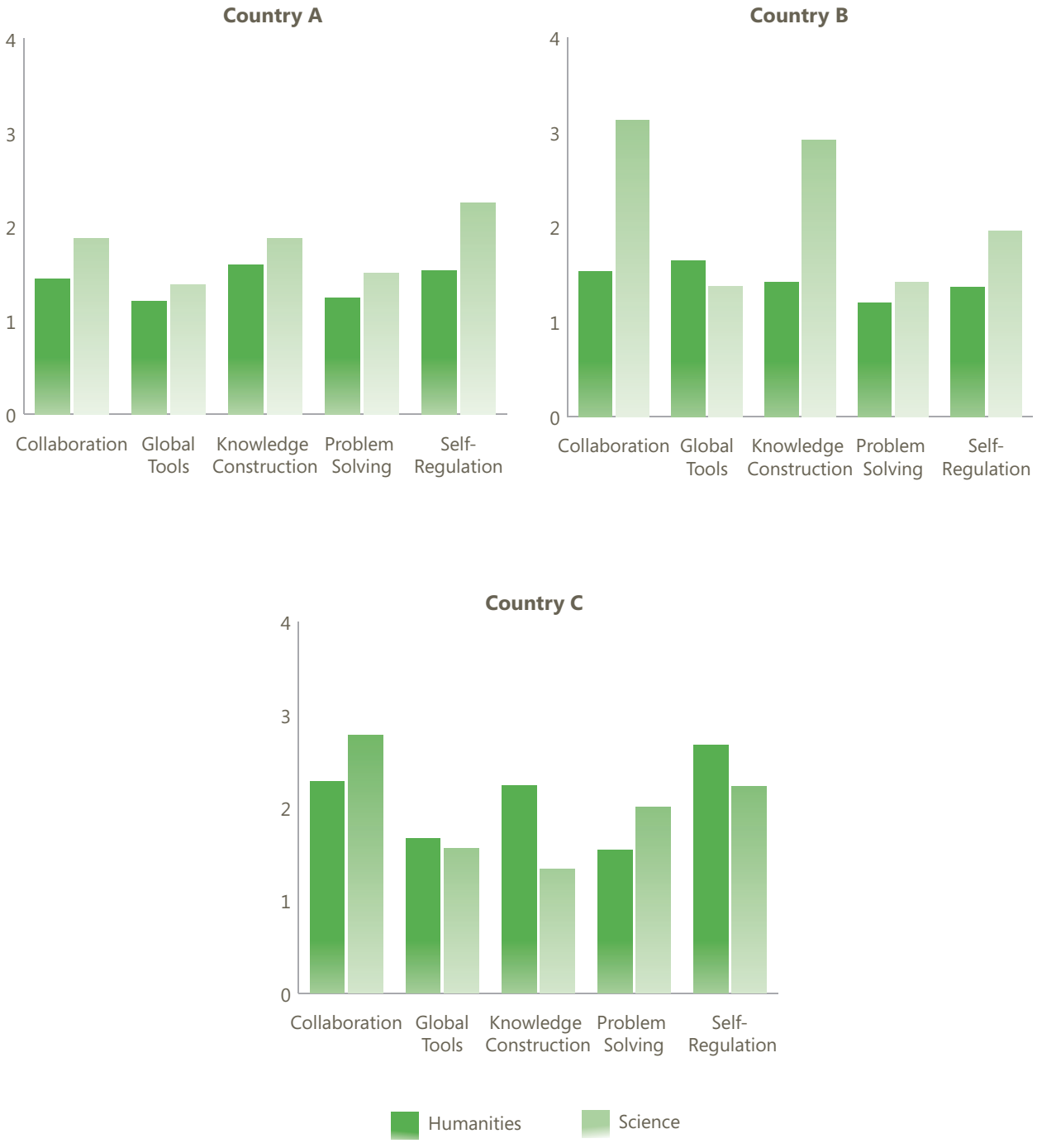
*Influence of subject matter*

Overall, the learning activity codes were similar for humanities and science assessments, as shown in Figure 4-7.

**Figure 4-7. Bar chart of average learning activity codes, by subject area**

Larger differences are seen between the learned activities collected in different individual countries. Figure 4-8 shows three countries' charts.

**Figure 4-8. Sample country-level learning activity codes, by subject**




Note: Letters are used in lieu of country names to respect teacher confidentiality.

*Differences between humanities and science activities were found for some countries but not others.*

*Humanities learning activities in primary classrooms provided more opportunities to acquire skills for innovative learning than did the activities in secondary humanities classrooms.*

In Figure 4-8, country A's chart shows that the learning activities had average codes below the Innovative Schools Program average of 2 for problem solving, use of global tools and perspectives, and, for the humanities, self-regulation. In country B, some average codes are below 2 and some are above. There is a large difference between the codes for humanities and science learning activities in country B; science activities are more innovative, especially in the areas of knowledge construction and collaboration. However, the subject area patterns are quite different in country C: there the humanities learning activities are stronger than the science learning activities in terms of knowledge construction and self regulation.

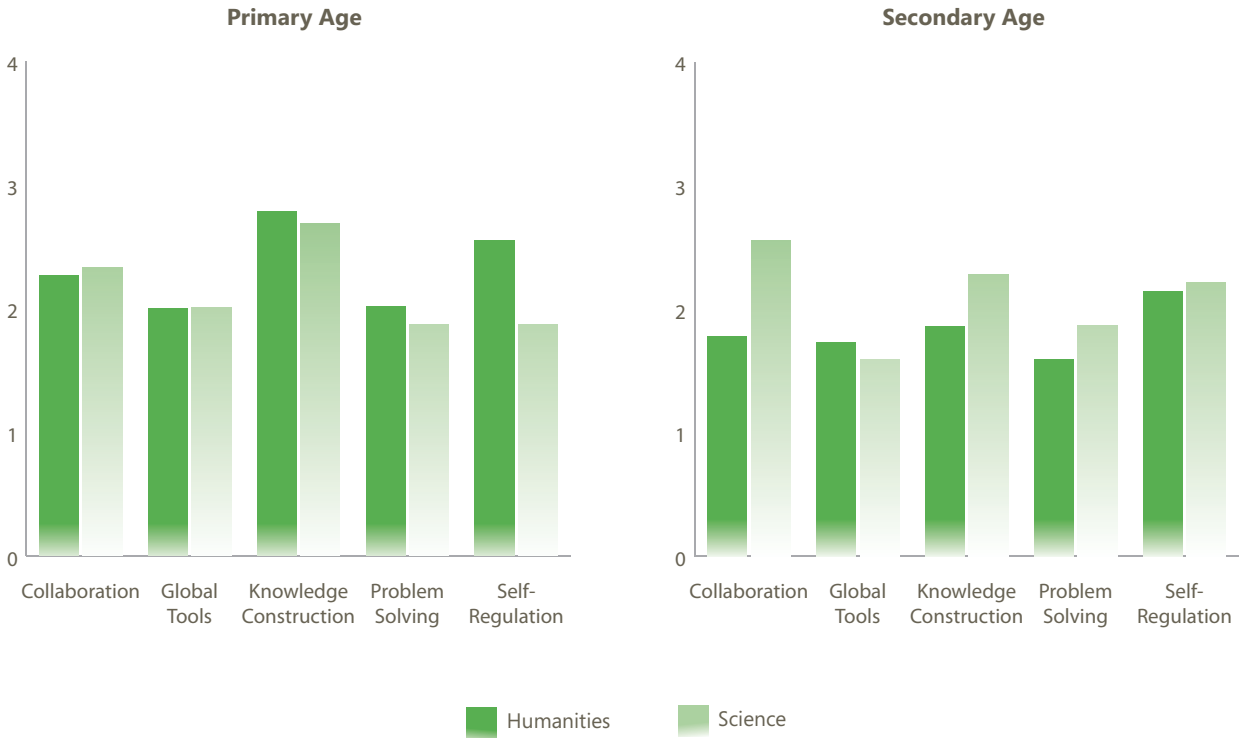
As the examples in Figure 4-8 illustrate, differences between average codes for humanities and science activities were found for some countries but not others. In four countries, the average codes for humanities and science learning activities were very similar. In three countries, there was more use of collaboration in science learning activities than in the humanities; in the other countries, learning activities in the two subjects involved roughly similar degrees of collaboration. Other differences between the two subject areas appeared to be country specific, suggesting that there is nothing about the two subject areas per se that produces higher codes for learning activities in one subject than for those in the other.

### *Differences by student age*

Another factor associated with differences in learning activity ratings was the age of the students to whom learning activities were assigned.[13] It appears that humanities learning activities in Innovative Schools classrooms serving primary students provided more opportunities to acquire skills for innovative learning than did the activities in humanities classrooms for secondary students, as shown in the left-hand portion of Figure 4-9. This finding matches the results from classroom observations (see Figure 4-4). For science learning activities, the pattern was somewhat more complex. Learning activities at the primary level show a greater emphasis on knowledge construction and global tools, but secondary-level learning activities require more self-regulation and slightly more collaboration.

13 The learning activity ratings were designed to apply across grade levels, but coders were instructed to consider their country's standards for students at the age level of the class in which they were used.

**Figure 4-9. Learning activity codes by student age level and subject area**



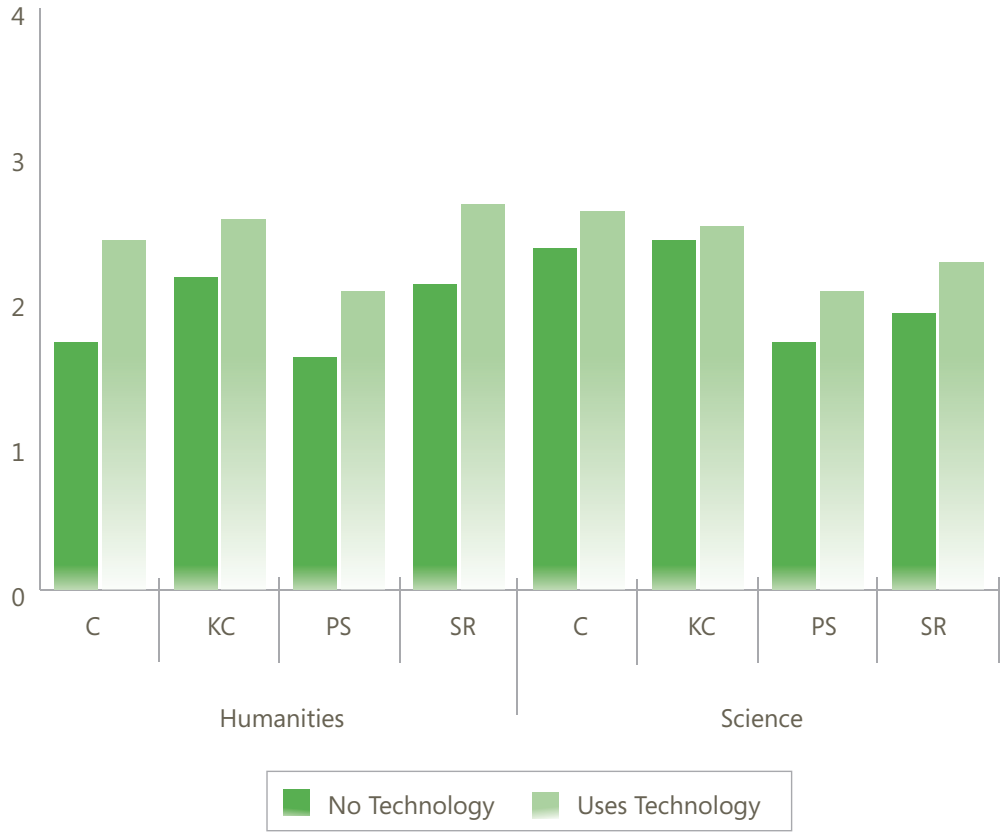

### *Influence of using technology*

*Learning activities incorporating technology offer more innovative learning opportunities than those without technology.*

One of the premises of the Innovative Schools Program is that use of technology in teaching and learning will support innovative learning. To test this hypothesis, analysts identified those learning activities involving student use of technology and those in which students did not use technology at all. Learning activity codes for knowledge construction, collaboration, self-regulation, and problem solving were then compared for these two sets of learning activities.[14] Figure 4-10 shows the findings for learning activities with and without technology.

14 We did not compare these two sets of activities in terms of Global Tools and Perspectives codes because use of technology was one of the criteria for this dimension.

**Figure 4-10. Innovative learning opportunities in activities with and without technology**




Note: C = Collaboration, KC = Knowledge Construction, PS = Problem Solving and Innovation, SR = Self-Regulation.

This analysis of learning activities in Innovative Schools matches the findings from classroom observations: learning activities incorporating technology have higher ratings than those without technology. Statistical analyses found the difference to be significant for the dimensions of collaboration and self-regulation.

Analysts also examined the difference between learning activities with and without technology in individual countries.[15] In four countries, there was a large positive difference favoring learning activities incorporating technology. In two countries, there was little difference. The distinction between basic and higher-level uses of technology discussed above as part of the presentation of classroom observation findings helps us understand this difference. In the two countries where the use of technology was not associated with greater innovative learning opportunities as measured by coded activities, most or all of the uses of technology observed in classrooms were basic uses (such as drill and practice software or simply looking up factual information) rather than higher-level uses (such as organizing and analyzing data). In the four countries where there was a large difference in

*In general, higher-level uses of technology are associated with other innovative forms of instruction, while basic uses of technology are not.*

15 In nine of the ten countries, there is only one Innovative School. Thus, the data generally represent one school within a country and cannot be considered representative of the country as a whole.

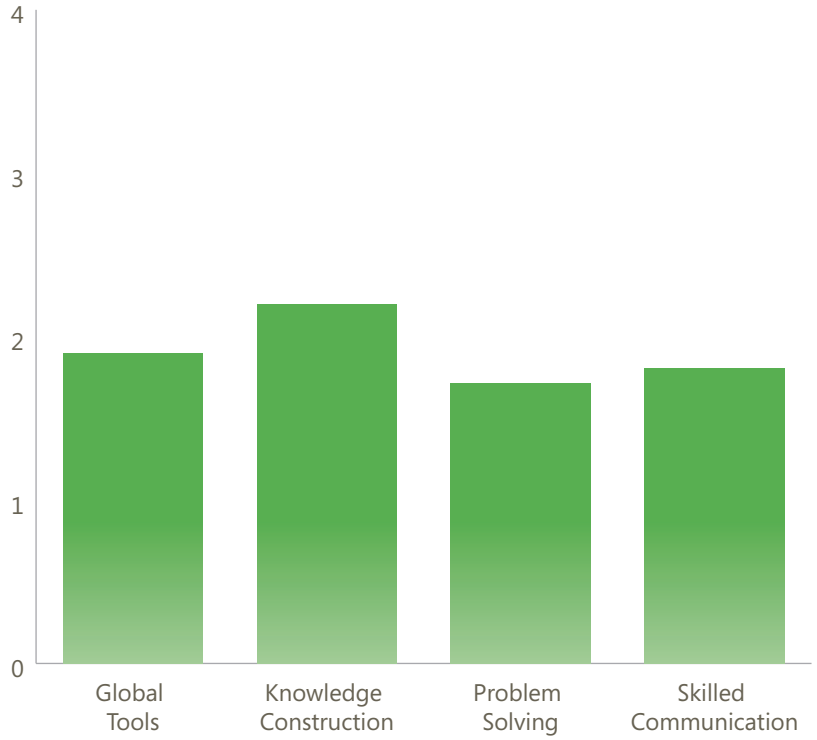
innovative learning opportunities (as measured by the coded activities) associated with technology use, all or most of the uses of technology observed in classrooms were of the higher-level type. Thus, the two different methods for characterizing innovative learning opportunities (classroom observations and analysis of selected learning activities) when applied to two different samples of classroom teaching and learning produced strikingly consistent results at the school level: in general, higher-level uses of technology are associated with other innovative forms of instruction, while basic uses of technology are not.

## Students' work in Innovative Schools

The ultimate goal of the Innovative Schools Program is to enhance students' skills as innovative, 21st-century learners. Prior research on education reform efforts cautions against expecting major results in terms of student learning outcomes in the first year or even the first three years of an initiative (Borman, 2005; Shear et al., 2008). Also, the Innovative Schools were starting at very different places in their reform efforts. A few had a long history of reform-oriented teaching and learning, while others were working in very traditional, top-down education systems within which they were just beginning to find opportunities for innovation (see Chapter 2). Thus, we would not expect to see highly innovative student work at most of the schools at this stage in the process.

To characterize the performance of Innovative Schools' students in terms of their application of innovative learning skills in humanities and sciences, SRI analyzed the codes given by each country's raters to their samples of student work. Figure 4-11 shows a bar chart of the average ratings for the four dimensions of student work.

**Figure 4-11. Average student work codes**



*Student work samples showed some evidence of the dimensions of innovative learning skills.*

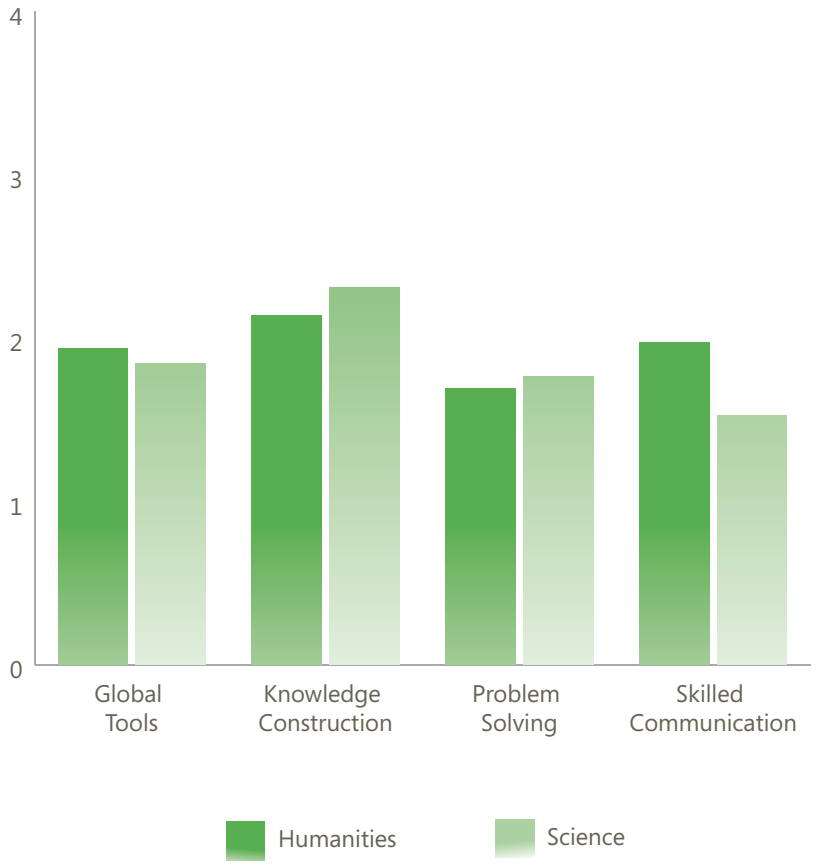
Student work samples showed some evidence of the dimensions of innovative learning skills. Overall, the sample of 962 pieces of student work received an average rating of 2 in terms of evidence that the student had engaged in knowledge construction, just below 2 in terms of skilled communication and the use of global tools and perspectives, and midway between 1 and 2 in terms of problem solving. This means, that on average, the students' work had the following characteristics:

- Demonstrated some knowledge construction, but most of it appeared to have been created by reproducing something students had read or heard.
- Usually included extended writing (at least a full paragraph), but the writing lacked a central theme or focus.
- Included an element of problem solving some of the time, but the problem solving was usually neither creative nor something implemented in the real world.
- Included just one of the three elements of global tools and perspectives (use of technology, multiple disciplines, or perspectives from multiple cultures or countries).

### *Influence of subject matter*

There was a significant difference between student work codes for skilled communication for humanities versus science samples. As seen in Figure 4-12, the average skilled communication code in the humanities was 2, while that for the sciences was midway between 1 and 2. This suggests that in much of their science work, students are answering questions with a number, word, phrase, or single sentence rather than writing full paragraphs. For the other dimensions of student work, differences between humanities and science were not statistically significant.

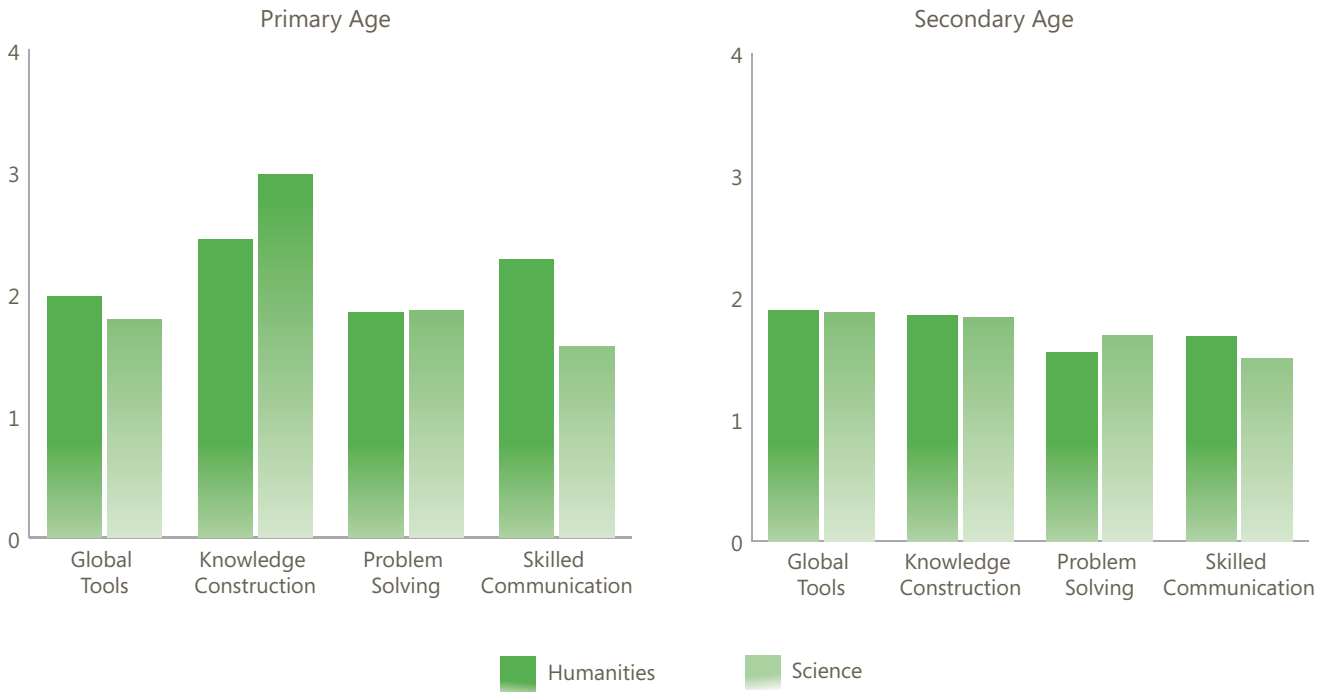
**Figure 4-12. Average student work codes by subject area**




## *Differences by student age*

The student work sample was divided into work produced by primary- and secondary-age students. As shown in Figure 4-13, there was a difference between primary and secondary students in knowledge construction, with the work produced by primary students more likely to show evidence of knowledge construction, for both humanities and science. This pattern parallels the higher requirement for knowledge construction in primary school teachers' learning activities shown earlier (Figure 4-9). A second difference in the student work for the two age groups was the higher average code for primary students' humanities work in terms of skilled communication. Primary students' work had an average skilled communication code of better than 2 while that for secondary students was between 1 and 2. In part, this difference may be accounted for by the fact that coders were instructed to consider a primary student's writing well organized if it had a clear topic, while secondary students' writing had to be organized around a clear theme (a premise or an assertion) to be considered well organized. But the fact that the average code for secondary students' humanities work was well under 2 suggests that much of their work in humanities classes does not involve extended writing of any kind.

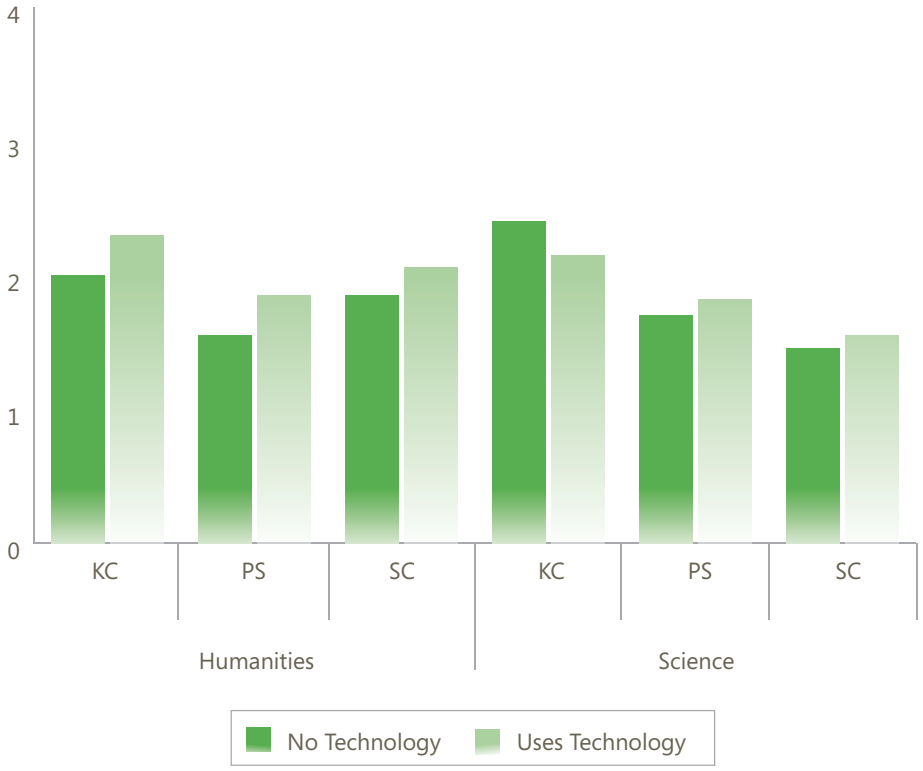
**Figure 4-13. Average student work codes by subject and age level**




## *Influence of using technology*

Analysts compared the ratings for knowledge construction, problem solving, and skilled communication for pieces of student work that showed evidence of the use of technology and those that did not. The results are shown in Figure 4-14. For the sample overall and especially in science, there appears to be a less consistent influence of technology use on the rated quality of the students' work than there was on the rated quality of learning activities.

**Figure 4-14. Average student work codes by subject area and technology use**




Note: KC = Knowledge Construction, PS = Problem Solving and Innovation, SC = Skilled Communication.

## Relating the nature of learning activities to the quality of student work

The ratings for learning activities presented earlier measure the extent to which teachers provide students with opportunities to develop the skills they need to become innovative learners. We would expect that when students are given greater opportunity to acquire and practice these skills, their work will reflect higher skill levels. In other words, we should be able to predict the quality of students' work based on the quality of the learning activities.

Table 4-3 shows the correlations between the codes for learning activities and student work on knowledge construction, global tools and perspectives, and problem solving and innovation (the three dimensions that were used to code both learning activities and student work). As the table indicates, there is a positive correlation for each of these dimensions, that is, when the learning activity asks students to do more in one of these areas, students' work is more likely to demonstrate the corresponding quality. By social science standards, the correlation between learning activity and student work quality for knowledge construction is moderate in size; the correlations for global tools and problem solving are large.

**Table 4-3. Correlation between learning activity and student work codes**

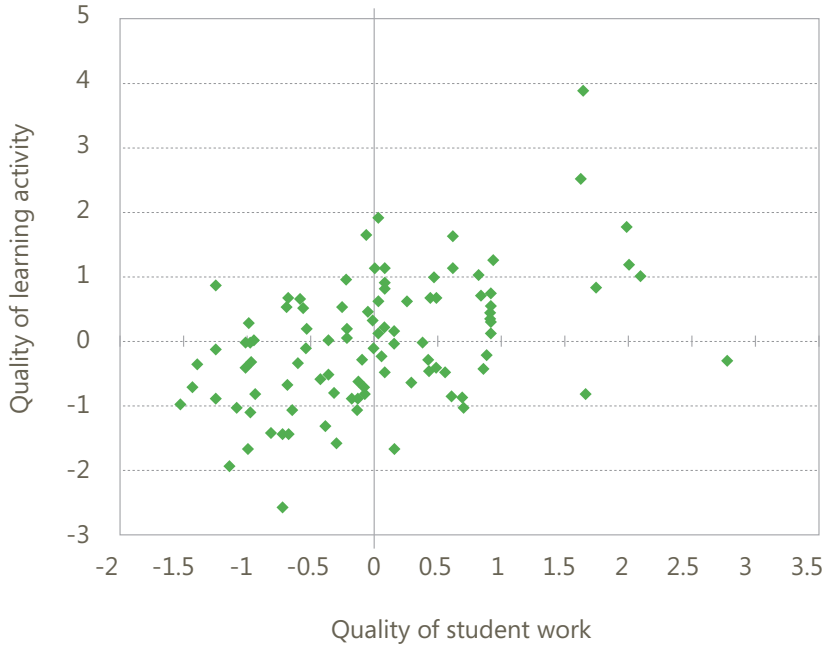
| Student Work | Learning Activity | | |
|---|---|---|---|
| | Knowledge Construction | Global Tools | Problem Solving |
| Knowledge Construction | 0.33 | n/s | 0.20 |
| Global Tools | n/s | 0.55 | n/s |
| Problem Solving | 0.21 | 0.29 | 0.48 |

Note: n/s = Not significant.

To get a sense of the relationship between the quality of the learning activity and that of the corresponding student work, a composite "quality score" was developed for learning activities and for student work. In both cases, this score was created by combining the codes for each of the various dimensions.[16] The relationship is displayed in the scatterplot in Figure 4-15. Each dot in the scatterplot represents a learning activity and the student work associated with it. A dot's distance from the *y* axis represents the quality of the learning activity, and its distance from the *x* axis represents the quality of the work that students did as part of this learning activity.

16 First, the codes for each dimension of learning activities and student work were rescaled within each country to have a mean of 0 and a standard deviation of 1. These were then averaged to obtain an overall score for activities and work. Finally, the scores for student work associated with each learning activity were averaged to obtain an overall student work score for each activity.

**Figure 4-15. Relationship between learning activity and mean student work quality**




*Students display more 21st-century skills in their work when their teachers implement more innovative learning activities.*

As expected, the overall quality of the learning activity in terms of promoting innovative learning is associated with the innovative learning skills evident in students' work. The correlation between the two measures is 0.41. This degree of association is moderately strong. One way to think about the relationship is that for every unit (standard deviation) of increase in learning activity quality there is a 0.41-unit (standard deviation) improvement in the average quality of students' work. Thus, this analysis of learning activities and student work in the Innovative Schools suggests that students display more 21st-century skills in their work when their teachers implement more innovative learning activities.

## *Conclusion*

This chapter documents the extent to which pilot schools provided innovative teaching and learning opportunities during the first year of the Innovative Schools Program, based on analyses of observation data, learning activities, and corresponding student work from 10 countries. The results indicate that many teachers were experimenting with some aspects of innovative practice but that for most teachers, there is room for improving the extent to which their practice is student-centered and supported by technology. Continued progress in this direction can be nurtured through ongoing teacher collaboration and informal teacher learning opportunities to help teachers translate their new understandings and intentions into actions (Kennedy, 1999).

Both the observation data and analyses of learning activities showed that innovative teaching practices were more evident in primary schools than in secondary schools. Although this difference could be simply a reflection of the particular samples of teachers in the two sets of schools, interviews with teachers suggest that the difference is at least in part attributable to the fact that in many countries primary school teachers have more flexibility to experiment with new practices and are less affected by standardized testing and other requirements.

The observation data and analysis of learning activities also show that when students used technology in support of higher-order tasks (for example, analyzing data, creating multimedia presentations), aspects of 21st-century teaching and learning such as collaboration, multipart complex tasks, student choice in their learning, real-world connections, and opportunities for feedback and revision were more likely to be present as well. This finding confirms one of the main premises of the Innovative Schools Program—technology supports 21st-century teaching and learning.

Finally, our analysis of the relationship between the quality of classroom activities and that of corresponding student work revealed that students demonstrate more 21st-century skills in their work when teachers assign more innovative learning activities. Although perhaps intuitively obvious, this finding points to the important role played by teachers in engaging students in 21st-century learning.

# Chapter 5: Summary and Implications for the Innovative Schools Program

The data presented in this report were collected during the first year of the pilot schools' involvement with the Innovative Schools Program. Microsoft chose to work with schools that they judged to have a serious commitment to providing their students with more innovative learning experiences but that represented a broad spectrum of sizes, structures, and prior school reform histories. At the end of their first year of involvement with the program, the Innovative Schools were in different places with respect to innovative teaching and learning, but all showed some progress relative to their starting points.

## *Areas of Early Progress*

Studies of educators in schools undergoing significant change suggest that it is a multiyear, multistage process (Hall & Hord, 1987; Loucks-Horsley, 1996). Starting with an orientation toward learning more about an innovation, adopters go through a process of planning how they might apply it and then work on the changes that are necessary if the innovation is to be put into practice in their context. These stages apply at both the school level and the classroom level, and researchers report that management concerns (that is, how the change can be accommodated within the existing system) typically take up to at least a year before the desired changes become a regular part of practice.

While a few of the Innovative Schools (notably those in the UK and Brazil) had been engaged in innovative teaching and learning for years, most began the program with only a few pockets of innovation, and some were very traditional. For the majority of the pilot schools, their first year of the Innovative Schools Program was devoted to information seeking, introspection, and planning. As one would expect, teaching and learning had yet to be dramatically changed at the end of the program's first year. What was evident, however, was improvement to the technology infrastructure for many of the school communities and experimentation by some teachers with more student-centered instruction. Teachers reported new experimentation with project-based learning, group work, and technology use in nearly all of the schools. These early attempts to change their teaching practice made the schools' teachers better aware of the benefits of project-based learning and technology-supported instruction, but at the same time made them aware of new challenges, such as the implications of unreliable Internet connections for teaching and learning, the difficulty of fairly assessing students working in groups, and the need to make sure that student projects focus on intellectually valuable activities.

## *Areas for Focus in the Second Year*

The second year of the Innovative Schools Program is expected to bring a broadening and deepening of the schools' cultures for innovation, bringing more teachers into conversations about the schools' changes, instituting more organizational changes to support innovative teaching and learning, and having a greater impact at the classroom level.

Reports from teachers reflecting on their first year with the program suggest that they feel a need for more resources and professional development, focusing in particular on the following:

- Assessment practices that support learning, and especially ways to assess students as they work in groups
- Ways to design and implement activities that call on students to use technology to support higher-order skills such as analysis, conceptual understanding, and skilled communication.

At the same time, schools need to continue to deepen their focus on creating a culture of collaboration among school staff, with teachers encouraging and supporting one another as they try new teaching approaches and seek better learning outcomes for their students.

Research suggests that these needs can be addressed together (Penuel & Riel, 2008; Rogan & Grayson, 2003). Rather than waiting until the school staff have achieved the desired level of collegiality to begin promoting changes in teaching practice, schools can plan routines for collaboration that support better instruction and the building of trust (Bryk & Schneider, 2002; Marx et al., 2004). To the extent that the teachers' shared planning time is focused on improving their instruction, the two efforts will proceed hand-in-hand. Improvement requires finding ways to break through the culture of teacher privacy, giving teachers windows into one anothers' practice and developing norms around self-assessment and positive coaching. Routines for collaboration around the improvement of instruction can support schools' advancement with respect to innovation. Teachers trying out new practices can collect evidence of the learning outcomes and make their practices available to others. School staff who accept joint responsibility for improving teaching and learning can focus on how new practices can be improved and tried in additional classrooms, in repeated cycles of planning, implementation, reflection, and practice refinement. While most of the pilot schools took important steps toward these cultural norms and practices in their first year, schoolwide cultures require time and focused effort to take root.

## *Indicators of School Readiness*

The second phase of the Innovative Schools Program will build on the experiences of the pilot schools and extend the opportunity for program participation to a much larger number of schools. As schools consider whether they are ready for program participation, they may want to think about some of the markers associated with greater progress in school improvement:

- *Existing capacity developed through prior efforts with similar goals*. Schools that have participated in prior efforts to organize themselves around students' needs and to provide student-centered, technology-supported instruction are likely to have developed an experience base and a set of committed staff who will accelerate their implementation of innovations inspired by the Innovative Schools Program.
- *Shared sense of need*. Organizations are much more likely to change if there is a shared sense of a need to do something different. For many of the pilot schools, the sense that their students will need a set of skills for the 21st century that their traditional mode of schooling does not foster has been the impetus for joining the Innovative Schools Program. This sense of need relates to Michael Fullan's concept of a "moral purpose" for school reform. To the extent that not only school staff but also the local and national education authority and the parent and broader local communities share the perspective that change is needed, the school will find it easier to innovate.
- *Strong leadership*. Studies of school reform point to the importance of a strong school leader, and the Innovative Schools Program is no exception. Typically, but not always, it is the head of school who provides the leadership that galvanizes the school staff. Leaders have key roles in relating to the Innovative Schools Program community, interpreting and communicating Innovative Schools Program ideas for their staff and community, making available time for teachers to work together on redesigning their school and improving their instruction, and empowering a broader set of leaders within the school.
- *Interest in and ability to make time for a teacher learning community*. We have suggested that the establishment of a culture of learning and innovation within the school is critical for improving the quality of teaching and learning. Establishing such a culture requires having opportunities for teachers to work together and to jointly reflect upon their practice. This evaluation has confirmed that finding such time can be difficult in many contexts. In some education systems there is little or no provision of time for teachers to come together for purposes of planning or professional development. In some places, it is not customary for teachers to engage in professional activities outside the boundary of their paid work day. When both of these conditions apply, it is difficult for a school to develop a teacher learning community. Potential applicants to the Innovative Schools Program may want to negotiate with their local education authority around this issue.

- *Sense of empowerment among school staff*. Studies of school improvement point to teachers' belief that they can make a difference in their students' learning outcomes as an important prerequisite for the adoption of innovations. Staff in the pilot schools varied in the degree to which they believed that change was possible within their local context. Teachers who believe that change is not possible do not try new approaches until enough successful change is demonstrated for them to begin to change those beliefs.
- *Commitment to self-evaluation and continuous improvement*. In addition to an interest in change and the belief that change is possible, school staff need to be willing to look critically at what they are doing and to consider ways to make it better. School improvement and innovation occur not through a dramatic one-time change but rather through iterative cycles of trying things out, looking honestly at the results, and then refining the practice and reassessing.

Some of the pilot schools demonstrated many of the above characteristics when they joined the program. For many others, an important focus of effort in their first year was on building these and other dimensions of readiness for change. With these foundations, the Year 2 Evaluation Report will describe the pilot schools' continued progress in instituting cultures of innovation and offering students new learning opportunities that will better prepare them for success in the 21st century.

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