Intel® Education Research on Technology Adoption in Large-Scale Deployments: Guiding eLearning from Vision to Practice

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Intel's Deployment Research is a multi-year program designed to help stakeholders learn from the experience of large-scale eLearning deployments. The research has impact both locally, in guiding specific initiatives, and globally, in generalizing themes and lessons learned to inform the success of current and future initiatives. Developed by a team of researchers from Intel, EDC, and SRI International and enacted by local researchers in each deployment setting, Intel Deployment Research provides a framework to look both within and across a variety of eLearning deployments. This program is unique in the large scale of participating initiatives, aiming to benefit large numbers of communities and schools, and the methods developed to support research at this scale.

This report is the second in a series, describing results and lessons learned across the first four years of the Intel Deployment Research program. The first report introduced a common framework and dimensions, analyzed early experiences of eLearning deployments in five countries or regions (including national deployments in Argentina, Macedonia, and Portugal, and regional deployments in the State of Piraí, Brazil, and in Kocaeli province, Turkey) and suggested general conditions for success based on experiences in the deployments investigated to date. The current report provides new insights, informed by a dataset that is both broader and deeper:

- **Broader**: The portfolio of eLearning deployments now includes initiatives in Bosnia; the City of Shanghai, China; Terengganu Province, Malaysia; and a new national deployment in Turkey.
- **Deeper**: Participating deployments in Argentina; Macedonia; Portugal; and Kocaeli, Turkey have continued to mature in 2011-12, and several now offer experience of implementation in classrooms and communities.

These programs are described in more detail in the next section of this report.

The remainder of this report is organized as follows:

- **Section 2. Participating eLearning Deployments** describes the initiatives included in this report, with a set of important characteristics that help to categorize this diverse set of initiatives.
- **Section 3. Common Framework and Dimensions** offers a conceptual framework of key activities at different phases of the initiative to help decision-makers compare and learn from different eLearning efforts.
- **Sections 4-7** describe each phase of activity in turn, offering important themes that arise from the experiences of the eight initiatives.
- **Section 8. Conditions for Success** offers a set of recommendations for decision-makers who plan to undertake an eLearning deployment.

**Intel Methods for eLearning Deployments Research**

The research takes an ethnographic approach to elucidate the complex process of education technology integration in various geographical regions and across a range of significant eLearning deployments. Depending on the maturity of each initiative, collected data include:

- Stakeholder interviews
- Observations of teaching and learning
- Background materials and documents
- Prior research and evaluation reports

These methods are designed according to a common framework, which is adapted and implemented by a leading research team in each setting for results that are solidly grounded in local contexts yet informative for global analysis.

Protocols and templates from this project are available in Intel’s Guide to Monitoring eLearning Programs.

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This research encompasses a diverse set of eight eLearning deployments. While they all represent significant rollouts of 1:1 devices to youth in their country or region, they vary in primary goals, geographical scale, and many other important contextual considerations. The initiatives are described in the box below.

Each initiative under investigation falls under the broad category of an eLearning deployment that is being integrated into the formal primary education system or the lives of families in communities. An analysis across initiatives, however, indicates that each eLearning deployment begins from a unique starting point, addresses distinct goals and expectations, encounters disparate challenges, and operates in specific local and educational policy contexts.

Early observations indicate a clustering of initiative types into three key areas: digital inclusion, economic development, and improvement in teaching and learning. For example, while the initiative in Kocaeli (Turkey) is aimed at promoting a stronger regional economy, the Conectar Igualdad program primarily hopes to provide equal access to technological and educational opportunities for children across Argentina.

We hope that over time and with the expansion of Intel’s global research effort, this initial typology will evolve into a clearly defined taxonomy.

While we acknowledge the distinctive nature and particular characteristics of each eLearning deployment, our research also has shown how each initiative builds from a shared framework. This common framework and dimensions is presented in Section 3. For further information see our first whitepaper.
Argentina: Conectar Igualdad. Conectar Igualdad is a large-scale nation-wide initiative aimed at increasing educational equality and promoting economic development. The initiative will distribute approximately 3 million Intel® classmate PCs to secondary schools from 2010 through 2012 to enable schoolchildren to engage in 1:1 learning.

Bosnia (Rpublika Srpska): Project Dositej (the Dossitey Project). Rpublika Srpska hopes to modernize education and prepare students for future job markets by implementing a new 1:1 eLearning initiative, Project Dositej. The government will distribute Intel classmate PCs to the 10,200 students in Grades 3-5; provide laptops and teacher training for 408 participating teachers; and translate Intel® skoool™ content into local languages for teachers and students to use.

Brazil (Pirai): Um Computador por Aluno (One Computer per Student). The municipality of Pirai is piloting the federal 1:1 computing program, Un Computador por Aluno (UCO), whose goals are to advance social and economic development by increasing ICT skills and improving education more broadly. Through UCO, all students at municipal schools in Pirai will receive Intel classmate PCs.

China (Shanghai): The e-schoolbag Project. The purpose of the Shanghai e-schoolbag project is to create a “ubiquitous learning” environment, where all students can develop 21st century skills through self-directed learning using mobile devices. The government is distributing individual mobile learning devices to all students in kindergarten through secondary school; creating digital content and online courses; and building a public education service platform for administrators, teachers, and students to access eLearning tools and resources.

Macedonia: Computer for Every Child. In Macedonia, the Computer for Every Child initiative aims to promote regional economic development by increasing ICT literacy among teachers and students. The government distributed 53,000 Intel classmate PCs to students in grades 1-3, and provided infrastructural improvements and teacher professional development, to support increased use of ICT in the classroom.

Malaysia (Terengganu): The e-Book Project. The e-Book Project in the Malaysian state of Terengganu aims to increase computer literacy among students and their families to create an innovative, tech-savvy citizenry. To that end, the government has distributed 93,000 Intel classmate PCs loaded with digital content to primary students beginning in Grade 4 (ages 10-11); showcased selected “virtual classrooms” to illustrate the vision for technology-enhanced education; and provided professional development and school-based technical support for teachers.

Portugal: The e.Escolinha Project. The Portuguese e.Escolinha Project aims to increase access to ICT for students and families and enable ICT-supported learning both in and out of the classroom. As part of this initiative, the government has provided nearly 500,000 Intel classmate PCs at subsidized prices to families with students aged 6-12; offered training for teachers and families; and supported the development of online portals and digital content.

Turkey (Kocaeli): One Computer Per Child. The One Computer Per Child initiative in the municipality of Kocaeli has three goals: eliminate inequality in education and narrow the digital divide; support ICT skills development to create a pipeline of ICT-literate professionals; and provide a model for similar deployments throughout Turkey. To do so, the government is providing computers to 6th grade students and their homeroom teachers; creating a digital curriculum; and providing ICT basic skills training for teachers.
3. Common Framework and Dimensions

As described above, the eLearning deployments featured in this report have a diverse set of goals, contexts and designs. This project has taken a ground-up approach to generate a framework that describes a set of important considerations: four broad phases that define the process of significant eLearning deployment, and sets of factors that must be considered by stakeholders in each stage. In this way the framework offers a shared vocabulary for describing and evaluating eLearning deployments. This framework is presented in Table 1 below, and described in more detail; see Glossary for definitions of key terms. In this report, the elements of the framework have been updated slightly to reflect additional data from initiatives that are now in the Implementation and Re-informing Vision phases.

Phases of the framework are as follows:

- The first phase of any eLearning deployment is to define the **program vision**. Multiple factors inevitably shape this vision, including the policy and educational context; goals and priorities for the initiative; the unique personalities and backgrounds of those leading the efforts; and financial realities for implementing and sustaining the initiative.

- In the **planning phase**, leaders must define all of the key features of the initiative, including the geographic scale for the initiative, roles and responsibilities for implementing different initiative components from infrastructure to program evaluation, and strategies for communicating between stakeholders about all aspects of the initiative.

- **During implementation**, stakeholders enact the components of the initiative, from installing infrastructure to deploying technology, using technology in the classroom and at home, providing and participating in professional development, undertaking evaluation, and communicating about progress.

- The **re-informing vision** phase refers to the on-going process of examining the initiative and its implementation; identifying challenges, successes, and emerging results; and using that information to refine and strengthen all aspects of the initiative.

### Table 1: Common Framework of eLearning Programs

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Although these phases describe the activities involved in designing and implementing an eLearning deployment, the reality is somewhat more intricate than this picture implies. First, although the framework defines stages in a linear progression, the process of eLearning integration is actually more cyclical than linear (see Figure 1). As stakeholders plan and implement the initiative, they may also adjust the vision to match realities; early implementation may create the need for stakeholders to plan for circumstances they hadn’t foreseen; and certainly, the whole purpose of re-informing vision is for stakeholders to intentionally create learning opportunities throughout the experience to enable ongoing improvements.

This eLearning deployment cycle operates at multiple different governmental levels: it may initially be defined at the federal level, but some elements of design and support may be owned at the provincial level, while implementation is ultimately enacted at the school level. Each level can be described as a unique ecosystem, in which a new configuration of players and influences further shapes the initial vision and plans to make the program locally tenable. Each level implies, for example, the need for localized vision and planning, and for differing roles of stakeholder groups, from national policy makers, to regional/provincial authorities, school administrators and leaders, teachers, community organizations, and individual participants.

The following sections describe themes that emerge from analysis across the eight participating initiatives in each stage of the framework.
4. Vision

Typically, a small group of decision-makers articulate the program vision. Although these leaders vary across contexts in their vision for the eLearning deployment, they all face certain contextual factors and considerations that shape their work. The general policy context and program funding considerations, for example, are two key factors that shape and constrain goals and priorities. The research identified themes that characterize the vision for different eLearning deployments across contexts.

Chosen goals, and their specificity, have implications for the immediate focus of planned components. As described above, different initiatives focus on substantially different goals, ranging from economic development to social equity to improving education. Goals also differ in their specificity. For example, the initiative in Shanghai (China) has specific goals focused on “ubiquitous learning” through individualized 1:1 eLearning, with an educational service platform and digitized content. In order to meet these goals, the initiative emphasized school-related activities. Terengganu’s (Malaysia) initiative had precise goals focused on digital social inclusion, especially getting all families, including rural families, access to computers. To meet these goals, the initiative logically began with technology distribution to families. The initiative in Kocaeli (Turkey) has broader and loftier goals about creating the “Silicon Valley” of Turkey, cultivating innovators, and thus expanding economic development. The initiative provides technology for teachers and students to improve learning as an intermediary for creating a pipeline of STEM professionals, but some ambiguity remained about the actual nexus of the program (home or school) and how users should leverage the technology.
The degree of policy alignment can facilitate or hinder initiative success. It seems logical that policies across levels and domains would need to be aligned with one another in order to support program implementation. In Shanghai (China) the e-schoolbag project builds on an incremental strategy for technology integration, and currently sits within a coherent collection of educational policies. The overarching policy, called the Shanghai Medium and Long-Term Development Plan for Education Reform and Development (2010-2020), introduced “ubiquitous learning” as its central goal and as a core strategy for advancing education throughout the city. Becoming more specific, the Shanghai e-Educational Trial Program (2011-2015) outlines precise short-term goals for technology integration in education, such as creating a comprehensive technology infrastructure for the education system and establishing an eLearning environment to support student learning. The e-schoolbag program has its own goals and strategies that fit within these broad policy directives. In some instances, however, initiatives encountered policy conflicts that presented challenges for the eLearning initiative. In one setting, a national law prohibiting students from bringing devices to school created a barrier for schools participating in the eLearning initiative, forcing them to obtain special waivers before implementing the initiative. In another case, a policy requiring all teachers to use technology for 30 percent of instructional time was met with mixed reactions from teachers, some of whom had the capacity and motivation to follow this standard, while others did not.

The vision for eLearning deployments sets the stage for planning activities, which concretely spell out preparations, processes for operations and coordination, and mechanisms for evaluation that are required to translate the vision into practice.

5. Planning

In the planning stage, top-level program leadership joins forces with a wider group of stakeholders to specify details about program design and implementation. For example, leaders decide what the initiative will entail, determine who is responsible for oversight and implementation of specific program components, define strategies for stakeholder engagement and communication, and prepare for rollout. This research identified factors that influence program planning for eLearning deployments across varied contexts.

Clearly articulated and well-communicated vision and goals are a critical prerequisite for smooth progress during the planning stage. Stakeholders on the front lines of implementation are more likely to provide essential support if they have a clear understanding of the program vision and the value it can be expected to provide to teachers, students, and families. Conversely, in some of the eLearning deployments studied, challenges arose when stakeholders who were responsible for local implementation did not have a strong understanding of the underlying program goals.

In two countries, a lack of communication between federal leadership and local governments resulted in limited local support for the project and uncertainties at the local level about implementation specifics (for example, around infrastructure and professional development). A third initiative was characterized by limited communications about eLearning vision and goals from the responsible government office to its partners at the local Ministry of Education, the school community, and the public. As a result, teachers questioned the value of the initiative and felt unsupported by the local MoE to implement it; consequently, they were not actively involved with implementation. The initiative also suffered from inconsistent priorities espoused
at different levels of the system: while the sponsoring government office highlighted children and families as the top priority, ICT officials and school-based personnel believed that teachers and students should come first.

During planning, participation from a broad range of stakeholders is necessary to advance the project from political promise (vision) to local enactment (implementation). At the planning stage, the pool of stakeholders expands beyond early champions to include decision-makers from a wider range of government and educational organizations. At each level, stakeholders in some of these initiatives performed important roles, such as creating plans to implement the vision is locally appropriate ways, determining the technical and human capacity for implementation across sites, identifying strategies for enhancing capacity as necessary, and managing local program coordination, operations, and communication.

The eLearning initiative in Bosnia, Project Dositej, recently began expanding participation beyond central leadership. For example, the government has created an Electronic Management Information System that allows e-mail communication between principals and the Ministry, supporting open bidirectional communication between schools and government authorities. The system is expected to expand to include e-mail addresses for all teachers and free hosting for school web sites. The government has also already begun providing advanced IT training for teachers. As part of this course, teachers create online lesson materials that have formed the beginnings of an online repository of teacher-generated instructional resources.

The Conectar Igualdad initiative in Argentina illustrates both successes and challenges that can occur when expanding program participation to move from high-level vision to program implementation. In the early stages, the government established an effective system where a federal Conectar Igualdad committee facilitated communication across multiple agencies, including the MoE, the Ministry of Planning (MPF), and the pension and retirement fund (ANSES). However, aggressive rollout timelines (described above) prioritized technology distribution over gaining buy-in and alignment with provincial and municipal stakeholders. Some challenges ensued: for example, because of uncertainties about infrastructure responsibilities, many schools received computers well before the supporting infrastructure was ready. Recognizing these problems, Conectar Igualdad leaders worked to build more local participation and planning. Eventually, provinces created local action plans that, with approval from the federal government, guided locally appropriate and locally owned implementation.

Another initiative faced challenges because program vision limited planning scope, and excluded stakeholders who were integral to successful implementation. Specifically, the government distributed technology directly to students and families, but did not provide teachers with the same technology that students received. Classroom integration was difficult because teachers had not been sufficiently in the loop.

Lack of technology oversight (including technical and financial responsibility for technology maintenance, repair, and replacement) can hinder ongoing success of the initiative. Technology is at the heart of any eLearning deployment and relies on someone responsible for ensuring that the technology continues to function in its intended capacity. Leaders of the Portuguese initiative planned for technology oversight from the outset, with a two-year maintenance plan stating that schools should contact program leadership regarding any technology-related problems.

In contrast, the transition from a centralized to decentralized government structure in Macedonia complicated roles and responsibilities within the eLearning deployment, creating a challenge for technology oversight in particular. While the central system owned distribution, jurisdictions were responsible for the cost of ongoing maintenance. But local jurisdictions were often struggling to pay for basic school operations, and ongoing technology maintenance was simply not in the budget.

Program vision and contextual circumstances inform program planning, which in turn creates the groundwork for implementation of the eLearning deployment. In the next section, we discuss themes that emerged related to program implementation.
Implementation is the actual enactment of eLearning deployments. During this phase, all program components are put into place: coordinators deploy the technology to end-users; teachers and others slated for training receive professional development; and teachers, students, and families begin using the technology. Other important activities in this phase include program coordination to ensure that program components operate smoothly and coherently, and alignment and communication among stakeholders to bolster support and ensure smooth adoption of the initiative.

Implementation requires a realistic rollout strategy and can benefit from a coherently crafted pilot program. Major eLearning initiatives are tremendously complex endeavors, and some of those studied found benefits in starting small rather than attempting a full-scale rollout all at once. Before the 1:1 eLearning deployment in Pirai (Brazil) was implemented citywide, the initiative first conducted two pilot programs. The municipal Pirai Digital City initiative implemented a pilot program starting in one school, and then expanding to four pilot schools. Further, Pirai was itself a pilot location for the national Um Computador por Aluno (UCA) program.

Formative insights from the pilot schools led to iterative changes in the program plan, both within the pilot sites themselves and for the full-scale implementation. For example, low standardized test scores at the pilot site just before implementation led program leaders, in collaboration with school staff, to revise the pedagogical plan; this new plan in turn informed the pedagogical plan for the full-scale initiative. The first local pilot school also provided a proof of concept for technology in education that has changed the tone of local debate. Now organizers have a point of reference when describing the benefits of computers in schools, which is likely to help strengthen program support during expansion.
The "Computer for Every Child" initiative in Macedonia did not initially include plans for each of these components, but program leaders learned from early implementation experiences and successfully remedied missing elements. For example, technological readiness was not part of early planning and consequently lagged during implementation. But project leaders discovered this shortcoming during the initial rollout and updated school infrastructure so that all schools had Internet connectivity in time for the second phase. In addition, the eLearning deployment teamed up with a USAID/AED program that provided teaching models and a toolkit with curriculum and instructional materials, providing the key resources that teachers need for integrating technology into their classroom practice.

Teachers need access to digital content, or at least technology-ready instructional materials, in order to be able to make use of technology to enhance teaching and learning. Infrastructure can provide the groundwork for teachers to be able to use technology in the classroom, and training can build teacher capacity for this integration. But using technology is a new practice for the majority of teachers, and without concrete content and instructional materials that can be used directly in their classrooms, technology integration can require a prohibitive amount of time and energy to adopt. This content may include digitized curricular materials and/or print-based instructional materials that are specifically designed for use with technology.

For the initiatives participating in this research, the creation and rollout of technology-ready curricular materials was often one of the last steps in the implementation process; consequently, many initiatives had not yet fully realized this piece of their programs. In Malaysia, computers included PDF versions of textbooks rather than interactive ones, and these did not facilitate the interactive use that was imagined for the technology. In Portugal the ICT integration process is being led by innovative, motivated teachers, in part by adapting materials for use in Portuguese classrooms to contribute to available technology-supported curriculum resources. In these and other cases, lack of sufficient and high-quality teacher-ready content was seen as one of the biggest challenges to successful classroom use.

7. Re-informing Vision

This phase entails a process of continuous improvement in which stakeholders examine initiative progress and identify opportunities to improve plans and supports. Ongoing, formative program evaluation provides insights on implementation and enables leaders to make mid-course corrections to address any unanticipated challenges. Summative evaluation provides insights about outcomes and overall value that can inform decisions about the initiative’s future. Strong communication of both formative and summative results enables stakeholders to respond to research findings and participate in ensuing discussions about future directions for the initiative.

Some initiatives improved their success by building processes for continuous improvement from the outset, rather than considering evaluation only after implementation was in place. Initiatives varied in their strategies for incorporating purposeful reflection into the programmatic process. One clear way to build in opportunities for learning and program improvement is to start with a pilot, as discussed above. The pilot program in Brazil provided valuable insights that initiative leaders used to revise the program plan. Importantly, pilot schools in Pirai had the flexibility to respond to this rolling feedback. School staff made changes to the school schedule and physical layout, pedagogical plan, and curriculum, based on insights from the pilot implementation. In addition to the Intel-run pilot in Terengganu (Malaysia), leaders incorporated ongoing reflection and revision into their processes—and implemented some important mid-course corrections as a result. Specifically, a state-level committee tasked with program oversight and monitoring met quarterly to review progress and challenges. Informed by this process, leaders began distributing computers to teachers as well as students, so that teachers had access to the same technology and could better incorporate that technology into classroom practices.
They also increased access to training and provided more fully developed pedagogical models for teachers to guide eLearning implementation. In some cases, initiatives that did not have explicit evaluation plans or metrics nonetheless succeeded in making important mid-course corrections based on informal observations about program progress.

Program metrics are sometimes limited to the immediate rollout, with less consideration for long-term outcomes. Among the Intel eLearning deployments, initiatives more commonly specified metrics related to short-term implementation rather than long-term outcomes. Certainly monitoring program implementation by looking at immediate rollout characteristics such as teachers trained and computers distributed is important for understanding how any initiative is progressing. At the same time, focusing exclusively on these metrics can limit attention to important longer-term outcomes such as pedagogical change and student achievement gains. Defining these long-term indicators, aligned with program goals, is important for understanding broader program impacts and for steering designs in ways that are likely to achieve them. The Intel Advocacy Memo provides guidance on identifying relevant indicators for program adoption, implementation, and outcomes (including educational change, economic change, and social change) in the short-, medium-, and long-term timeframes.

8. Conditions for Success

This report has described the progress and experiences to date of eight significant eLearning deployments around the world. As these initiatives exemplify, a large 1:1 deployment is typically a very important strategic investment on the part of its federal or regional government sponsor, and is often accompanied by lofty expectations for educational or economic transformation.

But collective program experience also demonstrates that computers will only live up to their potential if they are distributed within a ready ecosystem of supports. The specific characteristics of this ecosystem depend strongly on goals for deployment: for example, different supports are called for in initiatives that seek to promote community-based equity or transformation of formal education systems, and according to local expectations of the degree of transformation that is envisioned. Nevertheless, some common elements emerge across the settings described in this report.

1. Engage all stakeholder groups that will be involved with program implementation. In particular, involving provincial authorities and school personnel early in the planning process can ensure that local needs are addressed in designs.

eLearning deployments that were planned exclusively among national stakeholders typically encountered unforeseen challenges during implementation, when most activities took place at the regional and school levels. It is also important that communication in early phases be broad as well as deep. In this study, the experience of initiatives with insufficient communication from program leaders to the public make it clear that public support relies on a clear understanding of program vision and concrete enactment plans.
2. Beyond this involvement, enable ownership and appropriation on the part of provincial and school-level actors to facilitate local integration and sustainability. Large eLearning deployments are complex efforts with multiple cycles of activity, often beginning with a national or regional vision but ultimately enacted by local owners. We use the term “appropriation” to describe activities undertaken by local actors to adapt the initiative to local goals, conditions and capacities within the context of the broader initiative vision. In Argentina, a lack of clear transfer from national to provincial ownership resulted in disconnects of necessary implementation and support tasks until authorities in each province began to embed the initiative into a coherent local vision and support system. For successful implementations, this process of appropriation at each level of enactment should be built into plans and communication strategies from the beginning.

3. Consider provincial and local capacity for implementation—including human, technical, and financial capacity—before implementation begins. Just as provincial and local ownership of tasks are essential for successful implementation, capacity for carrying out those tasks must also be identified and supported. If teachers are to enact technology integration in their classrooms, for example, professional development prior to deployment is essential to make sure they have not only the technical expertise but also the pedagogical models to make that integration successful. Initiatives can also be challenged by a lack of local technical readiness (such as in one country where only 17 percent of schools had Internet connectivity when they received the laptops) or a lack of financial capacity (as when national funding extends as far as initial distribution of computers but municipalities are responsible for providing funding for ongoing support and maintenance). The bottom line for policymakers is that in order to achieve desired outcomes for youth and communities, deployment of computers to those who will be using them is not the end goal: it is only the beginning.

4. Even when primary program goals focus on social equity or economic development, consider the opportunity to improve learning by leveraging schools as a pathway to longer-term social and economic goals. Technology integration in schools has the potential to democratize learning opportunities and improve learning outcomes for all students—both important facilitators of greater social equity and economic development. Leaders hoping to catalyze this process, however, should be aware that a host of important factors must be addressed in order to achieve a positive effect on education. Successful technology implementations begin with a clear vision for the new types of teaching and learning that will be enabled with the support of new tools, and specific models to demonstrate how they can be achieved in the classroom. Other important factors include teacher capacity and teacher professional development; technology for teachers as well as students; and locally-appropriate curriculum/content that fits standards, visions, and tools. Early planning with respect to educational goals as well as social or economic ones can pave the way for smooth implementation and steady progress toward all goals, including those in the educational, social, and economic arenas.

5. Align policies at different levels of government to support program implementation and adoption. A lack of alignment can create barriers and inconsistencies for program implementation and hinder stakeholder appropriation. Schools participating in some of the initiatives described in this report experienced national prohibitions against use of the devices they sought to integrate, or mandated uses that did not match local parameters. It is helpful to consider related policies at all levels while initial plans are being made to confirm that policy environments are supportive of the initiative, or that initiative goals are realistic given the policy climate. This step is particularly important to consider early, because in many countries there is a long path to policy change.

6. Include formative evaluation from an early stage, to learn about implementation and enable mid-program course corrections. Unpredicted barriers and opportunities during planning and implementation phases are to be expected, and were experienced by all initiatives studied. Ongoing program monitoring can supply information needed for nimble course corrections. This information might come from formal programs, such as a well-researched pilot study that helps to shape the larger rollout, or regular processes that communicate information from the field into a central process of analysis. Either way, it is important that evaluation represent an ongoing process of learning rather than solely a study after the fact to see how it went.
Appendix: Framework and Considerations Glossary

**VISION**

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<td>General policy context</td>
<td>The overall policy environment and current initiatives and priorities that shape the eLearning deployment.</td>
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<tr>
<td>Education and ICT policy context</td>
<td>Specific policies and policy climates related to education and ICT within which the deployment is being—or will be—enacted.</td>
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<td>Program priorities</td>
<td>An area of policy emphasis to which the deployment is expected to contribute; priorities can be (and often are) expressed in abstract, visionary language.</td>
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<tr>
<td>Goals and indicators</td>
<td>The specific targets of the deployment and the events that demonstrate whether and to what extent its goals are being achieved.</td>
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<td>Champions</td>
<td>The chief sponsors or advocates for the deployment; these may or may not be the principal decision makers.</td>
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<tr>
<td>Funding model</td>
<td>The funding streams that support the deployment and strategies for sustaining it.</td>
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Intel has helped to implement more than 200 education programs in over 70 countries, and has invested more than USD 1 billion in the last decade to improve teaching and learning environments.

Working with governments, policy makers and local vendors, Intel helps to implement eLearning solutions that provide professional development to teachers; support student achievement and development of 21st-century skills; and enable access to relevant, localized digital content.

The education transformation model developed by Intel helps governments improve the quality of their education systems, leading to economic and social opportunities for their citizens.

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# PLANNING

**Geographical and human scale**
Some eLearning deployments address a large scale, including entire nations and students at several grade levels (e.g., Argentina, Bosnia, Macedonia, and Portugal), whereas others are more locally centered and incremental in scope (e.g., Koçaeli, Pirai, Shanghai, and Terengganu). The latter may function as pilots for later large-scale deployments.

**Infrastructure preparation**
The electrical (outlets, etc.) and connectivity (network cables, broadband connection, etc.) infrastructure that needs to be ready for the use of the eLearning solution. This consideration also includes the agencies responsible for coordinating and assessing the infrastructure preparation activities.

**Program functional features**
The design of the initiative itself: plans for program elements such as hardware, software, and professional development, and a schedule for their deployment in the various locations.

**Program coordination and operations**
Systems for ongoing implementation monitoring, providing resources, and supports where necessary; definitions of roles at various levels of the system (e.g., national, regional, or local); coordination for handoffs between decision makers and implementers.

**Strategies for stakeholder engagement**
Planned activities and mechanisms for inviting engagement from program stakeholders, both horizontally, across coordinating organizations, and vertically, within the hierarchy of a single organization.

**Communication**
Formal and informal communication strategies to improve the flow of information among stakeholders, enhance stakeholder alignment, and advance program coordination.

**Feedback mechanism for course corrections**
Planned activities and mechanisms to capture emergent changes, resulting from unknown or unanticipated aspects of the integration context, and adjust program planning and implementation.

# IMPLEMENTATION

**Consideration**

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<tr>
<td>Rollout of elements/components</td>
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<tr>
<td>Program adoption in classrooms</td>
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<tr>
<td>Program coordination</td>
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<tr>
<td>Ownership of specific components</td>
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<tr>
<td>Stakeholder engagement and alignment</td>
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<tr>
<td>Enacted communication</td>
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# RE-INFORMING THE VISION

**Extending the vision**
Shaping or next steps for program goals and vision based on progress to date.

**Progress to success indicators**
The extent to which the initiative is effective at catalyzing educational change according to locally defined success indicators.

**Emergent challenges**
Unknown or unanticipated features of the eLearning deployment context (e.g., teacher characteristics, buy-in by various levels of implementation, organizational capacity and structures, local politics) that may influence enactment in nontrivial ways.

**Formative, just-in-time monitoring of program operations**
Assessment designed to capture emergent changes and identify adjustments to program operations to accommodate (or take advantage of) unanticipated contextual factors.

**Dissemination of course corrections**
Communication mechanisms related to learning from data on implementation and outcomes so far, and actions to implement improvements or next steps.

**Summative monitoring of progress toward goals**
Monitoring of progress toward ultimate outcomes to capture planned changes, assess progress to success, and identify lessons learned.

**Dissemination of summative findings**
Reporting and other processes to inform stakeholders and implementing agents about program results for ongoing decision-making.
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