Ten Years of Evaluation: Intel® Education Initiatives

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We cannot afford 21st century students being taught using 20th century methods in 19th century classrooms. According to a recent World Bank survey on Information and Communication for Development, policymakers found that connecting schools to ICT constitutes one of the top e-strategies to help promote economic growth and reduce poverty. The latest developments in interactive computer technologies and student-centered teaching and learning practices help transform our schools and empower our students to keep up with the global knowledge economy.

- Martina Roth, Director Global Education Strategy, Intel Corporation

INTRODUCTION

For over a decade, Intel's philanthropic educational initiatives have provided millions of teachers and students around the globe some of their first experiences with the principles and practices of progressive education. By virtue of Intel's programming, for example, teachers have developed lesson plans for implementing project-based learning, teens have created multimedia presentations on social issues that matter to them, student groups have discovered ways of representing content-specific data and ideas using novel online tools, and school administrators have assessed learning outcomes based on rubrics applied to student-designed products instead of tests focused on information recall. These impacts all derive from Intel's core vision of promoting improved educational opportunities and outcomes for children around the world.

From the early stages of this work—totaling close to $1BB in philanthropic support—Intel has also engaged independent researchers to monitor and evaluate its efforts to answer questions about the impact of their programs. This paper describe the relationship Intel has had with these researchers, how the evaluation has documented and affected Intel's core vision of teaching and learning, and how the evaluation approach has in turn been shaped. Does it really help to evaluate programs? What does evaluation achieve? Our intent is not to produce a straight history recapitulating evaluation designs and findings, but rather to describe the rich and long collaboration between Intel and its evaluators and the ways in which the evaluation has supported the emergence of critical insights about Intel's programming.

In general, there are several reasons to examine the role of independent evaluation research as it functions within corporate educational philanthropy of a global reach. The first is to analyze this role in relation to the rationale and impacts of the educational programming it targets: Does it provide a sound perspective on the strengths and weaknesses of design and implementation? Does it succeed in identifying appropriate outcome indicators and metrics to determine the effectiveness of the programming on its own terms? Does it produce findings that directly or indirectly improve programming and shape initiatives? A second reason to examine the role of evaluation is to see if it works effectively to show how philanthropic educational programming is situated within the larger context of government efforts towards educational reform, digital inclusion, workforce development, or other goals for each country's educational sector. That is, is evaluation good at showing what the programming is doing in the country overall? A third reason is to use both the evaluation findings and an account of the relationship between the evaluator and the program designers to question the nature of global corporate education philanthropy and its impact on the lives and societies it touches. How do evaluation efforts and findings provide perspective on the role of corporate programs on global educational practice and culture? What are the broader set of effects of corporate philanthropic educational programming on individuals and society? Although

this third reason is beyond the scope of this paper, we raise it to indicate our awareness of the attention being given the role of corporate players on the global stage in education.[i]

To address the first two sets of issues, this paper will explicate Intel's global vision and how the company's programs have supported teachers to meet that vision—providing Intel's perspective on these issues using the voices of those who have shaped the programming. We will then describe Intel's programs and give an overview of findings from the evaluations, focusing on the local and immediate tasks at which the evaluation work has been directed (i.e., formative and summative objectives tied to programmatic goals), and also going beyond reporting on the "usual" aspects of the evaluator's business to address additional lessons learned.

INTEL'S OBJECTIVES

BACKGROUND

Increasingly, the role of technology has become the focus of conversations about educational reform and its effects on economic development and social equity. These conversations typically address the effectiveness of technology integration and what impact technology plays in the quality of teaching and learning in today's classroom. For those in the private sector supporting the use of education technology in schools and communities, these questions frequently challenge both their motives for their involvement and the efforts associated with understanding the effectiveness their involvement. There is rarely agreement on the roles and methods of such public-private partnerships. Former Intel Corporation Chairman, Craig Barrett, has for decades stood as a champion for much of Intel's strategy regarding its educational initiatives and has often been at the center of the debate.

Barrett was an early champion of educational technology, chartering the effort for Intel to expand the corporation's involvement in education in 1997. When computers were introduced to US classrooms in the 1980's and early 1990's, much of the teacher professional development at the time was focused on basic hardware and software skills. There were few professional development programs available to help teachers use this new technology to improve student learning directly by improving instructional practice.[ii] Growing recognition of the value and importance of technology as an education tool eventually fueled interest in teacher professional development that went beyond basic skills training to emphasize the instructional purpose of technology and its potential impact on learning.[iii] Along with the content, the quality and length of teacher training began to change.[iv]

In the decade that followed, U.S. Secretary of Education Richard W. Riley stated in a speech at the National Conference on Education Technology, "Teaching and learning that uses technology effectively can lead to greater academic success and make a real difference in the lives of students." He also added that, [technology] "...is not a substitute for solid teaching and learning—but a tool to help teachers teach and help students learn at the highest levels and helps teacher teach more effectively. Technology is one part of a comprehensive quality learning experience that, at its very core, involves the concept of teaching people to think and to continue to learn throughout their lifetimes so that they can benefit from change."[v]

Seeking ways to address the need for instructionally oriented teacher professional development, the Intel Foundation contracted with the non-profit Institute of Computer Technology in March 1998 to collaborate on a new approach. They creating the Intel ACE (Applying Computers in Education) Project, designed to support classroom teachers in integrating computers into their existing curriculum. In the first year, this initiative trained over 1,200 K-12 teachers in six western U.S. states (California, Oregon, Texas, New Mexico, Washington, and Arizona). In 2000, the ACE project became the Intel Teach to the Future Program with the goal to expand into a worldwide initiative to address the barriers teachers face in effectively applying computer technology to improve student learning.

Today, renamed the Intel® Teach Program, the Intel Corporation's efforts have been geared towards helping K–12 teachers be integrate technology into their lessons, promoting problem solving, critical thinking and collaboration skills among their students. A key element of the Intel Teach program is maintaining localized content and administration through a train-the-trainer model where local training agencies recruit and train master teachers who will each train additional classroom teachers. To date, the program has trained more than 9 million teachers in more than 60 countries, and is committed to reaching millions more.[vi] A suite of complementary, related offerings targeting administrators and students, most notably the Intel Learn Program, have also been developed and implemented worldwide.

COMMITMENT

Intel's core philosophy for addressing global equity issues has been consistent: every child should have a generally equal opportunity. By providing relevant, useful content, fit to local conditions with classroom practices and the utilization of local resources for deployment on a global scale, educational assistance becomes more than a handout, it becomes a sustainable effort that meets basic needs within the local context. According to Barrett, "All governments face the same challenge: to provide their citizens with the opportunity to succeed in the global economy. Increasingly, that success is linked to the quality of education."[vii]

Just prior to his stepping down from his role as Chairman in 2008, at the Annual Meeting of the World Economic Forum in Davos, Switzerland, Barrett participated in an online YouTube interview and answered the question, "What one thing do you think that countries, companies or individuals must do to make the world a better place?" Barrett responded, "It's got to be education. Education is the basis for hope and opportunity, that's what the next generation needs. Education is the basis for economic development, that is what all the emerging economies need. Education and exposure to the information base of the world helps understanding between different countries, that's what we need to get peace around the world."[viii]

The key to Intel's strategy for supporting education has been developing relationships and establishing collaborative efforts with education leaders and governments in a broad scope. By working with teachers, school districts, state and national departments of education, and, internationally, ministries of education, Intel has created the opportunity for impacting the classrooms widely through an economy of scale. As a result of these collaborative efforts, Intel has been able to advocate for teacher professional development, increases in infrastructure and access, improved education standards, and a focus on student-centered teaching and learning built upon

problem solving, collaboration, communications, digital literacy, and creative thinking. True reform, however, centers on the teacher. "What really drives quality education is quality teachers," Barrett said. "Computers are a tool, but no more. Teachers are the most important part of bringing kids into the 21st century with 21st century skills."[ix]

Following a transition to new corporate leadership, the commitment to education transformation remains. Shelly Esque, Vice President of Legal and Corporate Affairs for Intel Corporation, has described the way in which technology is responsible for a modern world in transition, creating tremendous opportunities as well as competition for jobs and economic development. As a result, countries are facing immense challenges in ensuring that their education systems are ready to prepare the next generation to take advantage of the opportunities. Most MoEs have come to recognize that ICT is playing an increasingly important role in not just the way we work, but also in the way we gather, assimilate, and use information to create knowledge, which is increasingly becoming the backbone of modern economies. This knowledge economy brings with it the need for a vast range of complex skills in the workforce, so that workers collaborate better, communicate effectively, critically evaluate options, and successfully compete on a global scale. This in turn necessitates the need for education transformation to match the new paradigms and the effective use of ICT. While there is an ever-increasing use and induction of ICT into the education systems across the world, it is critical that the usage models of ICT defined by any country fall in line with not just the desired short-term educational outcomes, but also align with the long-term vision that the country has set for itself.

IMPACT

Along with program and infrastructure investments, Intel has also dedicated sizeable resources to rigorous program evaluation in order to ensure continuous, targeted improvement of all of these educational products and activities. The research and evaluation conducted for this purpose has not only enabled the improvements of the program development efforts, but now also comprises a comprehensive body of evidence that demonstrate program impact.

The Intel Education programs worldwide are evaluated by local research teams, which conduct studies within individual country and language contexts. To ensure a consistent approach across the international programs, these local teams are guided by the Intel corporate Education Research Manager and two key global research partners: EDC's Center for Children and Technology and SRI International's Center for Technology in Learning. The evaluations vary depending on the program, country context, and maturity of the national program. Evaluations of programs in early stages of development or pilot efforts focus on formative data within the areas of localization, adoption, and comprehension. Evaluations of expanding programs focus on continuous improvement processes, applied knowledge, and a change in teacher and learner activities within the classroom environment. Ongoing, long-term evaluations focus on sustained learner-centered teaching, technology use, and activities that support the new types of teaching and learning.

Recently, Intel identified a comprehensive set of outcome indicators, subset characteristics, and specific operationalized behaviors of the indicators by comparing program evaluation results to the stated goals and objectives of the programs. As a result, a cross-program indicators model was

developed that illustrates primary outcomes in a way that enables these outcomes to be measured or observed. This framework provides international evaluation teams tools and protocols that directly address the primary indicators and answer relevant questions about program performance, in order to optimize available evaluation resources and ensure that claims about program impacts reflect the collected data and do not go beyond what the data can demonstrate.

Such a focus on primary indicators enables the international evaluation teams to target the key outcomes using rigorous multi-method designs, taking into account reasonable logistical and resource limitations. These designs, which represent a significant investment as well as a commitment to evaluation standards, include such tools and methods as participant surveys, site observations, interviews, case studies, focus groups, and reviews of student work when possible. Intel's commitment to monitoring its own actions is articulated by Intel Vice President Esque: "It is thus extremely critical that as we march down the path to transform education, we know what the end goal looks like and have relevant mechanisms in place to measure the educational outcomes, as well as monitor the effectiveness of our actions."[x]

THE INTEL PORTFOLIO

The Intel® Education Initiative is a portfolio of programs that is designed to improve teaching and learning, both within and outside of the formal education system, and to advance understanding of science and mathematics. The primary evaluation efforts supported by Intel have focused on two flagship programs intended to promote changes in educational practices—the Intel® Teach Program for teachers and the Intel® Learn Program for children. The Intel Teach Essentials Course trains teachers to integrate information and communications technology (ICT) across the curricula as a tool for learning, and to design and implement inquiry-driven, project-based learning activities. The Intel Learn Program gives children the opportunity to design, create, and solve problems in collaboration with their peers. It also provides them with a structure, tools, and adult guidance to gain new knowledge and to become proficient in basic skills. The evaluation results gathered over the years have suggested these programs hold the potential to transform learning environments and to enhance teacher capacity to use student-centered pedagogical practices and to use ICT in pedagogically appropriate ways. Both programs have been well received by participants, and there are clear indications of changes in teachers' use of ICT and student-centered pedagogy.

The portfolio reflects Intel's sustained commitment to improve teaching and learning through the effective use of technology and to advance mathematics, science, and engineering education and research. The portfolio consists of programs designed to improve teaching and learning, both within and outside of the formal education system, and to advance understanding of science and mathematics (see Table 1). Through these programs, Intel partners with governmental entities to address various components of the education system: policies, professional development, pedagogy, curriculum, assessment, information and communications technology (ICT) use, school organization, and, at the higher education level, the development of technical curricula and research programs. The Initiative is intended to help educational systems move from an approach that emphasizes the acquisition of knowledge, to one that emphasizes conceptual understanding and the application of concepts to real-world situations. All of the programs are designed to improve the effective use of

technology to enhance the quality of education, to promote the development of twenty-first century skills, and to encourage excellence in mathematics, science, and engineering.

Table 1. The Intel Education Initiative Portfolio

Intel® Teach	The Intel® Teach Program improves teacher effectiveness through professional development, helping teachers integrate technology into their lessons and promoting students' problem-solving, critical thinking, and collaboration skills
Intel® Teach Skills for Success Course	Training on a student curriculum that develops digital literacy, problem solving, critical thinking, and collaboration skills
Intel® Teach Getting Started Course	Introduction to classroom software productivity tools and student-centered approaches to learning
Intel® Teach Essentials Course (f2f)	Training on how to integrate technology into existing classroom curricula to promote student-centered learning (F2F for inservice and preservice teachers)
Intel® Teach Essentials Online Course	Training on how to integrate technology into existing classroom curricula to promote student-centered learning (Hybrid F2F and Online for inservice and preservice teachers)
Intel® Teach Thinking with Technology Course	Training on effective technology integration skills using online thinking tools to enhance students' higher-order thinking skills
Intel® Teach Teach Advanced Online Course	Training that enables teachers to build communities to advance their integration of technology and 21st century learning
Intel Teach Leadership Forum	Interactive, face-to-face forum focused on leadership in promoting, supporting, and implementing effective technology integration in schools

Table 1. The Intel Education Initiative Portfolio *(continued)*

Intel® Teach Elements	**Explore 21st century learning concepts through a series of compelling online courses that use interactive e-learning tutorials. Designed for teachers with intermediate technology skills, there are no prerequisites and courses are available to anyone, anywhere.**
Project-Based Approaches Course	Project-Based Approaches helps teachers improve their understanding and application of project-based approaches in the 21st century classroom. By the end of the course, participants who complete an Action Plan will have designed materials and activities to implement or improve project-based approaches in their classrooms.
Assessment in 21st Century Classrooms Course	Assessment in 21st Century Classrooms helps teachers see how assessment strategies can benefit their teaching practices and students' learning. Participants learn how to plan, develop, and manage student-centered assessment. The course offers opportunities to apply the assessment concepts with action planning exercises.
Collaboration in the Digital Classroom Course	Collaboration in the Digital Classroom helps teachers develop students' 21st century thinking skills, deepen content understanding, and prepare for the global world. Learn how to plan and manage collaboration activities that integrate online collaborative tools that are increasingly part of our globally connected workplaces.
Thinking Critically with Data Course	Thinking Critically with Data helps teachers prepare students to think critically in our information-rich world. Participants explore practical skills and strategies to draw on when teaching students to think critically about the information around them.
Educational Leadership in the 21st Century Course	Educational Leadership supports exploration and discussion of school leadership in our students' technological 21st century world. School leaders review best practices, examine leadership behaviors, and develop strategies to better support their teachers.
Intel® Learn	**Designed to meet the specific needs of children aged 8 to 25 in underserved communities, the Intel® Learn Program extends learning beyond classrooms to informal environments in local community centers.**
Intel® Learn Technology and Community	Using a project-based approach, the curriculum's activities and projects show learners how they can use technology productivity tools to contribute to their communities
Intel® Learn Technology and Work	Intel Learn Technology at Work shows learners how computers are used in a variety of jobs and careers. Employing increasingly sophisticated use of office application software and Internet tools, students create projects ranging from survey designs that healthcare workers might use to project management plans that a local engineer might create.
Intel® Learn Technology and Entrepreneurship	Intel Learn Technology and Entrepreneurship introduces learners to the basic concepts of entrepreneurship and demonstrates how technology can be used to advance a business idea. Using Internet tools and office applications, learners research and formulate a business idea. Then they create and present a business plan for that idea.
Intel® Education Teachers Engage Community	*Teachers Engage* is a global education community that supports research-based best practices in effective use of technology, project-based approaches, and assessment of 21st century skills.

In a report titled *Lifelong Learning in the Global Knowledge Economy*,[xi] the World Bank states:

> Developing countries and countries with transition economies risk being further marginalized in a competitive global knowledge economy because their education and training systems are not equipping learners with the skills they need. To respond to the problem, policymakers need to make fundamental changes. (p. xvii)

Research from around the world shows that educational ICT can support change, positively affecting an array of educational outcomes such as improving school attendance, deepening conceptual understanding in core school subjects, and promoting wider involvement in community development.[xii] Teacher quality plays a central role in this process; research demonstrates that the effective use of ICT is dependent on teachers' ability to select ICT tools and strategies that are appropriate for achieving specific instructional goals.[xiii] Yet, research also shows that, to achieve positive outcomes, programs that integrate ICT into educational practice must be designed in accordance with state-of-the-art understanding of how children learn.[xiv]

The flagship programs in the Intel Education portfolio of offerings—the Intel® Teach Program and the Intel® Learn Program both seek to promote research-based changes in educational practice. The programs represent Intel's most comprehensive efforts to improve the quality of K–12 education through the effective use of technology. In its Intel Teach offerings, Intel targets two aspects of teacher quality that are core to twenty-first century educational reform: (1) adoption of student-centered pedagogical practices; and (2) integration of pedagogically sound use of ICT into those practices. The Intel Learn Program focuses on student learning, specifically in the areas of technology, collaboration, and critical thinking skills. The program's curriculum also exemplifies the instructional design goals of Intel Teach courses, aligning the program's outcome objectives with many of the teacher outcomes targeted by the Intel Teach Program.

THE INTEL TEACH PROGRAM

Intel realizes that teaching for the twenty-first century is very different from traditional teaching. Improving teacher training and knowledge is a high priority for nations engaged in educational reform since the quality of instruction is central to improving academic achievement.[xv] Teachers and students play different roles than in earlier eras. The teacher is no longer the sole font of information, and the student is not a passive recipient. Increasingly, students assume active roles in their education, continually striving to understand the world and to apply what they learn. To meet the demands of these evolving roles, teachers need to expand their skills and refine their pedagogical approaches and students need to be able to access resources. The key to changing what is taught and learned in the classroom is effective professional development that builds teachers' capacity and that provides them with new resources to share with students.

The Intel Teach Program is designed to help schools become twenty-first century places of learning by providing teachers and administrators with the skills and resources they need to effect change. Launched in 2000 as Intel® Teach to the Future, the program has trained more than 10 million teachers in over 60 countries. Its customizable set of course components ranges from basic ICT literacy skill training to training on tools that support the development of students' twenty-first

century skills to the training of school administrators on effective ICT implementation. The program is composed of five components: Getting Started, the Essentials Course, Skills for Success, Thinking with Technology, and the Leadership Forum. All five Intel Teach professional development courses directly target improving teachers' knowledge about effective instructional strategies and the use of ICT.

The Intel® Teach Essentials Course offers ministries of education (MOEs) a program intended to help meet the goal of creating a well-trained cadre of teachers who are able to integrate ICT into student-centered and inquiry-driven learning activities, in particular, project-based learning activities. The curriculum addresses crucial factors for creating student-centered learning environments, including the classroom management issues associated with using technology with students, conducting research on the Internet, assessing students' technology-rich work products, and managing intellectual property issues.

Divided into 10, four-hour modules, the Essentials Course curriculum guides teachers through a process of developing a complete unit plan. In creating the unit plan, teachers use technology to conduct research, compile and analyze information, and communicate with others. Teachers learn from other teachers how, when, and where they can incorporate these tools and resources into their work with students, with a special emphasis on how to support students' work on sustained projects and original research. In addition, teachers are instructed on how best to create assessment tools and align lessons with local and national standards. The course is delivered through a train-the-trainer model, using classroom teachers and other local educators as trainers to develop local capacity and to make the program more sustainable. The training uses commonly available productivity software, focusing primarily on how to use word processing and presentation software (e.g., Word, PowerPoint, Open Office) to support students in creating presentations, web pages, brochures, and newsletters.

The course includes many techniques that research suggests are necessary for professional development programs to have an impact on teacher behavior. These techniques include focusing on issues that are directly relevant to teachers' everyday work, offering a well-defined concept of effective learning, and offering opportunities for teachers to develop knowledge and skills that broaden their repertoires of teaching approaches.[xvi] Research has also demonstrated that professional development programs which, like the Essentials Course, offer teachers time to explore new content and actively engage with the ideas presented to them are more successful than programs that present prescriptive approaches to teaching.[xvii]

Bringing the Essentials Course to teachers in so many different countries has required worldwide, regional, and country-level program staff to maintain a constant balance between investing in localization of the program and a commitment to its core themes and goals. When the Essentials Course is introduced into a country, the Intel management team enlists local education experts to adapt the program to better conform to the requirements of that country's education system while maintaining certain core concepts such as the focus on project-based learning and the use of a unit plan to structure the training activities. In each country, the program is shaped by the current education system, traditional educational practices, level of economic development, and ICT infrastructure of each country. Nevertheless, the evaluation data suggest that the Essentials Course can be adapted to a wide range of contexts.[xviii]

THE INTEL LEARN PROGRAM

Designed for informal, community-based educational settings, the Intel Learn Program provides a project-oriented, hands-on approach to ICT learning for under-served children ages 8–16. Over the past few decades, evidence has accumulated to show that hands-on learning or "learning by doing" can produce significant outcomes.[xix] In Intel Learn, children work on problems that have relevance to their lives, which research indicates can help children learn foundational skills useful across settings and situations.[xx] Research also indicates that instruction grounded in hands-on experiences can be especially useful for segments of the population less successful at school.[xxi] In addition, we know from research that informal, everyday activities often provide children with a richness, complexity, and authenticity that both engages them and develops their capacity for critical thinking Learning, as is increasingly acknowledged, is a "life-wide" process; that is, it occurs across all settings and situations, including in the informal settings in which Intel Learn is implemented.

The Intel Learn Program targets three primary outcomes goals:

- Technology literacy
- Critical thinking and problem solving
- Collaboration skills

Children in the Intel Learn Program follow a design sequence of open-ended learning activities, in which they explore software applications, arrive at decisions about what they would like to do, and relate their learning to issues in their everyday lives. They have the opportunity to design, create, and solve problems in collaboration with their peers and with the structure, tools, and adult guidance to gain new knowledge, arrive at standard solutions, and become proficient in basic skills. Initially piloted in late 2003, the Intel Learn Program has been implemented with over 1.5 MM children in 14 countries worldwide.

The curriculum is divided into two 30-hour units: Technology and Community and Technology at Work. Technology and Community introduces learners to skills for word-processing, graphics, spreadsheets, multimedia, and Internet research. Children use technology to understand, design, and create products relevant to community life (e.g., fliers, calendars, news articles, multimedia presentations). Technology at Work provides learners with experience using computers as they might be used in a variety of jobs and careers (e.g., designing a survey that might be used by a public health worker, creating a business plan an entrepreneur might use). The units are typically divided into two- to three-hour face-to-face sessions two to three times per week.

In addition to the curriculum, the program provides structured training for program staff—typically community-based educators or classroom teachers working in the after-school setting. The 40-hour training mirrors the hands-on, project-oriented approach of the children's program to a large extent. In the training, participants engage in the program's learning activities as children would and role-play facilitation of the course to provide constructive feedback to peers.

Like Intel Teach, the program has been localized in an effort to suit the linguistic and cultural context and is implemented using a train-the-trainer model. Governmental and non-governmental agencies oversee the training and pedagogical support teams in each country. These agencies

provide the staff, the physical facilities, and the technical infrastructure needed to implement the program. The types and combination of Intel's partners at the national level vary widely from country to country, but in each case the support of local educational agencies is an essential element of the program model. Non-profit foundations and consultants have also played key roles in the implementation of the Intel Learn Program.

EVALUATION METHODS AND FINDINGS

Since the inception of these programs, the Intel Education Initiative has partnered with the EDC and SRI to conduct program evaluations. Intel's focus on program quality has meant that evaluation efforts have been distributed among three evaluation goals:

- Formative Evaluation: ongoing analysis designed to provide feedback for continuous program improvement.
- Process Evaluation: analysis of program delivery and fidelity, serving as a means to monitor the quality of implementation.
- Outcome Evaluation: analysis designed to determine the effectiveness of the intervention.

Consistent with standard practices in the field, EDC and SRI have used mixed-methods evaluation approaches to study the Intel Teach Program and the Intel Learn Program, often relying on indirect indicators to determine the degree to which the programs are meeting their goals. The Intel Learn evaluation has largely been formative in nature, while the Intel Teach evaluation has had a more summative focus. Both evaluations, however, offer insights into what participants have gained from the programs and what the broader impacts of the programs have been.

METHODS: INTEL TEACH Essentials Course

There is a two level evaluation approach built up around Intel Teach Essentials Course under the leadership of EDC. The core evaluation focuses on the experience teachers have of the Essentials Course itself and how they follow up in the classroom and provides a standardized set of evaluation resources. But there is another level of evaluation work that explores how the Teach program supports the larger context of education transformation and the introduction of ICT into education. Each of these evaluations has asked a unique set of questions and the valuation plans and instruments are developed individually to meet the needs of each contextual study.

The core of the evaluation of the Essentials Course, led by EDC, is a set of two surveys that all countries worldwide complete. The first survey, the End of Training Survey, is given to teacher participants on the last day of the training and asks teachers to report on their training experiences. The second survey, the Impact Survey, is administered to teachers at least six months after they have completed the training and asks them to report on whether and how they were able to use the ideas, techniques, and materials presented or developed in the training in their classroom instruction. The purpose of these surveys is to understand teachers' responses to the training and to assess the kind of impact teachers believe the training had on their teaching practice. This information provides feedback on the quality of the training and the implementation processes to program developers.

In addition to these core surveys, Intel encourages individual countries to conduct localized evaluations designed to address country-specific questions and concerns. These evaluations are central to the localization process. Evaluation data offer MOEs and program staff insight into how their teachers respond to the curriculum and identify the course elements and content that teachers believe is beneficial or challenging. These localized evaluations often involve case studies and other qualitative data collection techniques that delve more deeply into issues of interest. Some countries have conducted comparison studies between teachers who have participated in the program and colleagues who have not.[11] Local evaluators have conducted observations of the training and in the classrooms of teachers who have participated in the program; they have conducted interviews with policy-makers and educational administrators at the national, regional, and school levels, and they have reviewed teacher work products to assess the quality of the instructional materials trained teachers develop.[xxii]

As the Teach program has matured, Intel began to develop evaluation questions about how the program was supporting the long-term reform goals of the various MOEs and how can the Intel Teach experience inform the global debate on ICT in education. To answer these evaluation concerns, Intel began to fund evaluations that looked at the interplay between Intel Teach, education reform and ICT issues. There were a number of interesting studies done under this evaluation focus. In the US, for example, EDC conducted a summative study of the effect of the Essentials Course in five school districts comparing teaching practice and ICT use between Essentials participants and non-participating teachers.[xxiii] Deakins University in Australia did a ten country evaluation of Intel Teach in pre-service programs in Asia that explored effective strategies to embed Teach with in pre-service programs.[xxiv] Additionally, EDC did a study of Colombia's ICT in education policies[xxv] and a study on the new learning environments emerging in successful Essentials schools in three developing countries.[xxvi] Both of these studies sought to highlight positive examples of the education transformation that can serve as a model for other MOEs.

Recently, Intel has added what might be a third level of evaluation around Intel Teach by using the network of participant teachers as an access point to recruit innovative ICT using teachers for other studies. EDC completed a study of teachers using web2.0 in the classroom to capture some of the emerging uses of these new tools.[xxvii]

METHODS: INTEL TEACH

The most recent analysis of global data, representing survey responses from 15,000 teachers in 20 countries, indicates the program has strong success rates across four indicators that EDC tracks.[xxviii] First, 75% of respondents reported that they had used the unit plan they created during the workshop at least once with their students, if not more often. This suggests that most teachers leave the Essentials Course with usable lesson plans that let them experiment with ICT in the classroom. Second, 77% of survey respondents reported that they had engaged students in new ICT-based activities (in addition to their unit plans) since the training, suggesting that the Essentials Course helps teachers use technology with students beyond just that one unit plan. Third, 81.9% of respondents reported that they had used ICT more for their own lesson planning and preparation, suggesting that the course is introducing teachers to new professional resources. Fourth, 58.6% of respondents reported that they had increased their use of project-based approaches with their

students. This finding might indicate that the Essentials course is encouraging teachers to experiment with new models of teaching. Teachers also reported positive student reactions to the ICT activities—91% of teachers said students were "motivated and involved in the lesson," and 81% of teachers stated that "student projects showed more in-depth understanding" than other, comparable work.

EDC also examined the global data by level of economic development, grouping countries according to the World Bank's 2006 categorization of national incomes based on gross national income (GNI) per capita. In reviewing the relationship between economic development and key indicators of program impact, the data suggest that there is no strict connection between the two. The program can be localized and adapted to support teachers in a variety of contexts to change their use of ICT. A majority of teachers at all levels of national income seem to be following up on what they learned in the Essentials Course. The individual national evaluations also suggest that local and national contexts and the program needs and goals are increasingly aligned, and this alignment appears to support teacher success with the Essentials Course.

The evaluations also indicate, however, that two key contextual factors continue to be different for less economically developed countries than for wealthier ones. First, while the data suggest there is a core level of in-school access to computing resources across all levels of national income, there is still a trend for teachers in the lower income countries to have access to computers only in a computer lab rather than in their classrooms. In contrast, teachers in higher income countries are more likely to have access to computers in both a lab and their classrooms. The second point at which there was a linear relationship with national income was in teachers' familiarity with project-based teaching methods; teachers from countries with fewer economic resources were less likely to have had prior exposure to the teaching methods presented in the Essentials Course. This might be due to two inter-related factors: one, with fewer resources, these countries cannot afford to offer as many professional development experiences to their teachers, and two, the Intel Teach Program might be one of the first ICT professional development programs being offered to these governments.

The survey did not ask about the training or the specific instructional and technological practices that program participants encountered. Rather, it was designed to ask teachers general questions about their instructional practices, classroom uses of technology, access to technology, and experiences with technology professional development. (The title of the survey did not mention the Intel Essentials Course, but teachers were made aware that the study was funded by the Intel Foundation.)

Results from this survey suggest that there are significant differences between Essentials Course participants and non-participants, with a higher percentage of Essentials Course participants using technology to support their teaching than non-participants. The survey data from this sample of teachers in the United States indicate that more program participants than non-participants used technology—94.4% of participants reported using technology in their practice, while only 86.1% of non-participants did so. While the study found that teachers with good ICT access and extensive experience with project-based approaches were able to benefit from the program, the analysis suggests that the program is most effective for teachers with the weakest prior knowledge of project-based approaches and the poorest access to technology.

Research on effective ICT integration shows that the pedagogical beliefs that teachers hold impact their educational technology practices. Teachers who hold student-centered or "constructivist" pedagogical beliefs tend to value technology integration more than those whose beliefs about teaching are more teacher-centered.[xxix] However, the analysis of the results from this survey suggests that the Essentials Course had a greater influence on the behavior of teachers who exhibited characteristics (e.g., teacher-centered pedagogical beliefs, poor technology access) that research has found make teachers less likely to integrate technology into their practice. EDC used data from survey questions that examined teaching beliefs to cluster respondents into three groups: teachers with strong constructivist beliefs, moderate constructivist beliefs, and weak constructivist beliefs. Evaluators then used these groupings to determine if there was a relationship between teachers' pedagogical beliefs and their responses about using technology in their classrooms. The analysis showed an interesting interaction between program participation, teachers' pedagogical beliefs, and what teachers do in their practice and with their students. For teachers with weak constructivist beliefs, the Essentials Course participants were more likely to be using ICT in their practice (93.6%) compared to the non-participants (82.2%).

EDC also conducted a thematic analysis of in-depth qualitative data presented in the 2005–2006 evaluation reports of 16 countries (Argentina, Brazil, China, Columbia, Egypt, India, Israel, Japan, Jordan, Korea, Malaysia, Philippines, Russia, Thailand, United States, Vietnam) that implemented the Essentials Course. It also analyzed quantitative data submitted by 20 countries during 2005 and 2006. From these analyses, EDC identified the significant roles that national and regional policies on education and ICT infrastructure play in teachers' ability to follow up on their participation in the Essentials Course. Policy-related factors such as the professional expertise of local leadership, the coherence and depth of national curricula and standards for learning, standards for training local teaching staff, and the range and quality of instructional resources all shape teachers' opportunities to innovate and improve their teaching practices.[xxx] Below, findings are presented regarding two factors—curricular alignment and infrastructure—that were frequently identified in country evaluations and that have particularly strong roots in local and national policy.

Curricular alignment. Findings from EDC's thematic analysis indicate that teachers in countries that have invested in reforming education policy to advance student-centered models of teaching and learning have consistently more positive and productive experiences in the Essentials Course. They are also better prepared to follow up on what they have learned when they return to their classrooms. Teachers that do not have a supportive policy context might still react enthusiastically to the content of the Essentials Course. Yet, many quickly encounter obstacles when they attempt to follow up on what they learned after they return to their classrooms. The following three, common challenges emerged from the thematic analysis of evaluation reports:

- Lack of time in the school schedule for sustained student project work
- Lack of opportunity to use teacher-developed curricular materials
- Required assessment measures that do not capture a wide range of students' skills

These challenges make it difficult or impossible for teachers to justify investing time or effort in pursuing classroom activities that cannot be sustained or do not serve their students' immediate needs appropriately.

Multiple country evaluations demonstrate that if MOEs wish to promote the use of ICT for project-based and student-centered learning, national curricula and assessments must reinforce and support this vision.[xxxi] Many countries are at some stage of a process of curricular reform and/or reform of assessment practices, but few countries have moved far enough along in this process to have fully implemented new curricula that might align more closely with the models of teaching and learning emphasized in the Essentials Course.

Infrastructure. In order for teachers to follow up on their training and sustain student-driven, well-integrated uses of technology, ICT tools need to be easily accessible, reliable, and available in large enough numbers to support a variety of student activities. Providing and maintaining an adequate ICT infrastructure is a constant challenge, even for schools with considerable resources. The thematic analysis revealed that a significant minority of teachers participating in the Essentials Course does not have adequate access to technology, and a small group of participants have no access to technology at all. Many participating countries have established policies to drive the deployment of ICT and Internet access in schools, but in many cases these policies have not yet been implemented at the local level.

The evaluation of the Essentials Course program has been designed to gain a comprehensive understanding of how the program functions in a wide range of environments in order to support program development and improvement, and to gain perspective on the fidelity of program implementation. The surveys of teachers' responses to the training and their use of ICT in their classrooms provides insight into teachers' experiences, while the local evaluations illustrate how the program works within each country's educational environment. Current findings suggest that the program is well-received by teachers and that they find it useful for integrating ICT into their classrooms. The case studies and in-depth research also demonstrate which components of the program engage teachers and afford them the opportunity to experiment with new approaches and tools.

METHODS: INTEL LEARN

In partnership with local research organizations, SRI has conducted a mixed-methods evaluation of the implementation of the Intel Learn Program in each of the nine participating countries. The evaluation has included:

- Collection of program completion data
- Observations of trainings at the national, regional, and local levels
- Observations of program implementation with children
- Surveys of teaching staff at multiple points in their involvement
- Teaching staff logs and interviews
- Stakeholder interviews
- Collection and analysis of student work
- Case studies of communities and regions impacted by the program

To measure student outcomes, in 2006 SRI developed two types of assessments of student learning: a rubric-based method for analyzing student work products and a multiple-choice assessment closely aligned with the Intel Learn curriculum. (The multiple choice assessments, which focus on the processes for creating the types of technology products featured, were developed for an in-school version of the program, Skills for Success, and have not yet been used in any of the implementing countries.) Evaluators have used the rubric to assess the quality of a sample of student work products in all participating countries. The original intention in developing the rubric was to track a sample of groups of students over time to attempt to detect changes in the quality of their work. This strategy did not prove practical. Nonetheless, evaluators in each country have piloted the rubric on a relatively large number of student work samples, analyzing 3,466 samples of learners' activities (work completed prior to the final project) and 1,077 examples of learners' final projects. The work was rated on five dimensions (originality, technical skills, required elements, communication to audience, collaboration) on a four-point scale (needing improvement, approaching expectations, meeting expectations, and exceeding expectations).

Although focused on formative and process evaluation, the work of the worldwide evaluation team has used diverse data sources to monitor the outcomes of Intel Learn. These sources include student completion rates, independent observation of student collaboration and engagement, staff and stakeholder report of program successes, and, most importantly, independent analysis of student work products.

FINDINGS: INTEL LEARN

Overall, findings across evaluation methods reveal many positive outcomes. Most notably, the majority of children that enroll in the program remain in the program. Children freely "vote with their feet" when they decide whether they will participate in a program in an informal educational setting. In these settings, participation rates are noteworthy indicators of a program's potential. In 2006, Intel Learn's completion rates (i.e., attending a specified number of courses and completing activities) ranged between 85% and 99%, averaging 94% across the nine countries. Other key findings include:

- Teaching staff reported training prepared them well for facilitating the program (an average of 4.3 on a scale of 1 to 5 where 1 is not at all prepared and 5 is extremely well-prepared).
- The majority of teaching staff, also classroom teachers (many are not), reported that they had used methods from the Intel Learn Program in their regular classrooms.
- Teaching staff reported that their students were prepared to undertake their final projects and had improved in their skills by the end of the course (an average of 4.0 on a scale of 1 to 5 where 1 is not at all prepared and 5 is extremely well-prepared).
- Staff reports, observations, and work sample analyses indicate that learners become more proficient with technology over the course of the program.
- Observations by independent evaluators indicate that student collaborations are effective, inclusive, respectful, and communicative.
- Staff report and observations indicate that students were highly engaged and motivated.

Analysis of learner work (based on the rubric described above) shows that a majority of learners meet or exceed expectations in originality, technical skills, required elements, communication to audience, and collaboration. In 2006, 69% of the 4,543 pieces of learner work submitted and analyzed met or exceeded expectations, and only 8% of work fell into the "needing improvement" category. A slightly smaller percentage (67%) of learners' final projects met or exceeded expectations. Eleven percent of project samples fell into the "Needs Improvement" category.
These findings were largely replicated by an SRI analysis of a random sample of learner work from Chile. This analysis served to assess learning outcomes in the program better and to test whether evaluators were applying the rubric in a consistent and reliable way. A team of SRI coders[xxxii] conducted independent analyses of a random sample of 337 of the approximately 1,000 pieces of learner work produced in Chile during the program's first year there. Findings show that 63% of the samples that the coders scored represented work that fully met all the expectations for learner performance; this rate was comparable to the overall rate across all other countries. Moreover, many of the samples considerably exceeded expectations for these activities in regard to their originality, quality of communication, use of technology, and other assessment criteria. An additional 31% of the work samples that SRI scored closely approached expectations. Findings for learners' final projects, which consist of extended multimedia presentations developed by teams on topics of interest and import, showed that 83% were at the highest levels of achievement. Further, because the "approaching expectations" category represents work that is only marginally below the standards of achievement targeted by the program, SRI's analysis of the Chilean sample provides evidence that almost all learners are achieving at high levels or are very close to doing so. These findings, viewed in light of the comparability of the Chilean data from other countries, indicate positive learning outcomes for students in the program throughout the world.

Overall, the positive indicators from the evaluation and characteristics of the Intel Learn program suggest that it represents an approach to ICT learning that is engaging for participants and is aligned with twenty-first century teaching and learning approaches.

There are impacts other than individual and cognitive ones to consider, however, and the broader social change effected by transfer of educational resources lies squarely in the appropriate purview of educational evaluation. Towards these goals, in April of 2010, researchers from SRI conducted site visits in communities throughout Chile to document the ways in which the program has developed and the types of impacts it has had on the *communities* where it has been implemented—looking beyond individual learning outcomes to the program's effect on life outcomes of participants and their families, their neighborhoods, and other collective groups that Intel Learn has served.

SRI's case study of the impact of Intel Learn in Chile shows two important overarching findings:

(1) The program has been adapted to fit in a wide variety of social needs and niches.

(2) The program has been transformative across contexts not just at the level of individual learning, but also at the level of community impact.

These two findings are highly interrelated. As the program has met the needs of populations ranging from elementary children in school to university faculty to adults with minimal education, it has also allowed for collective change in pedagogical vision, community action, and social development. This type of effect was seen multiple times among the various sites we visited.

More specifically, our study shows that youth programming with Intel Learn in Chile has been far-reaching and impacted children's lives by empowering them to take on new challenges using digital tools and systematic approaches to creating useful products with these tools, and providing them with distinct and meaningful connections to people and groups with resources to offer.

Adult programming of Intel Learn in Chile has had dramatic impacts on the lives of participants. Adults benefit from new experiences with the kinds of changes they can effect when they have the proper tools, support, and structure; they also benefit from the connections and new community bonds that they form. Adults we spoke with were committed to using their Intel Learn experiences for developing personal tools for micro-enterprises and other practical benefits, or enacting social change in their communities and better addressing the needs of their families.

Impacts of the Intel Learn course extend to facilitators, as well, many of whom experienced profound personal changes as a result of their participation in the course. Our findings indicate that, because of the program, facilitators for Intel Learn in Chile become deeply engaged in providing service to the greater community, and experienced in both learning and teaching with non-traditional pedagogy.

The program is supporting community change by:

- Promoting gains in human capital that readily translate into new capacities and improvements in the community.
- Instilling appreciation of and interest in community service.
- Benefiting from the aggregate effects of many people from the same community participating in capacity-building experiences.
- Supporting connections to networks of helpful people, useful organizations, and valuable information.
- Creating linkages across communities and organizations, helping them grow and succeed.
- Contributing to the infrastructure for modernizing Chile in the digital age, thereby creating powerful societal impacts.

SUMMARY OF FINDINGS

A substantial amount of information about how the Intel Teach Program and the Intel Learn Program function across a diversity of national contexts can be drawn from the formative and process evaluations that have been conducted to date. In many countries, these programs have been functioning for over three years, and the consistency of the evaluation results suggest that the programs have reached a level of implementation maturity and fidelity which would allow Intel to undertake another level of evaluation and research around the programs.

Current data suggest that the Intel Teach Program and the Intel Learn Program hold the potential to enhance learning environments and to build teacher capacity to adopt student-centered pedagogical practices and to use ICT tools in pedagogically appropriate ways. SRI's evaluation of the Intel Learn Program and its characteristics indicates that the program represents an approach to ICT learning that is engaging for participants and is aligned with twenty-first century teaching and learning approaches. The findings on the Intel Teach Essentials Course from EDC and the local evaluators in

each country suggest that the Intel Teach Program can encourage change in teacher practice. The findings also provide insight into the complex mechanisms through which the programs function in multiple environments.

ANALYSIS AND LESSONS LEARNED

Although many corporations offer some form of philanthropic educational initiative, one of the most distinctive aspects of Intel's global initiatives has been the importance of evaluation—it has been included from the beginning. Intel's commitment to documenting and evaluating its programming has been evident in the planning and design processes for its new programs and the allocation of budgetary and human resources, anticipated and supported with dicta from the "top down." Between 1999 and 2010, Intel invested over $10MM in evaluation research to support its ongoing and diverse educational efforts. Paige Johnson, Director of Intel's K-12 programming in the early phases of the Teach program, often took the position that only once evaluation results were available would certain types of decisions regarding development and direction be able to be made.

In the earliest phases of the original, U.S.-based "Intel Teach to the Future" initiative, Intel invested heavily in formative evaluation of the program. Both structural and substantive elements of the program were constantly under scrutiny, and formative feedback to the program team informed a range of modifications during the early years of each program's development, ranging from shifts in the implementation model that better accommodated the needs of the Master Teachers, and more time and supports for critical aspects of the program, such as peer feedback on unit plans and the development of assessment rubrics for student work. Throughout this process, Intel team members exhibited a fundamental and sustained curiosity about how the program was playing out in the field, and a passion for responding quickly and clearly to needs that were identified by the evaluation. Among the major investments made in this regard was the hiring in 2004 of a senior manager for the education group's research and evaluation. In sum, the educational development teams at Intel have from the outset had the objective of monitoring their efforts and measuring outcomes in mind, planning for evaluation across the spectra of formative and summative, domestic and international programming.

Intel's support for external evaluation has been rooted in the company's orientation to treating its educational programming efforts as a learning and development process of it own. The work has proceeded, effectively, as a form of action or design research, grounded in questions about what does or does not work well and recursive in its impact on new stages of design. This emphasis in Intel's evaluation efforts has meant that individual programs and country-level evaluators worldwide have not been subject to a system of accountability or requirements for fidelity as much as drawn into a culture of program development. Intel's leaders have recognized that the process of inquiring into, documenting, and reflecting on implementation and outcome factors is key to helping local teams improve their programs and reach their goals. The formal requirements that evaluation be conducted at sites of program implementation have created new capacities among program development specialists worldwide, as they have turned their attention to more systematically investigating parameters of success.

As we have discussed in the previous sections of this paper, the evaluation efforts undertaken have been in close alignment with the goals for the evaluation, and the accomplishments of the evaluations must be considered in light of this. The primary goal Intel has established has been to figure out if program is meeting its objectives or not, using indicators and analyses that can allow the research and evaluation teams better determine how to improve or change the programs, as needed. These objectives are specific to local contexts, and derive from an interaction between the global and local teams, adhering to a principle of co-development that takes into account several requirements for efforts to monitor the development of and expand the implementation programming. The most fundamental requirement is that the program as implemented at a new site retain enough characteristics of Intel Teach or Intel Learn to still be true to the fundamental objectives and design of each of these programs. Within the constraints of this consideration, the evaluations have allowed for latitude that defies norms of "fidelity" in implementation and rather focuses on adaptation.

In addition to retaining fundamental features of the original program, the requirements for which allow for a fair amount of flexibility, numbers are a key consideration. Intel programming, as discussed, has never been intended to be "boutique" but rather to instill large-scale cultural shift, as reflected in the strategic decision to reach 10MM teachers worldwide with the Intel Teach program, and to ensure that large number of children participate in Intel Learn, which has passed the 1.5 MM child mark. In addition to reaching large numbers, the primary objectives for program implementation include meeting benchmark objectives. These benchmarks range from changing practices and beliefs to ensuring that programs are meaningful and enjoyable. Central to evaluation objectives is understanding how the programs work in the context of each country. Identifying new ways to serve the global community at the national level through improved or added programming has always been a long-term goal of the Intel effort.

The evaluation itself—not just programming—has had to adapt to match local needs, capacity, and culture. Each country's evaluation must be must be practical at the local level. As with the programs, goals are not be strongly imposed. That is, the evaluation is be tailored to local capacity and resources, as well as educational history and culture, to serve local needs for documentation and research. This flexibility can only be achieved with international collaboration, support, and an eye to capacity building as well as to each country's context and experience. Just as providing new curricula and programs involves a candid assessment of how the program will impact each local context, evaluation designs, instruments, and offerings developed at a global level assessed and adapted to be useful in the specific country context.

Above all, the evaluation efforts supported by Intel have sought to be relevant and reliable, closely linked to the programmatic goal of changing classroom practice for teachers. For both Intel Teach and Learn, the evaluation has been structured to include a set of global protocols. A challenge for the global research team has been to design protocols that would accurately assess what was occurring in the classroom in a variety of contexts. The solution was to create protocols closely focused on the programmatic elements (i.e. what teachers learn in the program), rather than on the classroom changes that one might expect. Although Ministries of Education and multinational agencies often want to know what is changing in the classroom, it has not been possible to create a standard measure of student performance or classroom change, given the different starting points in each country and the prohibitive cost of such studies. Intel's focus has been on creating conditions

for improving student performance and outcomes, by creating shifts in culture of beliefs and practice. Conducting a large trial studying student test scores would be fundamentally problematic, since there is an essential lack of validity between the program's focus and what would be measured in a randomized control trial. Rather, on a global level each context or country serves as a case that can be applied to new situations. That is, the evaluation of Intel educational programming has functioned as implementation research that uses all and any evidence in case studies to plan implementation in new settings.

To ensure that EDC and SRI, as long-term evaluation partners for Intel's programs, have not lost their objectivity, there are multiple "checks" on the system. First and foremost, EDC and SRI function as critical friends to Intel; without a critical stance, they would be much less useful. The trilateral nature of this core evaluation arrangement also increases the accountability each member has to the educational objectives of the corporation. Each organization specializes and complements the others' work, creating a distributed capacity to conduct the research and also to serve as a critical friend to one another in addition to Intel. Intel supports other evaluators for projects beyond those discussed in this chapter, and they similarly provide counterpoint to the research approaches and interpretation of findings developed by each. The funding environment in which Intel's external evaluators work is not static; each organization works on multiple other projects and determines annually how and whether the evaluation of Intel's programs fits its portfolio. Similarly, Intel each year determines whether to continue the relationship with SRI and EDC. Ultimately, each organization's professional reputation is at stake, as it is in all contract research work.

The most important indicator of the critical role EDC and SRI have played[xxxiii] for Intel how evaluation findings have shaped Intel educational programming. For example, case studies of Essentials have provided an understanding of what works well in the program and should be replicated as a "best practice" in other settings. Such case studies have revealed, among other findings, that when Essentials is implemented in conjunction with other programs as a part of a broader education reform initiative, there is a multiplying effect and results are particularly strong. In one instance, a school in rural India combined Essentials with a reform program from the local teacher training college to great success. Also, through EDC's work and the work from Deakin University in Australia, Intel has developed a deeper sense of the contextual factors educational institutions can change (or coordinate) to support teachers and schools in following up in the classrooms—aspects like supporting school leadership, or aligning curricula with reform goals, supporting incentives for PD, and proving follow up support. Evaluations have also helped Intel to develop a deeper sense of the contextual factors educational institutions can change (or coordinate) to support teachers and schools in following up in the classrooms—by, for example, providing support for school leadership, aligning curricula with reform goals, and supporting incentives for PD.

Evaluation findings have also had impact on program design. After the first round of Intel Learn programming, changes were made to the size and shape of the learners' materials, the organization of the curriculum units, the frequency with which certain activities were undertaken, and features of the facilitator training. Intel Teach programs have also changed over the years as feedback from evaluation were integrated. The focus on essential questions in Intel Teach has evolved and deepened as evaluation found this to be of great interest to teachers but still challenging for them to understand and implement in their classrooms.

A third way in which Intel programs have been impacted by evaluation findings is in shaping or changing the context in which the programming is unfolding. A key example comes from implementation of Intel Teach in Pakistan, which was launched in 2002. During the year, surveys, interviews, and focus groups were conducted around the nation to understand the nature of challenges for teachers in changing their practice based on the training. As in many countries, time, infrastructural supports, and access to technology presented broad scale challenges that would require time and investment to effectively address. One particular problem, however, was a function of a policy that could easily be changed. In evaluation surveys, 55% of teachers noted that they could not schedule time in the computer lab, even when it was not being used, because of simple lack of accessibility—the labs were locked when not in use. Based on evaluation findings, the state of Punjab instituted a policy that required all school-based PC labs to allow access to all teachers and students in support of the Intel Teach to the Future Program.

The fourth—and perhaps most important—way in which evaluation has shaped Intel programming is through providing findings that alter or inspire strategic directions. Repeated findings that some teachers did not feel adequately prepared in basic skills to undertake Teach Essentials led to the development of the Getting Started course, an introduction to the functions of technology and to reform pedagogy. Findings from evaluations had also indicated that many participants in the Intel Learn program were ready for and wanted additional programs to take them further once they had completed the basic Technology and Community Course. Because of this, Technology at Work was developed, including a unit on using technology in teaching settings. The synergy between the Intel Teach and Intel Learn findings in this case allowed for the creation of a new course that addresses a basic need within the teaching field worldwide and fills a hole that previously existed in the Intel Education portfolio.

Intel Learn developed in part as a result of evaluation efforts, which included a theory of change that helped all involved realize that the Clubhouse model and Intel Education's goals to promote student learning of a certain set of skills did not fully mesh. The evaluation also helped Intel recognize what parts of its broader goals the Clubhouse did meet, which led to moving the program to a different part of Intel. Intel Education simultaneously received requests from Ministries of Education to develop a basic digital inclusion program for children, which led to the creation of Intel Learn.

A more recent example stems from the Intel Teach Essential Online evaluation. The depth and breadth of that course—including a sheer volume of material—indicated the value of creating a more modular course that would target specific reform areas and allow for implementation as feasible on a more customized basis. Evaluation findings, in this case, corroborated the experience of and requests from program managers at the regional and country level, who realized the difficulty of including all the content in the TEO course within one training experience and saw the advantages of a more modularized approach, leading to the development of the Elements course. Evaluation research from the case study of the community impacts of Intel Learn in Chile show the multiple ways in which the program can be adapted for different purposes and creates documentation that can serve as an example for implementation and for research in other countries.

CONCLUSIONS

At this point, we offer some preliminary thoughts regarding the role of Intel evaluations to broader concerns about corporate activity within the global educational environment. Intel stands as a lead player among the "new donors" in the global educational philanthropy—a domain into which have entered dozens of private corporate entities, including Microsoft, Cisco, and Oracle as well as non-US based corporations such as Schlumberger. Evidence suggests that Intel stands apart both in the early stage in its educational programming at which it engaged external evaluation and degree to which it has sought the input and scrutiny of outsiders. In these ways, Intel has developed a culture of transparency and accountability for its efforts in promoting its educational agenda.

What this means, more broadly, is that Intel's agenda itself has been open for critique. The claims Intel's corporate and foundational spokespersons have made amount to a rhetorical commitment to serving as a catalyst for shifting global educational practice away from the bureaucratic knowledge transmission models of the 19th and early 20th centuries to better align with the recent research on teaching and learning and the progressive goals of 21st century education. This research has theoretically advanced and empirically validated approaches to student learning through a process of constructing and developing knowledge and the meaning of learning in their own lives. The bottom line is that the evaluation efforts this paper has examined strongly align with an agenda that prioritizes pedagogical improvements within a framework of broad educational reform rather than the distribution of technologies per se, unexamined with respect to the impact this has on the schools, communities, educational systems, and cultures into which the technology is introduced. Intel has consistently sought (a) to focus on the pedagogical impacts that it claims are the goals of its programming and (b) to substantiate those impacts.

The approaches have sought evidence at many levels, both through broad and comparable quantitative data that has been useful to benchmark impacts on teaching practice and learning outcomes, and through qualitative case studies that examine at a ground level the consequences of the implementation of Intel programs and the actual experiences teachers, students, administrators and other stakeholders have within the framework of programming. These examinations of program impacts, conducted worldwide and at great expense, hold Intel accountable for the quality of programming rather than, as typically is the case in corporate accountability, quantity as a sole or even primary metric of success. Intel, then, has used its evaluation finding to create a deliberate and progressive culture of program improvement, building at each stage only on designs that have been shown to be effective in line with the agenda and intentions—the programmatic theory of change—to which Intel has publicly committed itself.

A real understanding of Intel's efforts must account for the role of external evaluation and the attendant open scrutiny that is part of it. Intel's education programs have consistently been technology and platform agnostic. Direct links between program evaluation and corporate marketing have been prohibited since the inception of Intel Education. Its products, additionally, stand at a remove from direct consumption—they are part of products, designed, marketed and sold by other companies. The simplistic picture of a product promotion and sales motivation that some claim characterizes all corporate philanthropy in the global education space needs to account for what might be called the Intel difference—or as Paige Johnson repeatedly has told outside

evaluation teams: "What I want from you are findings that can better help teachers teach, and better help learners learn."

Evaluation, as we have shown, has great power to not only describe results of educational programs, but also to inform their development and implementation.

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[xxxii] Interrater reliability exceeded 80%.

[xxxiii] As noted earlier in this paper, EDC and SRI have not been the only sources of critical feedback to Intel. Other evaluation agencies, particularly at the local country level, have provided formative findings that have shaped programming throughout the piloting and implementation of Intel's offerings.

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