ITL Research Design

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ITL research
Innovative Teaching and Learning
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1. Introduction and Research Questions

This paper describes the design of Innovative Teaching and Learning (ITL) Research, a new multiyear global research program sponsored by Microsoft's Partners in Learning. ITL Research will investigate the factors that promote the transformation of teaching practices and the impact those changes have on students' learning outcomes across a broad range of country contexts.

Education and political leaders in countries around the world have recognized the imperative for preparing their youth for the 21st century,[1] a goal that many believe requires fundamental transformation of educational opportunities and the integration of technology into teaching and learning. But educational change is complex and takes place within an ecosystem of influences that range from national policies, programs, and supports to local community contexts and school-specific professional cultures. Rather than researching each component individually, ITL Research takes a broad look at school ecosystems, seeking to contribute to the current understanding of how effective transformation of teaching and learning supported by technology is taking place. This multiyear research program will make use of parallel case studies for deep investigation of the national and school-level factors that shape teaching practices within particular country contexts and will look across the cases to provide global stakeholders with information and informed recommendations on the future of teaching and learning.

The primary focus of this research is on innovative teaching practices that provide students with learning experiences that promote 21st-century skills. "Innovative teaching practices," in the ITL model, are characterized by student-centered pedagogy, learning opportunities that transcend the school walls, and the integration of ICT into teaching and learning. One of ITL's unique contributions will be a set of methods that can support the measurement of those teaching practices across highly divergent schooling contexts, from emerging markets to advanced industrialized countries. A second important contribution is the study of the connection between teaching practices and the resulting achievement of students' 21st-century skills (Pedró, 2009).

Global research questions are as follows:

1. To what extent do innovative teaching practices contribute to 21st-century learning outcomes? [2]
2. What school-level conditions contribute to innovative teaching practices?
3. How are national or regional program supports associated with increases in innovative teaching practices?[3]

[1] For example, see http://en.g8russia.ru/docs/12.html

[2] For purposes of this study, "21st-century learning outcomes" are defined as the following set of skills: knowledge building, problem-solving and innovation, skilled communication, collaboration, self-regulation, and use of technology for learning.

In 2009-10, the pilot year of this study, research will be carried out in four participating countries (Finland, Indonesia, Russia, and Senegal) that were selected in part to reflect the range of economic, cultural, and educational conditions around the world. In later years of the study, additional countries are expected to join the study. Over time, the intention is for ITL Research to become a research platform that many school systems and countries can use to monitor changes in teaching practices and outcomes.

The remainder of this document describes the following elements of the ITL Research design:

- *Theoretical Framework.* This section describes the logic model on which the design is based and the key constructs that will be investigated in this research.
- *International Study Design.* This section describes the balance of global and country-level activities in this multi-national study, and the organization and management of the global team of research partners.
- *Methods and Instrument Design.* This section presents the multiple methods that are part of ITL Research, and the process of development, testing, and administration for each type of instrument.
- *Sampling*. This section lays out the global sampling guidelines that researchers in each country are asked to enact for their local samples.
- *Sample Report Outline.* This outline describes the types of content that might be selected for inclusion in a report from the pilot year.
- *Pilot Analysis.* For more technical readers, this section provides details of the analytical methods that will be used to assess the technical quality of pilot instruments and explore data from the pilot year.

More information about study design as it evolves will be posted online at http://www.itlresearch.wikispaces.net/.

[3] In the pilot year, this research question will be considered at a high level, and pilot data collected will be used to determine how much depth is appropriate for research on this question in subsequent years.

2. Theoretical Framework

An assumption in the ITL research design was that an international perspective, rather than a particularly U.S. or North American one, needed to inform the research questions and instruments. The literature that contributed to the design and instruments for this study includes leading multinational studies such as the Second Information Technology in Education Study (SITES; Law, Pelgrum, & Plomp, 2006) and the Programme for International Student Assessment (PISA; OECD, 2006); frameworks for 21st-century learning (e.g., UNESCO, 2008; Partnership for 21st Century Skills, 2004; Government of South Australia, 2008; ISTE, 2007, 2008); and research on specific constructs related to teaching practices that are associated with positive student outcomes (e.g., Bryk, Camburn, & Louis, 1999; Groff & Mouza, 2008).

These inputs contributed to the logic model shown in Figure 1. While this framework does not claim to be a comprehensive picture of all of the influences that support or shape changes to classroom practice, it does include a range of key constructs that research has shown to play particularly important roles.

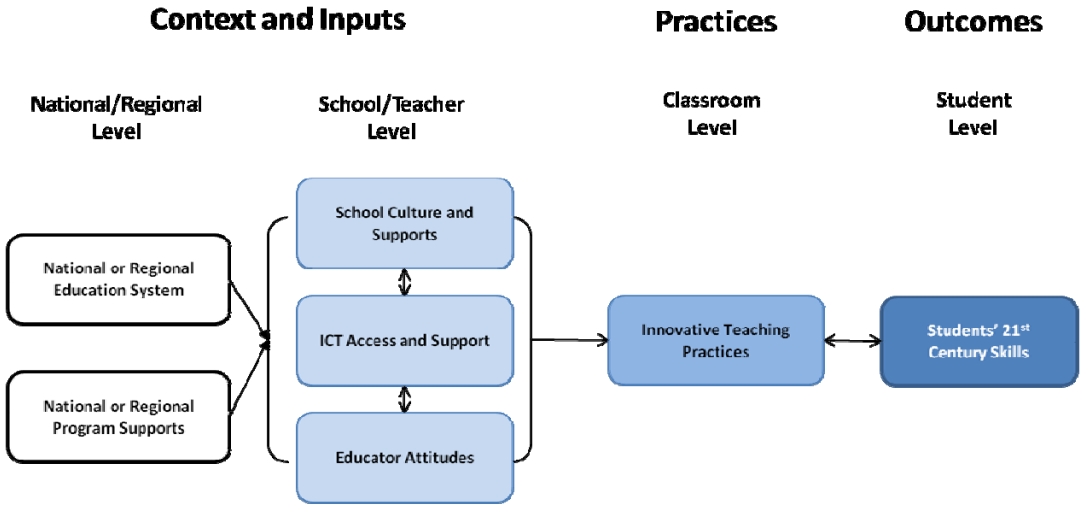

Figure 1. ITL Research Logic Model

The model is described as follows:

- *Innovative teaching practices* are the main focus of investigation. As noted above, innovative teaching practices are defined for the purposes of this study as including the following three primary constructs:

  Student-centered pedagogies. In this research, student-centered pedagogies include models of teaching and learning that are project-based, collaborative, foster knowledge building, require self regulation and assessment, and are both personalized (allowing for student choice and relevance to the individual student) and individualized (allowing students to work at their own pace and according to their particular learning needs). Each of these elements has a strong base of prior research linking it to positive outcomes for students in terms of development of 21st-century skills; see, for example, Bransford, Brown, & Cocking, 1999; Darling-Hammond et al., 2008.

Extension of learning outside the classroom. This construct refers to academic activities that reflect the nature of high-performing work groups in the 21st century. Learning activities extend beyond the traditional boundaries of the classroom, include individuals beyond the classroom community, provide opportunities for 24/7 learning, foster cross-disciplinary connections, and promote global awareness and cultural understanding.

ICT integration in teaching and learning. This construct relates to uses of technology by teachers and by students. Because the impact of information and communication technologies (ICT) can vary widely depending on its pedagogical application (Myndigheten For Skölutveckling, 2008), this construct includes a focus on *how* ICT is used and not simply *whether* it is used.

- Innovative teaching practices are shaped by a host of *school- and educator-level factors*. The model focuses on three overarching constructs:

  School culture and supports that shape teaching practice. For example, research has shown that teacher *communities of practice* can provide a powerful force for change (Little, 2006) and that *trust among teachers* is a critical enabler of the types of interactions that are essential for positive change to take root (Bryk & Schneider, 2002; Shear et al., 2009).

  ICT access and support, including such factors as location, availability, and functionality of ICT tools. Research has shown, for example, that while access is an essential condition for ICT integration in the classroom, educators cite lack of support as a primary challenge (Law, Pelgrum, & Plomp, 2006).

  Educator attitudes shape educational reform in powerful ways. In ITL Research, this construct includes teacher beliefs about teaching and learning (for example, their beliefs about new vs. traditional pedagogies; Becker & Reil, 2000), teacher motivation and self-efficacy (Gibson & Dembo,1984), and teacher attitudes toward and comfort with ICT.

- School and classroom factors operate in the context of *national and regional education systems* (including structure, policy, vision, and capacity) and *program supports* (which may be available through programs sponsored by government, NGOs, or the private sector).

Students' 21st Century Skills

Knowledge Building. Students move beyond the reproduction of information to construct knowledge that is new to them.

Problem-Solving and Innovation. Students solve problems for which there is no previously learned solution, make choices in their approach, and implement their solutions in the real world.

Skilled Communication. Students present their ideas in ways that are clear and compelling, and present sufficient relevant evidence on a topic or theme.

Collaboration. Students work together in groups, take on roles, and produce a joint work product.

Self-Regulation. Students plan and monitor their work, and make revisions based on feedback or self-assessment.

Use of ICT for Learning. Students use ICT to construct knowledge; choose when, where, and how to use it; and evaluate the credibility and relevance of online resources.

- Finally, *students' 21st-century skills* include broad skills that are seen as important goals of innovative teaching practices. The ITL Research model characterizes these skills as knowledge building, problem-solving and innovation, skilled communication, collaboration, self-regulation, and use of ICT for learning, as described in the box above.

These key constructs are described in more detail in Appendix A, which includes the specific definitions that operationalize each of the constructs for the purposes of ITL Research and the methods (described below in section 4) through which each of the constructs will be measured.

3. International Study Design

Following the model of other significant multinational research projects (e.g., Law, Pelgrum, & Plomp, 2006; Kozma, 2003; OECD, 2006), ITL Research uses a distributed design to carry out research that is at once global and local in scope. The project is sponsored by Microsoft's Partners in Learning, but it is managed independently by Langworthy Research, with the support of a team of international education experts and advisors.[4] A global research organization, SRI International, is responsible for research design, coordination, and results synthesis, ensuring that instruments and overall design parameters are developed centrally and implemented consistently across countries. At the same time, a national partner in each country is engaged to carry out the local research and participate in a global network. Research partners are selected through a competitive proposal process, and each represents a leading independent or university-based research organization in its country. The country partners create local design plans and adapt instruments as required to ensure that the research is appropriate to the country context and serves local as well as global needs.

This design enables a coherent global research program that includes country-level studies focusing on issues and programs that are important within each country. Key dimensions of variation will include:

- *Trajectories of innovation.* Across the four pilot countries (Finland, Indonesia, Russia, and Senegal), education systems and schools range from progressive to traditional, and from mature reform programs to early explorations into supports for new teaching practices. This research program's case study approach will enable both country-level and global researchers to study innovation in context. Many elements of change will be country and context specific; the study is also designed to look for global patterns or insights.
- *Focus programs.* ITL Research is, by design, broader than the study of a single program intervention. Within each country, however, sampling will include both participants and nonparticipants in up to three selected "focus programs," key regional or national programs designed to promote and support technology-enabled teaching and learning. Focus programs in each country are being selected with input from government education leaders to include widespread programs that are key to national reform plans. Across the pilot countries, selected focus programs include government-sponsored programs (for example, a program funding school-level innovation in Finland), programs funded by nongovernmental organizations (for example, World Links), and corporate initiatives (for example, Microsoft's Partners in Learning and the Intel Teach program).
- *Levels of schooling.* The target student age range for this research is 11 to 14, so the design in each country will involve the level of schooling that serves most students at these ages. In different countries, this is either upper elementary or lower secondary school.

These and other important country-specific design parameters will be described in the Country Research Plan that each country partner will develop before research begins. Plans will be reviewed by SRI, the global research organization, to ensure appropriate levels of consistency across countries.

[4] In 2009-10, project advisors include Francesc Pedro (OECD); Robert Kozma (Kozmalone Consulting); Tarek Shawki and Marta Encinas-Martin (UNESCO); Michael Trucano (WorldBank); Patricia Wastiau (European School Net); Lynn Nolan (ISTE); Hamish Coates and Geoff Scott (ACER); Paul West (Commonwealth of Learning); Deirdre Butler (St. Patrick's College, Dublin); Erik Yankah (Yankahlink Advisors); Bee Yann Lee (St. Andrew's Junior College, Singapore); Jenny Lewis (Australian Council for Educational Leaders); Leo Burd (MIT Media Lab); and Don Williams, Greg Butler, Kati Tuurala, and David Walddon (Microsoft).

Global and country-level participants in the pilot year of ITL Research are shown in Table 1. A more complete global organization chart is included in Appendix B.

Table 1. Global ITL Research Team

Country	Role	Organization
Global	Project sponsor	Microsoft Partners in Learning
USA	Project management and oversight Global research lead	Langworthy Research Center for Technology in Learning, SRI International
Finland	Country research partner Government partner	Agora Center & Finnish Institute for Educational Research, University of Jyväskylä National Board of Education
Indonesia	Country research partner Government partner	Centre for Strategic and International Studies Ministry of National Education (MONE)
Russia	Country research partner Government partner	Institute of New Technologies, Moscow The Academy for Teachers Training and Professional Retraining for Educators (APKiPPRO)
Senegal	Country research partner Government partner	Association of Teachers and Researchers of ICT in Education and Training National Ministry of Education

Two face-to-face workshops of the global pilot research team are planned during the pilot year in order to promote consistent use of methods across countries. A 2-day kickoff meeting will include training on each research instrument, along with specific instructions for localization, administration, and data reporting for each method as well as discussion of common research procedures. A separate 2-day workshop will be held to train research partners in the rubrics and procedures to be used for local coding of learning activities and student work. These meetings will be supplemented by regular telephone conferences and ongoing electronic communications between the global and country research partners in order to support and monitor ongoing consistency and research quality.

After the initial pilot study year, research partners will meet annually for a review and analysis workshop that may be open to third party researchers interested in ITL Research data as well.

4. Methods and Instrument Design

For a systemic understanding of educational reform, and following the logic model presented in Figure 1, it is necessary to collect data at multiple levels within the system, from the national or regional context to the school, educator, classroom, and student. As a result, this study employs mixed methods, with an integrated design that provides detailed definitions of essential constructs to ensure consistency across instruments. This multiyear study will collect data from each source annually to offer analysis of change over time. The study's methods are introduced in Table 2 below.

Table 2: ITL Research Methods Summary

Method	Purpose	Levels of System Addressed
Surveys of teachers and school leaders	Provides quantitative data from a large sample of respondents[5] to describe teacher and school leader experiences of national context and programs, school culture and supports, and self-reported beliefs and practices.	National/regional, school, educator, classroom
Interviews with school leaders and teachers	Provides richer and more contextualized data from a smaller sample of respondents on participants' experience of reform and the factors that shape it.	National/regional, school, educator, classroom
Analysis of Learning Activities and Student Work (LASW)	Uses artifacts of actual classroom practice to measure opportunities for 21st-century learning according to a set of dimensions that are defined consistently across countries and classrooms (See Appendix A).	Classroom, student
Classroom Observations	Allows researchers to observe and describe classroom environments and learning activities in common ways across country and school contexts.	Classroom
Student Focus Groups[6]	Elicits data on students' experience of teaching and learning from a small sample of students.	Classroom, student
Interviews with national/regional education leaders	Provides system-level data on education goals, national programs and strategies, and challenges within the country.	National/regional
Achievement Data	Where available, provides data on student academic achievement.	Student

ITL Research integrates these methods to provide data on the constructs in the study's conceptual framework (logic model, illustrated in Appendix A). Where possible, particular constructs are informed by multiple methods. For example, constructs related to innovative teaching practice—an important focus of this research—are investigated through teacher reports on surveys and interviews, observations of classrooms by trained researchers, and artifacts of classroom practice in the form of the

[5] As described in section 5. Sampling Plan the survey sample of teachers is not nationally representative, but is intended to provide some comparison between participants and nonparticipants in selected programs.

[6] Student focus groups will not be conducted in the pilot year, but are planned for future years.

learning activities that teachers ask students to carry out. In other cases, a construct is included in whichever form of data collection is likely to provide the best and most efficient source of the information. For example, technology that is available schoolwide is reported on the school leader survey, while the teacher survey asks teachers for their experience of technology availability and usage.

The sections below describe the design process for each type of instrument as well as piloting and other refinement processes, and overall guidelines for administration in each country.

4.1. Educator surveys

Wherever possible, SRI drew from prior research to inform both the content and structure of questions that measure particular constructs. For both the teacher and school leader surveys, the development process began with a search for existing instruments that could be a source of relevant scales[7] that had already been validated through prior research. Many of these scales had to be modified, however, to fit the focus of ITL research or the constraints of a multinational study. For example, questions that ask teachers to describe the frequency of particular classroom practices are often challenging to position appropriately in multi-national studies, because school schedules vary widely and therefore "twice per week" may have different meanings in different places. For ITL Research, we ask teachers to describe specific frequencies of practices, but we also ask how many times per week their class meets in order to inform the analysis of their responses. Most questions were customized to the needs of ITL Research; questions and scales that remain intact are attributed within the survey.

The content of the teacher and school leader surveys are different, to take advantage of the different perspectives and experiences of these two roles. The ITL Research teacher survey focuses on the teacher and on classroom practices, asking teachers to report their background experiences as teachers, their beliefs about pedagogy and about teaching with technology, the teaching and learning practices used in their classrooms, the access and use of technology in their school and classroom, the professional development in which they participate, and their experience of school leadership and professional culture.

The ITL Research school leader survey focuses on school-level issues, and asks school leaders to report background information regarding the number of students and type of school they lead, their perceptions of how their national and regional education systems support innovation, the school culture and supports provided to teachers, and the availability of technology to teachers and students at the school.

[7] Survey "scales" are sets of items that work together to evaluate a complex construct, as described in section 7. Pilot Analysis.

The teacher survey will be tested through the following steps:

- First, a think-aloud style focus group was conducted with five U.S. middle school humanities teachers, who took the survey and then met to discuss and provide feedback on each question. Based on input from this and other reviews, we modified the survey and created a pilot version.
- The survey will be piloted by approximately 200 teachers through an online teacher network in the United States. This pilot will be conducted online, so it will also serve to test the hosting and reporting capabilities of the vendor that will manage the online survey. The pilot will result in data that will test and improve the technical quality of the survey. See section 7. Pilot Analysis for more detailed technical descriptions of the piloting process.
- After changes from the pilot have been implemented, the survey will go to the four pilot countries for local testing. The global survey vendor will translate each survey, using a method of translation and back-translation to confirm the results, with additional review by the country research partner and other reviewers. The research partners will then conduct think-aloud pilots with five local teachers, using a common think-aloud protocol. In a think-aloud, subjects take the survey while verbalizing their thoughts aloud in response to researcher questioning, to make sure that survey takers are interpreting questions in the ways that survey developers intended. This activity will identify language and phrasing that need to be customized to make the questions and responses easily understood for teachers in each country.
- Based on think-aloud results, country research partners will modify language and examples as appropriate to their country. In addition, they will customize standard questions regarding involvement in and impact of the focus programs chosen for each country, so that questions are appropriate to each specific program. Other than these changes, survey questions will remain consistent across the four pilot countries to enable global analysis.

Following local translation, testing, and customization, the research partners will ready the surveys for administration. In most countries, the teacher survey will be available in both online and paper forms, depending upon which is most accessible for the educators in each region. Locally appropriate procedures for administration will be described and negotiated through country research plans, and common procedures will be the subject of group discussions during researcher training. For example, research partners will all work to obtain a response rate of 70 to 80% of teachers from each school in their sample in order to use the data in the larger study analysis, but they will provide teacher incentives for survey completion that are considered most appropriate locally.

4.2. School site visits

In the pilot year, research partners will conduct one brief (1- or 2-day) school site visit in each of six schools. School site visits will consist of one school leader interview, four teacher interviews, and one classroom observation of each teacher interviewed. Interviews will be conducted according to a structured protocol that guides the interview to cover themes related to the conceptual framework of the study. Because survey data will also be available from the same respondents, the interviews are used as an opportunity to obtain richer data on participants' goals and experiences. School leaders will be asked about the national and regional educational context, the school culture and supports provided to teachers, and the roles of innovation and technology in the school leader's goals for the school. Teachers will be asked to describe the teaching and learning practices used in their classrooms, the professional development activities in which they participate, and the roles of technology and innovation

in their teaching practice. Like the surveys described above, both of these interview protocols will be translated by the country research partners and customized to use language and phrasing most appropriate to the country. They will also be customized to inquire specifically about the particular educational initiatives and priorities that are active in each country, and to discuss teaching practices appropriate to the range of educational and technological innovation that is expected in the region.

The classroom observation instrument used in ITL Research builds on an existing observation instrument that was used in the global evaluation of Microsoft's Innovative Schools Program (Shear et al., 2009). The instrument was modified somewhat to fit the specific constructs and definitions of the ITL Research conceptual framework. To test the design of the modifications, the observation protocol was piloted in two U.S. classrooms with two observers, with changes made as needed to improve clarity and interrater agreement. The observation instrument will be the subject of explicit training in the researcher kickoff meeting, which will include practice using the observation form with video segments of a variety of classrooms, with discussion of areas of agreement and disagreement in order to build common interpretation and practice across countries. In addition, researchers in each country will conduct two of their four observations in each school jointly in order to confirm reliability and negotiate the application of constructs to local classrooms.

Research partners will synthesize the qualitative data gathered from interviews and observations in the form of a country-specific report that follows a common template. Classroom observation results will also be summarized in spreadsheet form for submission of discrete data for global analysis.

4.3. Learning activities and student work (LASW)

While most of the methods in this study will be familiar to readers, this section focuses on an innovative and less widely used component of the research: the analysis of samples of the learning activities or assignments (LA) that students are asked to do in classrooms, and the student work (SW) that they complete in response. The goal of this method is to allow for rigorous analysis of the actual activities of classroom practice in a way that is comparable across school and country contexts, without requiring either a disruption in normal classroom activities for research purposes or the ongoing physical presence of a researcher in the classroom. The rubrics that support LASW analysis also serve a valuable purpose in operationalizing the constructs used to describe innovative teaching practice: how exactly will we know knowledge building and collaboration, for example, when we see them in the classroom? The method engages teachers in the coding of classroom artifacts, providing a structured opportunity for them to examine practice that makes this method valuable for professional development as well as for research.[8]

In the pilot phase of ITL Research, this method of student work analysis serves as the primary method to measure student outcomes. In future years, partnerships with other research organizations are expected to expand the set of methods that ITL Research uses to measure student skill development.

The analysis of learning activities[9] and student work builds on a research tradition that began in studies of school reform in Chicago (Bryk, Nagaoka, & Newmann, 2000) and has since been applied in

[8] Rubrics from this project will be made publicly available for use either for professional development or by researchers.

[9] The prior work using this method used the term "teacher assignments" rather than "learning activities." We prefer the latter term because it suggests the possibility of more student-centered approaches to instruction, as opposed to "assignments" that might be assumed to be entirely teacher-directed.

research on both domestic (Matsumura & Pascal, 2003; Mitchell et al., 2005) and international (Shear et al., 2009) education reform programs. This method uses a set of clearly defined rubrics and definitions to score samples of learning activities and accompanying student work submitted by teachers across a defined sample of classrooms. Earlier work used the method to rate the authenticity and intellectual complexity of assigned work (Bryk, Nagaoka, & Newmann, 2000) or its rigor and relevance (Mitchell et al., 2005).

ITL Research is using rubrics that focus on the degree to which learning activities provide opportunities for students to develop 21st-century skills, defined in five dimensions (knowledge building, problem-solving and innovation, collaboration, self-regulation, and use of technology for learning), and the degree to which student work exhibits these skills. These rubrics build on those used in the evaluation of Microsoft's Innovative Schools Program (Shear et al., 2009), with modifications to map more closely to the constructs in the ITL Research logic model and to international frameworks (e.g., ISTE, 2007; ISTE, 2008; UNESCO, 2008). The adaptation process includes review of the changes with experienced LASW coding leaders and experienced teacher-coders, with refinements as appropriate to ensure clarity of key concepts.

In ITL Research, researchers in each country collect samples of learning activities and student work, and lead coding sessions in which a set of master teachers (not the teachers who provide the sample of learning activities) are trained to carry out the coding activity on the collected samples in the local language. While definitions are agreed upon internationally, assignments and work are analyzed locally, allowing for a deeply contextualized understanding of each artifact. The global research team then analyzes the resulting scores to examine the characteristics of classroom activity across schools and countries and over time. The design of this study also allows analysis of the relationship of LASW results to teacher self-reported practices and supports from the educator surveys of teachers in the LASW sample, as described in section 7. Pilot Analysis.

To promote consistency of the complex process of coding across countries, each step of the process is supported by detailed procedures, instructions, and templates. For example, the global research organization provides a set of detailed instructions for collecting samples of learning activities and student work, cover sheets to be completed by teachers, training materials for local teachers in the selection and submission of learning activities and student work samples, and procedures and templates for labeling. Similarly detailed procedures are provided for recruiting local teachers to work as coders and for the administration of the coding workshop. Rubrics and coding materials are distributed to country research partners at a common train-the-trainer workshop, which includes detailed training on the rubrics themselves, practice coding on sample classroom artifacts, and logistical supports for the in-country coding workshops.

4.4. Achievement data

To the extent possible, researchers in each country will collect student achievement data from national or regional standardized tests that represent important and age-appropriate measures locally. The goal of achievement data collection is to compare progress of schools within the sample to ensure that innovative practice does not have a detrimental effect on more traditional measures of student achievement. The specific tests chosen are expected to vary widely across countries and regions with respect to the academic standards upon which the assessments are based, the formats of available data, and the ages of students taking assessments. For this reason, achievement data will be used to inform local analysis within each country case study, but comparisons will not be made across countries. In future years, it may be possible to incorporate data from multinational assessments such as PISA into the study.

5. Sampling Plan

In the pilot year of ITL Research (2009-10), country research partners in each of the four pilot countries are asked to follow a set of sampling guidelines to design the specific sample for their country. These guidelines are summarized in Table 3 below, followed by more detailed sample descriptions.

Table 3. ITL Research Sampling Guidelines

Method	Country Sampling Guidelines	Estimated Four-Country Sample
Survey schools	20-50 schools per country (enough to yield 600 teachers as below), representing 4 selected geographical regions	80-200 schools
Teacher survey	All teachers in survey schools (n=600 total), including 150 teachers participating in each of 3 focus programs and 150 control teachers	2400 teacher surveys
School leader survey	1 school leader in each survey school (n=20 to 50)	80-200 school leader surveys
Site Visit/LASW schools	6 schools per country; a subset of the survey schools in 1-2 geographic regions, selected for innovative teaching practices	6 schools
Teacher interviews Teacher observations	4 teachers interviewed per site visit school (n=24); 1 classroom observation per teacher	96 teacher interviews 96 classroom observations
School leader interviews	1 school leader per site visit school (n=6)	24 school leader interviews
Learning activities	6 learning activities from each of 8 teachers per site visit school (n=288); teachers of humanities and sciences	1,152 learning activities
Student work	6 samples of student work for each of 4 learning activities collected per teacher (n=768)	3,072 samples of student work

5.1. Educator survey sample

Teacher surveys will be administered to all teachers in a sample of 20 to 50 schools in each country (a sufficient number of schools to provide at least 600 teachers with the distribution described below). Schools will all be at the same level of schooling in each country, the level that serves the most students between ages 11 to 14 (either upper elementary or lower secondary). Sampling will be driven by three selected national programs in each country that government education leaders consider to be among the most promising strategies to foster innovative teaching and learning supported by technology. The sample is not intended to be nationally representative; instead, the 600 teachers will be selected to facilitate comparison across program participants and nonparticipants. Country research partners are asked to structure a teacher sample in each country that includes the following:

- A total of at least 150 participating teachers who participated in *each* focus program (at least 450 teachers participating in focus programs in all)
- A total of at least 150 teachers who *did not* participate in *any* of the focus programs, from schools with similar characteristics[10] on average to the schools with participating teachers

Because teacher participation levels in these programs are expected to vary, the teacher survey includes questions about dosage (including both contact hours and timeframe of participation (Ingvarson, Meiers, & Beavis, 2005) to enable linking program participation to desired teacher practices, as described in Section 6 below. Country research partners are asked to devise their samples to include some teachers who are high implementers of each government-selected program (defined in a way that is appropriate to each program), and to include some schools that are recommended by program leaders as strong examples of instructional innovation and ICT integration relative to other schools in the country.

School leader surveys will be administered to one school leader in each school selected for the survey sample.

5.2. School site visit sample

In each country, six schools will be selected to participate in both case study site visits and the collection of learning activities and student work. Because the purpose of the site visits is to look at instructional innovation, country research partners are asked to select schools for site visits that are likely to be strong examples of instructional innovation and ICT integration relative to typical schools in the country. These schools will be a subset of the schools selected for the survey sample.

In the pilot year, research partners will conduct brief site visits (typically carried out in one day by two researchers) in each of the six schools between October and December 2009. At a minimum, in each school the researchers are asked to interview the school leader, interview four teachers, and conduct a structured observation of four classes (one class taught by each of the four interviewed teachers). The teachers selected will also be submitting samples of learning activities and student work. As a result, to the extent possible these will be teachers of humanities and science subjects, and teachers of students in the 11- to 14-year-old age range (the focus population of the LASW component of ITL research). The teacher sample should include some teachers who have participated in each of the focus programs for the country and teachers who are known to use technology in their teaching.

In later years of the program, site visits will be longer than a single day in order to collect a richer set of data, but they will take place in fewer schools. These site visits will also include student focus groups. If time allows in their pilot year data collection, country research partners may also choose to conduct one or more student focus groups, but this is not a requirement for this year of the research.

[10] Country research partners are asked to select locally appropriate characteristics to use in matching treatment and control schools. In some countries, for example, a measure of student socioeconomic level is reported for each school. In others, a school's public/private designation is the most appropriate indicator of the socioeconomic levels of students served.

5.3. Learning activities and student work (LASW) sample

Country research partners will collect samples of learning activities and student work from the same six schools in which they conduct pilot year site visits. Eight teachers in each school will be selected to submit LASW samples. To the extent permitted by the size of the schools, these will be teachers of humanities (for example, literature, history, or civics) and science subjects (for example, environmental science, biology, or chemistry), and teachers of grades that serve students between the ages of 11 and 14.

From the activities they conduct with their students between October and December of 2009, each teacher will be asked to select three learning activities for submission. Each teacher will be asked to select learning activities that, in their judgment, provide students with strong opportunities to learn 21st-century skills. They will be asked to submit three additional learning activities used during the January to May timeframe. Country research partners will visit the schools to train teachers in selecting learning activities and completing cover sheets, and will support these activities as needed.

For each of the three learning activities used between October and December and one of the learning activities used between January and May, teachers will also be asked to submit six samples of the work that students completed in response to the assignment. Researchers will draw a separate set of student names (with replacement and including alternates) for each learning activity from the class roster, to ensure a random assortment of student work, and request work for six of those students for each learning activity.

6. Sample Report Outline

This section describes a sample outline of a global synthesis report that countries will produce during the pilot year of ITL Research. The actual pilot report will include selected analyses in suggested topics, depending on the adequacy of pilot data collected. For example, the report will include data only from countries that meet a minimum threshold of data collection requirements within the required timeframe for reporting.

The report described below includes an overview of the study; an overview of the education systems in each of the pilot countries represented in the report; a description of research methods and pilot results related to instrument quality; pilot results related to teacher practices and student skills; and implications of pilot findings for systems, programs and practice and for the ongoing design of the study. Most of the reported results are driven by quantitative data, with qualitative data from site visits used mainly to illustrate the findings. More systematic qualitative analyses will be included in country-level reports in the pilot year and in global reports in subsequent years.

Innovative Teaching and Learning Research

Sample Pilot Report Table of Contents

4.4. Relationships among dimensions of innovative teaching *(for example, to what extent are teachers high on one dimension of innovative teaching, based on survey responses, also high on each of the others? What relation exists between the presence or absence of ICT integration and the other dimensions of innovative teaching practices?)*

4.5. School-level factors that support innovative teaching *(Addresses RQ#2: What school-level conditions contribute to innovative teaching practices?)*

4.5.1.School culture and supports *(Report of significant correlations between specific school culture/support measures and dimensions of innovative teaching, illustrated with examples from interviews)*

4.5.2. ICT access and supports *(Same approach as for school culture)*

4.5.3. Educator attitudes *(Same approach as for school culture)*

4.6. National and regional support programs and innovative teaching *(Addresses RQ#3: How are national or regional program supports associated with increases in innovative teaching practices?)*

4.6.1. Teaching practices of program participants and nonparticipants *(Report of significant correlations between level of program participation and teaching practices)*

4.6.2. School-level supports perceived by program participants and nonparticipants *(Report of significant correlations between level of program participation and school-level supports)*

V. Pilot Findings: Student Demonstration of 21st-Century Skills *(Addresses RQ#1: To what extent do innovative teaching practices contribute to 21st-century learning outcomes?)*

5.1. Student work ratings on four student work dimensions *(Description of student work dimensions and average scores per country, using pseudonyms)*

5.2. Opportunity to learn 21st-century skills on five learning activity dimensions *(Description of learning activity dimensions and average scores per country, using pseudonyms)*

5.3. Relationship between learning activity ratings and student skill demonstration *(Correlation between learning activity ratings and student work ratings on parallel dimensions and overall)*

5.4. Relationship between innovative teaching practices and student skill demonstration *(Correlation between innovative teaching indices from teacher survey and average student work rating for a teacher's students)*

VI. Implications for Practice

Implications highlight the value for students of innovative teaching practices and any suggestions from the pilot data on strategies for removing barriers to the adoption of innovative practices

6.1. Relationship between innovative teaching practices and students' 21st-century skills

6.2. Nature of programs associated with innovative teaching

6.3. School-level factors associated with innovative teaching

6.4. Teacher capacities associated with innovative teaching

VII. Implications for ITL Research

7.1. Changes to the research logic model

7.2. Changes to design

7.3. Changes to instruments

7.4. Next steps for ITL research

7. Pilot Analysis

The preceding sections have summarized the activities of pilot testing and data collection in the pilot year of ITL Research, and the types of analysis results that could be included in a global report. This section provides more detailed plans for both the validation of measures and the analysis of research findings from pilot year data, for readers who wish to have a deeper understanding of the technical design for ITL Research pilot analysis.

7.1. Instrument analysis

One important function of the Year One pilot is to assess the quality of the instrumentation. In general, SRI analysts will be looking for evidence that the instruments capture a range of self-reported and observed behaviors, and that the scores derived from these instruments are reliable.

Surveys

There are two waves of survey administration in this first year: a pilot test with approximately 200 U.S. teachers, and the full administration across the four countries. The analysis described below will be conducted on the pilot sample from U.S. teachers. Problematic survey items will be revised according to our findings, and the revised instrument will be administered across four countries. SRI will re-analyze the data from the four countries using the same procedures, paying particular attention to country-by-country variation in the way particular items perform.

First, SRI will compute “scales” based on bundles of related survey items. Typically, a variable like “extended classroom community” is measured by asking several questions related to student collaboration with community members. The individual items are typically scored on a scale of 1 to 4. We then compute the mean of these item scores and treat that result as a “scale score” representing the variable “extended classroom community.”

Our analysis proceeds by examining standard descriptive statistics (mean, standard deviation, and range) for each item and scale, primarily to confirm that there is sufficient variability among the respondents to warrant inclusion in the analysis. If all teachers scored at the top of the scale of innovative teaching practices, for example, such a result would be impossible to correlate with variations in other measures. We need to have a sufficient number of cases that fall into the low, middle, and high ranges of the scales in order to claim, for example, that teachers tend to have higher levels of innovative practice in schools that promote collaboration.

Next we will compute the internal reliability of each survey scale consisting of 3 or more items. Reliability is a measure representing the coherence of a group of items comprising a scale. In other words, respondents who score highly on some items of a coherent scale also tend to score highly on other items within the same scale; the items work as a “cross-check” for one another. When there is low coherence among scale item responses, the scale scores are unlikely to provide meaningful information for answering our three core research questions. In such cases knowing the limitations of a scale’s reliability can help us interpret “null” findings (such as no detectable relationship between a particular school-level support and teacher practices).

Finally, we will examine the correlations among conceptually related measures in the surveys in order to decide whether the items from two or more scales should be combined. Sometimes two shorter

scales with poor reliability can be combined into one longer, more reliable scale if they are measuring similar constructs. Techniques such as exploratory and confirmatory factor analysis may be used to investigate whether an entirely different item bundling scheme produces a more reliable and interpretable set of scales when compared to those originally proposed.

LASW

The LASW analysis begins with a review of the coding rubrics by U.S.-based teachers who are experienced as LASW coders and coding trainers. These teachers will check the rubrics for clarity and offering suggestions for improvement. The revised rubrics will then be piloted across the four countries.

After receiving the LASW scores submitted by each of the four countries, we will examine descriptive statistics to ensure an adequate range of scores are being reported. A preponderance of scores at either the low or high ends of the scale may suggest that the scoring rubrics need to be revisited and re-adjusted based on the quality of the teacher and student work.

Next we will compute interrater reliability statistics for the scorers within each country. This computation can show us when a particular dimension of the scoring rubric is difficult to interpret: for example, when two scorers looking at the same piece of work tend to consistently disagree on the scores they assign.

Last, we will examine the correlations among the dimension scores for both Learning Assignments and Student Work. Should we discover that two dimensions are highly correlated, and consistently correlated across countries, we might consider combining them into a single scoring dimension in future years of the study.

Classroom Observation Protocol

Much of the assessment of the observation instrument's utility will be based on direct reports by the classroom observers themselves. Still, we will examine the distribution of particular items to see whether there is a sufficient range across classrooms. Items that capture exceedingly rare events, for example, may be dropped in order to simplify the observational burden.

7.2 Model building and testing

The components of the logic model can be thought of as a series of beliefs or hypotheses. For example, we might believe that teachers in schools with particular program supports would report a higher level of innovative teaching practices. This belief can be tested against the data we collect. We test this belief by constructing a mathematical model of the relationship between level of program support and level of innovative teaching. The strength of that relationship is derived from the data. The relationship may be positive (higher support is related to higher innovation), negative (higher support is related to lower innovation), or inconclusive (we can detect no significant relationship, either positive or negative).

Because we are measuring only a sample of teachers within a country, there is some degree of uncertainty about the strength of that relationship. If we were to select a different set of teachers and run the same study, we would probably obtain similar, but not exactly identical, results. We can quantify this degree of uncertainty as a "margin of error" around our result. Smaller margins of error are desirable – they represent a higher degree of certainty about the results. There are two critical ways

margins of error can be made smaller: use of a sufficiently large sample, and high-quality instrumentation. Put another way, when either a sample size is small or a measure is unreliable, the uncertainty (and hence the margin of error) of our result is increased.

As we described above, a relationship can be positive, negative, or inconclusive. An inconclusive finding occurs when both positive and negative possibilities exist within a relationship's margin of error. For example, if the relationship between program support and innovative teaching is 0.4, with a margin of error of +/- 0.1, then that margin ranges from +0.3 to +0.5. All of the possible values within the margin are positive, and hence we could claim that a relationship is supported by the data. If, however, the measured relationship is 0.05 with a margin of error of +/- 0.1, then the possible values range from -0.05 to +0.15. In this case, the values could be positive, or they could be negative – we cannot tell with adequate precision. We call these cases "inconclusive," meaning that we have no way of knowing for certain whether a relationship exists, and in which direction it is oriented. We note that this is a very different statement than the claim that "no relationship exists."

In this study we are working with two different samples: the survey sample of 600 teachers per country, and the much smaller sample of 48 teachers from whom multiple types of data are collected in the site visit schools. When we can test our hypotheses using the larger sample, it is likely that we will have more precise estimates of relationships among variables. In some cases – particularly those pertaining to student learning – we will be limited to the smaller sample of 48 teachers per country. These student learning models will generally be associated with a greater degree of uncertainty around the measured relationships; however, multiple types of data will be integrated in the analysis to develop richer explanations of phenomena.

We will build and examine two statistical models, one based on the full sample of 600 teachers per country, and a second model based on the more limited case study sample. A model based on the full sample allows us to precisely measure the relationships among variables that are captured by the survey instruments.[11] In combination with information obtained from the instrument analysis, we can determine how the components of innovative teaching, for example, relate to each other and to teacher reports of student capabilities. The model based on the full sample will be primarily used to answer the research questions examining program supports and increases in innovative teaching practices, as well as school-level conditions that support such practices.

The second model – based on the sample of 48 teachers per country – will be used primarily to assess the relationship between teaching practices and learning outcomes.[12] We will combine data from teacher surveys, classroom observations, learning activities, and student work in a model designed to show which specific measurable practices are most strongly associated with 21st-century learning outcomes. Again, we note that due to the smaller sample size, the margin of error for relationships in this model will be larger, and hence we may see proportionally more inconclusive results.

[11] Technically, a structural equation model (SEM) will be constructed. SEMs model the relationships among variables while accounting for the technical qualities of the instrumentation. See Kaplan (2000) for background and details on SEM.

[12] This model needs to account for the fact that information about student learning is clustered within specific teachers. A variation of a hierarchical linear model (Raudenbush & Bryk, 2002) is appropriate in this application.

7.3 Analysis supporting specific findings

Once the models are constructed, they will be used to test a set of selected relationships. This section describes a range of analyses that may be conducted. Pilot year analyses will be limited to the data that are submitted by each country within the required timeframe and meeting required thresholds for completeness. It is possible, for example, that actual datasets in some countries will be smaller than predicted due to local circumstances and developing capacities for this type of data collection. Analysis in the pilot year may also be constrained by the formative status of the instruments; post-pilot improvements to the surveys and other instruments will result in more robust measures to support analysis in future years. As described earlier, additional measures of student outcomes are also expected to be available in future years.

To what extent do innovative teaching practices contribute to 21st- century learning outcomes?

This first research question will be analyzed using the sample of 48 teachers per country. We will begin by describing the nature and distribution of the learning activity and student work scores. Specific points on the score scales (low, medium, and high) may be illustrated with examples drawn from actual learning activities and student work.

There are three primary indicators of innovative teaching practices: the relevant scales derived from the teacher survey, the ratings of the learning activities, and the direct observation of classroom instruction. We will determine whether these measures are consistent across teachers – that is, do teachers who report higher degrees of innovative teaching actually demonstrate higher degrees of innovation through their learning activities and practice? Next, we will correlate the indices of innovative teaching[13] with the scores on student work. A positive relationship here would suggest that when teachers are engaged in more innovative teaching practices, students are able to demonstrate greater mastery of 21st-century skills.

What school-level conditions contribute to innovative teaching practices?

As noted above, we have three primary sources of data reflecting innovative teaching in each country: the evaluations of the learning activities in the 48 teacher sample, direct observation of those teachers, and teacher self-reports on the larger 600 teacher sample. Sources of data reflecting school-level conditions include both administrator and teacher survey responses as well as interview data with administrators and teachers.

Using only the survey data from the larger 600 teacher sample, we will examine the administrator and teacher indicators of school-level qualities for consistency. Depending on the results of this analysis, indices of school-level qualities will be constructed, and correlated with survey measures of innovative teaching practices.

Using the 48 teacher sample, we can also triangulate the assessment of school qualities with data from teacher and administrator interviews. Similarly, scores from learning assignments and classroom observations can be used to construct a more robust index of innovative teaching. Using these

[13] Depending on the degree of consistency between survey, learning activity, and observation data, we may construct a composite index of innovative teaching derived from all three sources of data.

enhanced indicators (albeit with a much smaller sample), we will examine the relationship between school qualities and innovative teaching.

How are national or regional program supports associated with increases in innovative teaching practices?

The 600 teacher sample will be selected by choosing 150 teachers participating in each of three national programs, plus an additional 150 nonparticipating teachers.[14] Using indices of innovative teaching described above, we will analyze how levels of innovative teaching vary across the four groups of teachers. There are two contrasts of particular interest: how innovative teaching varies between participants of each program and nonparticipants, as well as how the nonparticipating teachers compare to the combined group of participating teachers. We will examine both the mean level of innovation across the groups, as well as the overall distribution of innovative teaching scores. Results of this analysis in the pilot year may suggest ways to shape this research question in subsequent years.

[14] These are global sampling guidelines; local considerations will determine the degree to which the sample within each country matches these guidelines exactly.

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Appendices

Appendix A

Mapping of Logic Model Constructs and Definitions to Instruments

Construct	Sub-construct	Definition	Country Context Form	Teacher survey	SL Survey	Teacher Interview	SL Interview	Classroom Observation	Student Focus Group	Learning Activities	Student Work
National or Regional Education System											
	• Structure and organization of national/regional system	The national or regional educational funding, governance, and organization of schools, and the impact of these elements on schools at the local level.	●		●						
	• Standards and accountability policies	National or regional expectations for student knowledge and skills (what students should know and be able to do) as articulated and described for schools, educators, and students. In addition, responsibility of educators and schools to meet these standards, and the implications for educators and schools when the standards are not met.	●		●		●				
	• National or regional instructional and ICT goals	National or regional goals for teaching and learning, and expectations regarding the role of ICT in classroom instruction.	●				●				
	• Key strategic initiatives	National or regional policies for improving teaching and learning as implemented at the local level. May relate to perceived need for significant changes to instruction (e.g., new curriculum standards), or goals for student outcomes (e.g., initiatives to reduce dropout rates).	●								
	• Level of economic and technology development	The extent of financial and technical supports (both public and private) for educational programs and schools, and the extent to which each region has adequate equipment and human resources to support schools and students. This construct also includes the socioeconomic conditions and level of technology development in the region/nation more generally.	●		●		●				
National or Regional Program Supports											
	Government, NGO (e.g., WorldBank, UNESCO), private sector programs	The national, regional, or corporate/NGO sponsored programs (private or public) that provide school staff with resources to improve teaching and learning. Program supports can include resources such as workshops, conferences, materials, mentoring, networks, online communities, professional development, and equipment.	●	●	●	●	●				

Construct	Sub-construct	Definition	Country Context Form	Teacher survey	SL Survey	Teacher Interview	SL Interview	Classroom Observation	Student Focus Group	Learning Activities	Student Work
School Culture and Supports											
	• School vision (for teaching and learning, curriculum, and ICT)	Broad goals and plans for curriculum, teaching and learning, and professional community within the school, and how clearly and consistently the vision is communicated by school leaders.		●	●	●	●				
	• Common vision among school staff	The extent to which there is a shared understanding about goals for teaching and learning and how those goals should be met 1) among teachers in a school and 2) between teachers and school leaders.		●							
	• Shared leadership practices and policies	The extent to which educators work together to make decisions and set policies about school management and instruction. In distributed leadership, decisions and leadership tasks are shared among administrators, staff, and teachers, and structures (e.g., meeting times, teams) are in place to make key decisions.			●		●				
	• Collaboration / community of practice	The extent to which educators learn from each other and work together to improve teaching and learning, and the strategies they use to do so. Includes both process and cultural supports for teacher collaboration.		●	●	●					
	• Culture of continuous improvement	The extent of ongoing reflective dialogue among educators about student work, student outcomes, and pedagogy in order to improve teaching and learning. This construct relates to practices that promote continuous school improvement, and is different from a culture of continuous student assessment.		●	●	●	●				
	• Professional development	Opportunities for educators to participate in activities that support improvements in teaching practices, ICT skills, and ICT integration. Effective professional development is ongoing and relevant to daily teaching and learning. Includes less formal professional development opportunities (e.g., mentoring) and opportunities that teachers seek out beyond their own school (e.g., participation in an online teacher network).		●	●	●	●				

Construct	Sub-construct	Definition	Country Context Form	Teacher survey	SL Survey	Teacher Interview	SL Interview	Classroom Observation	Student Focus Group	Learning Activities	Student Work
ICT Access and Support											
	• ICT in the school	The range of ICT tools available to students and educators, both within and outside of the school. ICT is defined as tools and resources used to communicate, and to create, disseminate, and store and manage information. ICT includes digital tools such as computer hardware and software, networks, digital cameras, mobile phones, and graphing calculators.		●	●		●	●			
	• Location, availability, functionality	The extent to which ICT in good working condition is easily accessible to educators and students, where and when they need it.		●	●		●	●			
	• Support for ICT and ICT integration	The extent to which educators and students have the necessary technical support to operate ICT tools and to integrate ICT into their work.		●	●	●					
Educator Attitudes											
	• Teacher beliefs about teaching and learning	The beliefs held by teachers about instructional practices that help students learn best.		●		●	●				
	• Teacher self-efficacy and motivation	Teachers' beliefs about their own ability to help their students learn—even the most challenging students—rather than believing that students will fail because of students' own shortcomings or outside factors. Also includes teachers' satisfaction in the teaching profession, felt professional respect, and autonomy to make instructional decisions in the classroom.		●		●					
	• Teacher ICT skills and attitudes	The extent to which teachers are trained, skilled, and feel confident about their own technological skills and their readiness to use ICT in the classroom. Also includes the value educators place on ICT use in the classroom, and their vision of how ICT impacts teaching and learning.		●		●	●				

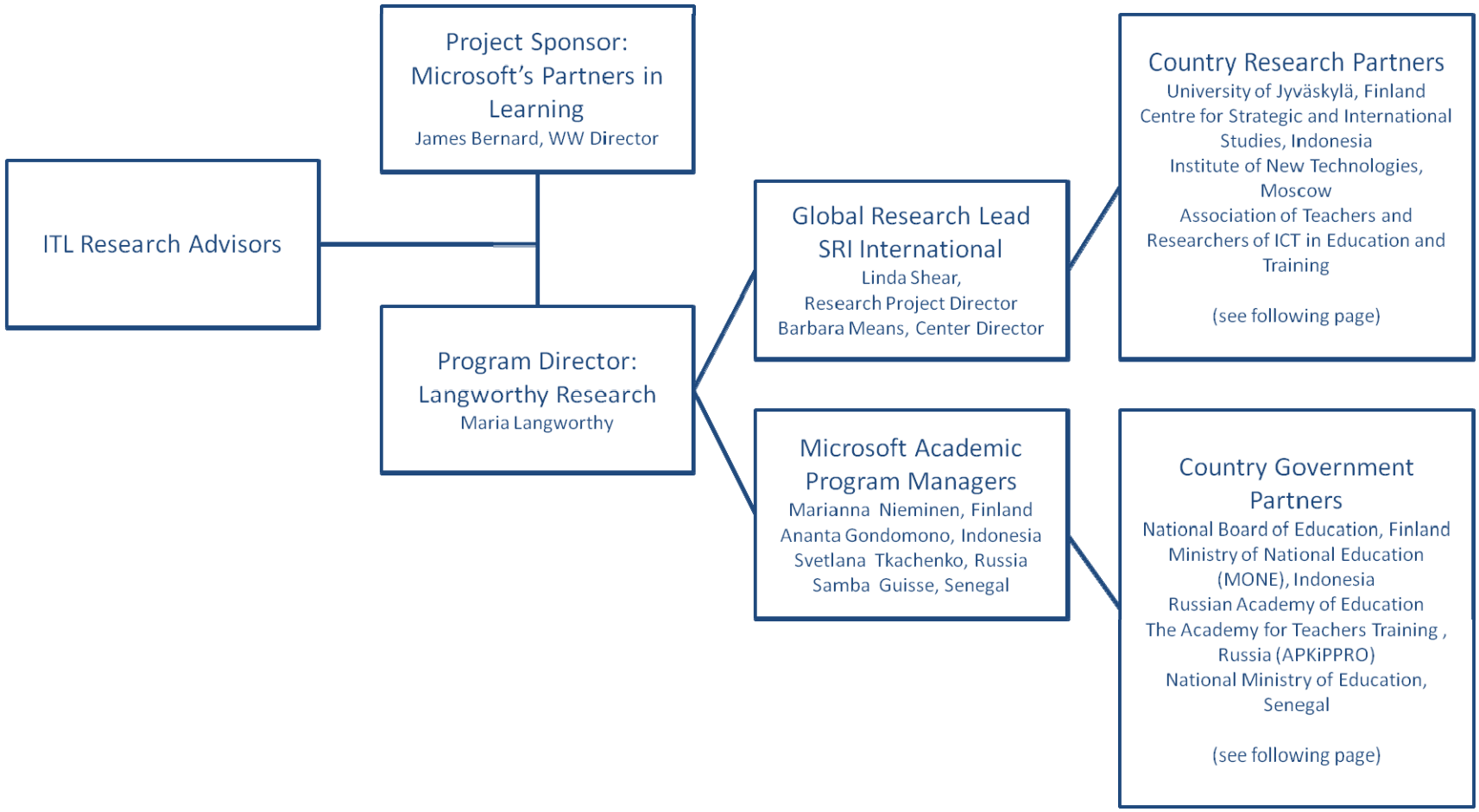
Construct	Sub-construct	Definition	Country Context Form	Teacher survey	SL Survey	Teacher Interview	SL Interview	Classroom Observation	Student Focus Group	Learning Activities	Student Work
Innovative Teaching Practices											
	• Student-centered pedagogies	Student-centered pedagogy provides learning opportunities that are shaped by the needs and interests of the student. Using this approach, students are active learners, and instructors work to facilitate student learning.				●	●				
	Project-based	Project-based learning opportunities engage students in open-ended, long-term (1 week or longer) questions or problems, usually one with no known answer or no previously learned solution.		●				●	●	●	
	Collaborative	Students are asked to work together in small groups on one or more phases of a task. Strong examples of collaborative activities ask students to take on different roles/expertise and create interdependent products.		●				●	●	●	
	Knowledge building	In doing their work, students must generate ideas and understandings that are new to them. Students build knowledge through interpretation, analysis, synthesis, or evaluation.		●				●		●	
	Self regulation and assessment	Students are required to take responsibility for their own learning. They must plan and monitor their own tasks. They know the criteria that define "success" for this task, and they must revise their work based on feedback from teachers or peers or based on self-reflection.		●				●	●	●	
	Personalized	Students are allowed to learn in ways that are relevant to their own background, experiences, and interests. Students can choose the topics they will learn about, the tools or strategies they will use, and the types of work products they will create.		●				●	●	●	
	Individualized	Teachers make it possible for individual students to work at their own pace or adjust instruction based on individual students' skill levels and learning needs. At higher levels, the work of each student is guided by an individualized learning plan.		●				●			

Construct	Sub-construct	Definition	Country Context Form	Teacher survey	SL Survey	Teacher Interview	SL Interview	Classroom Observation	Student Focus Group	Learning Activities	Student Work
	• Extension of learning outside the classroom	Learning opportunities extend beyond the traditional boundaries of the classroom, involving problems, people, and activities from the community, the nation or the world.				●	●				
	Extended classroom community	Students have opportunities to collaborate or communicate with people from outside the classroom (e.g., community members, family members, or experts); create work products that are used by people outside the classroom; or receive feedback from people outside the classroom.		●				●	●	●	
	24/7 learning	Students' learning activities extend beyond the time or space of the classroom, either physically (e.g., student work at an internship in the community) or through technology connections (e.g., remote access to classroom resources).		●					●		
	Cross-disciplinary learning	Students are encouraged to connect their learning to content from two or more traditional classroom disciplines (such as history and economics, or literature and science).		●				●	●	●	
	Global awareness and cultural understanding	Students have the opportunity to consider and explore information, cultures and concepts from outside their geographic area, or to study topics that relate to the interconnectedness of the world (e.g., flu pandemics or global warming).		●				●	●		
	• ICT integration in teaching and learning	The ways in which students use ICT to enable their learning activities, and the ways in which teachers use ICT for teaching and other professional practices.				●	●				
	Student ICT use	Uses of ICT by students as part of their learning process. Includes the ways that students use ICT, and the affordances for learning that result. At higher levels, students use ICT to do work that could not be done through other means.		●				●	●	●	
	Teacher ICT use	Uses of hardware/software by teachers, either for instructional purposes or to support other aspects of their professional role. At higher levels, teachers use ICT to access resources beyond the classroom or participate in professional learning communities beyond the school.		●				●			

Construct	Sub-construct	Definition	Country Context Form	Teacher survey	SL Survey	Teacher Interview	SL Interview	Classroom Observation	Student Focus Group	Learning Activities	Student Work
Students' 21st-Century Skills						●	●				
	• Knowledge building	Students are skilled in combining new information with what they already know to generate ideas and understandings that are new to them. Students are able to build knowledge through interpretation, analysis, synthesis, or evaluation.		●							●
	• Collaboration	Students are skilled in working together in small groups on one or more phases of a task. In strong examples of collaboration, students take on different roles, develop complementary expertise, and create interdependent products.		●							
	• Problem-solving and innovation	Students are able to successfully address a problem or issue with no known answer or design a product that meets a set of constraints. The solution is innovative when it successfully meets a real-world need.		●							●
	• Use of ICT for learning	Students are able to use ICT to construct knowledge. For example, they analyze multiple sources of information they find on the Internet, or they use a computer-based simulation to investigate a complex natural phenomenon. Students also make choices about when, where, and how to use ICT tools, and judge the credibility of resources they find online.		●							●
	• Skilled communication	Students are able to communicate their ideas in ways that are easily understood and compelling to a target audience. Their work products are coherent and well-organized, and contain sufficient, relevant evidence to support a topic or theme.		●							●
	• Self-regulation and assessment	Students are able to plan and monitor their own work. They are skilled in reflecting upon their work products at multiple substantive stages, and make revisions in response to feedback from teachers or peers or based on self-reflection.		●							

Appendix B

ITL Research Org Chart



Country Research Partners

	Organization	Research Leads
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