

INTEL® EDUCATION TRANSFORMATION

POLICY GUIDE



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The biggest strategic power for a country is a qualified workforce and socially engaged citizens. It increases the country's international competitiveness as well as national welfare, long term. Thus—investing in education means investing in the future. And successful investment means driving a systemic education transformation—including policy, professional development for educators, curriculum and content, assessment and evaluation, effective technology integration, and research. Transformative education should help increase student competitiveness, build relevant skills and competencies, support economic growth, and provide social cohesion.

There is consensus worldwide on growing the value of technology to provide education to all students, improve the quality of learning, learning systems, and learning outcomes. Accelerating education improvement requires a holistic approach that addresses critical and interrelated components of education transformation. Governments are finding that no single policy, pedagogy, or technology will bring the change. Education transformation is achieved by bringing together the right decision makers, experts, educators, and partner organisations to plan, promote, and provide the essential components impacting quality education practice.

What we endeavor to provide you with is a new Intel® Education Transformation Policy Guide which draws on the advice of an international panel of rewarded experts with a wealth of expertise to help leaders worldwide with transformative education policies. This guide features an extensive collection of global policy resources including case studies, reports, best-practice policy documents, and videos. The resources present a global array of policy contexts, as well as gender equality considerations.

Transformative change cannot be brought about in isolation. With over 200 education programs in more than 70 countries, Intel works with governments, national and international organizations around the world to help meet their educational goals. We do hope that the Intel Education Transformation Policy Guide will help us all work towards creating and sustaining education excellence.

Over the last 50 years, several countries around the world—including Singapore, the Republic of Korea, and Finland—have made significant strides in economic and social development, moving from struggling countries to world leaders. Several other countries, ranging from Rwanda to Jordan to Chile, have aspired to the same accomplishment. Central to the economic and social advancement in these countries has been a significant investment in educational transformation. Over an extended period of time, policies and programs have been put in place to improve teacher professional development, update the curriculum, make assessment more rigorous and supportive of learning, and make the pedagogy more relevant to real-world concerns. These changes are preparing students for an information economy and knowledge society in which a highly educated populace and workforce are able to respond flexibly to complex, real-world problems; to communicate effectively; to manage information; to work in distributed teams; to use technology; to produce new knowledge and innovative products and services; and to compete effectively in the global economy.

Information and communications technologies (ICT) have been an important part of this systemic transformation. The emergence and pervasiveness of ICT has both required and enabled these important educational changes. ICT has been a central component to the social and economic transformations that are requiring new responses from educational systems. At the same time, the use of ICT in schools has enabled new methods for teacher training, new pedagogical approaches, new assessment techniques, and new ways to organize courses and schools.

The focus of this Guidebook is to create effective ICT policies and programs in education that support educational transformation, especially as this transformation contributes to social and economic development. The Guidebook helps with the practical issues of ICT implementation: kinds and number of devices, appropriate software, networking, budgeting, etc., as well as corollary issues related to technical support and teacher training. But because ICT is considered in the broader context of educational transformation, policies and programs also address issues related to curriculum, pedagogy, assessment, teacher professional development, and school organization and management. The Guidebook helps policymakers consider the ways that ICT can support changes in these areas that contribute to overall education transformation and social and economic development.

In supporting these efforts, Intel assembled an international team of experienced consultants to write this Guidebook. The Guidebook takes the user through a step-by-step process that begins with a long-term vision for an education system that supports national social and economic goals. It moves to the design policies and programs that can achieve this vision. It addresses the important implementation issues that mean success or failure for policies. And it guides evaluation that can, in turn, contribute to revision in subsequent policies and programs that move toward the vision over the long term. The Guidebook draws on resources, experiences, case studies, videos, and example policies and programs from around the world. As such, the Guidebook is designed to support efforts in a wide range of situations, from least to most developed countries.

We hope you find this a useful resource in your country.

Robert B. Kozma. Ph.D.

Intel® Education Transformation Policy Guide and Intel® Education Transformation Policy Tool

The new and fully updated Intel® Education Transformation Policy Guide draws on the advice of an international panel of experts to help leaders formulate transformative education policies.

The Policy Guide is designed to assist policymakers through a four-phased policy development model. The phases include articulating a vision, developing a master plan, implementing initiatives, and evaluating and adapting the initiatives to realize the vision.

The Policy Guide has been updated to feature an extensive collection of global policy resources, including case studies, reports, best-practice policy documents, and videos. The resources present a global array of policy contexts, as well as gender equality considerations.

In addition to the Policy Guide, an online Policy Tool is available. The online tool features an easy-to-use user interface that makes it possible for policymakers to modify, customize, and collaborate throughout the four-phase policy development process.

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ICT-based innovation can happen in the classroom without an ICT in Education Policy.¹ In many cases around the world, motivated, skilled teachers have used the power of ICT to engage students in collaborating on research, searching and managing information, and creating and publishing digital products, even when ICT policies do not exist.² While these individual cases are important and it is worth building on the experience and expertise of individual teachers, ICT in Education Policy can have a particularly powerful impact on the education system. The resources offered here were developed to support decision-makers in developing ICT policies that will make transformational changes in their education system.

Policy—specific statements of priorities and plans—can connect ICT-based innovation to other changes in curriculum and assessment; to professional development, teaching and learning; and to research and evaluation. As a result, ICT in Education Policy can transform the entire educational system and guide everyday practices of teachers and school leaders. Furthermore, ICT in Education Policy can connect education transformation to important social and economic development goals, such as increasing school participation, promoting gender equity and reducing the gender gap, preparing a higher-skilled talent pool, creating high skilled jobs, and encouraging the development of the high-tech, software development, and eLearning sectors of the economy.

While policy can have these transformational effects, there is no guarantee the policy will be implemented, as any experienced politician or ministry official knows. There are many ways that the good intentions of policymakers fail in the design, implementation, or adoption of programs and initiatives. And what looks good on paper often looks very different in classroom practice, sometimes because school leaders and teachers are unaware of policies, sometimes because the everyday implications of policies are not clear from the

way the policies are stated, sometimes because the resources are not available to implement the policies, and sometimes because there is active resistance to the changes brought by the policies.

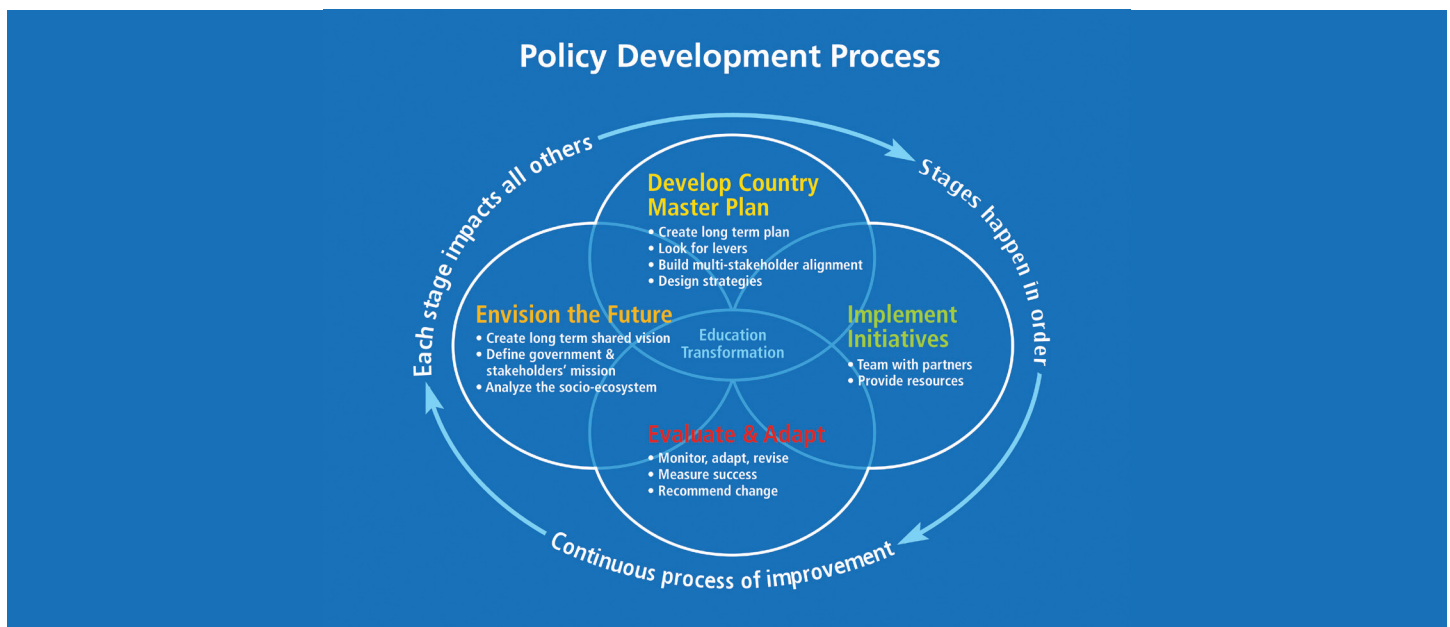
Consequently, the goal of this updated Intel Policy Development Toolkit, available in print and as an online tool,³ is to help ministry officials design ICT in Education Policy that will effectively transform the education system in a way that contributes to social and economic development and avoids many of the problems listed above.

With these materials, Intel seeks to support ICT in Education Policy and educational transformation by providing government agencies with an extensive, flexible, and extensible set of policy development tools. This updated print and online Intel Policy Development Toolkit consists of 12 sets of materials organized around a four-phase model of the policy development process, as described in the Educational Policy Brief, available on the Intel web site.⁴

The four phases in this model are:

1. Envision the Future
2. Develop a Master Plan
3. Implement Initiatives
4. Evaluate and Adapt

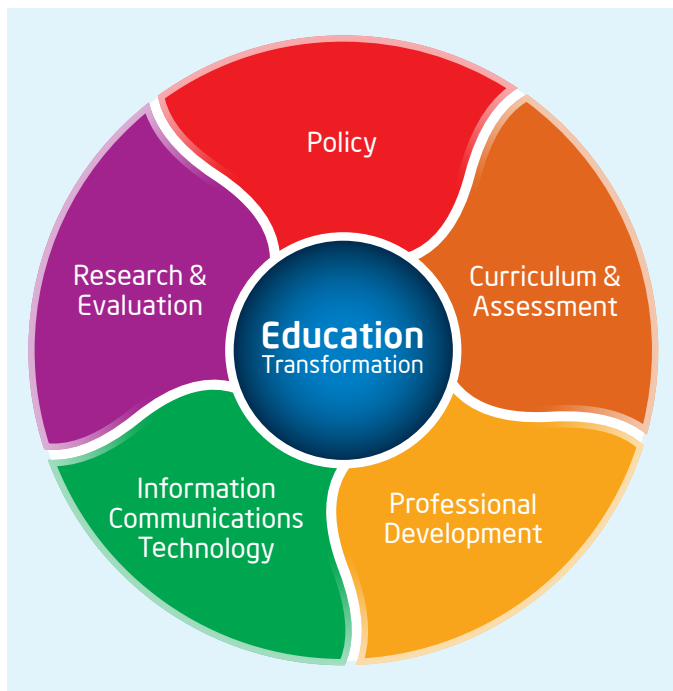
These steps are further elaborated to provide 12 sets of materials that policymakers can use to help them develop their skills and their policies. These materials address the five components of education transformation: policy, curriculum and assessment, professional development, ICT, and research and evaluation.



The Users

The materials presented here or online are designed to be used by a variety of users in a variety of policy contexts. You could be a top-level ministry official responsible for composing the initial draft of a policy document. Or, you could be a consultant contracted by the ministry with this charge. You may be a mid-level official or you may be part of a mixed group of officials from different departments, along with academics, school leaders, industry partners, etc., all charged with working as a team to come up with a jointly owned policy draft.

You may be from a country, state, or municipality. You may be from an advanced nation or a developing nation. These materials are ideal if your government is developing its first ICT plan. But the materials can be just as useful for governments that already have a plan in place and are fine-tuning their current policy or considering the next phase of their policy.



The Materials

The policy development materials are sets of online documents (exercises, readings, video clips, case studies, bibliographies, and other resources) that step you through the policy development process. While there is a default “beginning” to the process, a user can actually begin at any point. For example, your country may have a vision for its education future but not have a plan to achieve that vision, in which case you could start with Develop a Master Plan. Or you may have programs and initiatives planned but now are confronted by the realities of implementing them.

To accommodate a range of situations, the print version of the Intel Policy Development Toolkit is structured so that you can use it flexibly, in successive cycles of envisioning, design, implementation, evaluation, and redesign. The online tool is even more flexible, so workshop leaders can customize it for a particular audience.

The materials are designed in an interactive format, driven by “prompts” or questions that support and guide your thinking, along with resources to inspire and inform you. The online tool is particularly interactive and this is the preferred mode of use for these policy development materials. However, for those who prefer to use this print Toolkit, for whatever reason, we attempt to simulate the interactivity here using a number of directional conventions.

In both the print and online tool, there are a core set of prompts and resources in the appendices. Among the core set are two extended case studies, one from a developed country—Korea—and one from a developing country—Jordan—along with additional case materials and background resources. The case studies are meant to give you detailed, “real-world” examples of how the policy process has been implemented. In the case of Korea, the example is based on progressive versions of their policy and many years of successful implementation. In the case of Jordan, the example is based on recommendations that were generated by implementing the process described here with ministry officials. Of course, your situation may be very different from that in Korea or Jordan. So we supplement these core resources by additional resources from countries in various regions that may prove to be closer to your situation.

The materials are also designed to support three different delivery models:

- **Solo use.** The print and online tools are freely available from Intel. You may want to use them on your own.
- **Workshop.** These materials may be used in a workshop for groups of policymakers, perhaps from several countries, in which some or all of the materials are used, depending on the goals and agenda of the workshop and where the participants are engaged in the policy process. The workshop may be conducted by Intel staff or by external Intel consultants or partners.
- **One-on-one consulting.** You may be in a one-on-one consulting arrangement in which the corporate affairs managers or other Intel or external consultants work with you over time to help you through the process as you develop an ICT in Education Policy and plan.

Even if you are a solitary user, it is likely that early in the design process, you will need to consult with others and get their feedback and buy-in. The materials are designed in such a way that you may enter initial responses but then share them with others and combine your work with theirs. Again, this form of collective use is best implemented in the online version and only approximated in the print version.

In whatever form you use these materials, we hope you find them of help in formulating your ICT in Education Policy and transforming your educational system.

Leadership and Policy

For meaningful transformation, having the right leadership for setting the vision, to project planning and to manage the execution is essential. Equally critical is effective policy to establish the conditions for success. Policy is not limited to just the laws for access to technology and parameters of classroom technology, but also the ones that define implementation processes like setting standards, acceptable use cases, etc. within the school system. The right leadership team with policy framework aligned for desired behavior and outcomes are key for successful education transformation.

Financial Planning

Appropriate implementation of technology across the various components will enable the right shift in resources setting the path for identifying the financial resources for sustainable technology upgrades in the long run. Upgrade to digital curriculum, moving to online testing and assessment, suitable classroom and learning management system, all lead to better resource and time management enabling better options for personalized learning for improved student outcome.

Overview

The updated Intel Policy Development Toolkit consists of 12 sets of materials organized around the four-phase model of the policy development process:

1. Envision the Future
2. Develop a Master Plan
3. Implement Initiatives
4. Evaluate and Adapt

The materials for this first phase—Envision the Future—are organized around three steps:

1. Creating a long-term vision
2. Defining stakeholders' mission
3. Analyzing the socio-ecosystem

Goal

The materials for the Envision the Future phase are designed to help you create a long-term vision; identify key stakeholders and analyze their missions to help you create a shared vision; and analyze the current situation so that you know where you are starting from. The intent is to help you think “outside the box,” to help you envision and ultimately effect transformational change that contributes to social and economic development and responds to the demands of the 21st century.

Current Status

This initial phase is designed to address a range of current situations, although you will find that you use the materials differently, depending on the situation you are in. The Envision the Future phase is the appropriate starting point, whether or not your country, state, or municipality currently has an educational ICT plan or policy. Formulating or revising a vision statement and analyzing the current situation are also appropriate in either case.

Resources

Each step in the process includes a set of online documents (exercises, readings, video clips, case studies, bibliographies, and other resources) that will help you create usable outputs and achieve your goals.

Output

As a result of interacting with materials in the Envision the Future phase, you will have:

- A well-articulated, shared vision of what your education system will look like—or what you want it to look like—in 15 years and the role that ICT will play in creating that vision.
- A set of identified stakeholders, within and outside the government, who will need to share this vision. You will also identify their missions so that you know how they can help move toward the vision.
- An analysis of the current socio-ecosystem and previous successes and failures, so that you know your starting point and the strengths and weaknesses or “gaps” between the status of the current system and the desired vision.

Goal

The goal of this step is to help you think about the future of your country, province, or municipality: where it is you would like it to go, what it might look like, and how education fits into that. What social and economic developments do you see, and how will they advance and enrich your country? Such visions guide policy and program development, and assure that they are coherent and contribute to the desired direction for the country. The specific goal is to enable and enrich this vision with the use of ICT.

Your country may have an articulated national vision that specifies directions and goals for five, 10, 15 years into the future—goals in areas such as economic development, telecommunications, social programs, and health. Your country or province may even have a more specific vision for the future of education, as part of the current educational policy or even a current ICT in Education Policy for education. These are good starting points. This exercise begins with these visions and helps you take them to the next level, to sharpen the vision of the education system in the long-term future: what will be taught and learned, how it will be assessed, what teachers and students will do, how schools will be organized, and how ICT will be used to enable that.

This is not to say that governments or ministries are always in a position to implement long-term visions, uninterrupted by changes in party or leadership. But significant change takes time, and change that is limited in vision to only the next couple of years is often mere “tinkering” and no change at all. The process used here emphasizes constructing a shared vision, the consensus of which has a higher chance of surviving party changes in government and ultimately transforming education. This long-term vision can guide changes on the short-term scale of four or five years that may be within the limits of a specific government, and at the same time connect these short-term changes to more powerful long-term aspirations.

Resources

In addition to the “prompts” or questions in this exercise, you have access to a list of national visions (including those for Jordan and Korea) and a set of video clips of innovative schools that may serve to help you think “out of the box” about what your schools might look like in the future, enriched by technology.

Outcomes

As a result of this step, you will have an articulated vision of what schools will be like in the future and how technology will enable that vision.

National Vision

- 1. If your country has a national social or economic development vision for the future, please summarize it here.
List five key features of the vision:**

- 2. If your country has an education vision, please list five key features of the vision:** If your country does not have a vision, this is an opportunity for you to think about one. Review the visions of various countries in the Appendix, where you will find a Collection of Vision Statements and Idea Starters. After reading these statements in the Appendix, take the opportunity to discuss these ideas and vision statements with others, whether you are working alone or in a group.

- 3. Pick out the statements that you thought were best. What were the features that you liked most?**

- 4. Which were the vision statements that you liked least? Why?** Often envisioning is an extended process of creating a shared vision, and we will get to that part shortly. But for the moment, we would like you to set out your own vision of significant changes you would like to see in your country and what you would like it to look like in the future.

- 5. List five (or more) key social and/or economic changes you would like to see:**

- 6. How might education contribute to this grand vision of economic and social development in your country? List five key changes in education that would contribute to your vision of the future:**

- 7. How does the national vision for advanced economic and social development effect both females and males?**

- 8. How does the vision of education advance the welfare of both females and males?**

Sharpening the Education Vision

Vision statements are often high-sounding but general and ambiguous. Sometimes this is intentional, so as to create more agreement and buy-in. But the realization of a vision requires programs and initiatives that will actually move the country toward the vision. This, in turn, requires more specification of the vision. The purpose of this part of the exercise is to take the general vision statement above and turn it into a more focused picture of what the education system might look like in a future enriched by technology.

Sometimes we need help envisioning the future, especially in education where schools and classrooms today look pretty much as they did one hundred years ago. Take a look at the following resources, located in the Appendix, which are meant to help you envision the future:

- Collected vision statements
- Idea starters
- Vision videos
- Jordan and Korea case studies
- Cases of innovative schools

1. Having looked over the collected vision statements and case studies, what did you find interesting about them?

Pick one video or case study, and identify five things that you thought were innovative and might contribute to your vision.

2. Did ICT support or enable any of the changes you saw? How so?

3. After examining some of the envisioning resources, do the following exercise, either alone or in a group.

- If alone, go through each of the themes in the exercise and return here upon completion.
- If you are in a group, have each member select one of the themes below to create his or her own image of a future education system from the perspective of professional development, pedagogy, curriculum, assessment, or school organization and management. Upon completion, share the different perspectives within the group and discuss.
- If you are working in multiple groups, then have each group work on a theme and share your results with the other groups.

But first, consider the following:

What major social developments do you foresee in your vision, related to social and gender equity, social services, human relationships, human capital development, etc.? How will education transformation contribute to these changes?

What major economic developments do you foresee in your vision, related to the structure of the economy, broad-based prosperity, the distribution of wealth and resources, etc.? How will education transformation contribute to these changes?

What major technological development do you foresee in your vision, related to the power and ease of use of devices, the availability of devices, networking, multimedia, social media, etc.? How will education transformation contribute to these changes? How will these changes contribute to education transformation?

How does this vision of education advance equal access to education and use of educational tools, such as ICT, for both females and males?

4. Next, complete the Sharpening Your Vision exercise in the Appendix. When you have completed the exercise, list the changes at the end of the 15-year period in each of these areas:

School organization and management

Teacher professional development

Teaching and learning

Curriculum and assessment

Evaluation and research

ICT

5. How do changes in the various components work together to reinforce and support each other to create a new vision of education?

6. How does ICT support this vision? Give specific examples.

7. How do these changes in education advance to more general national vision for economic and social development?

8. Synthesizing your thinking across all of these themes and responses, generate a statement that summarizes your sharpened vision:

9. How does your vision statement advanced economic and social welfare of both females and males?

Share Your Statement

Next, share your summary statement with a wider audience of stakeholders for their feedback. Post your revised vision statement to a wide audience, as the result of your work.

Based on the feedback you have received from stakeholders, generate a revised vision statement:

Resource: Collected Vision Statements

AFRICA

Namibia

Namibia's National Plan, Vision 2030, states:

Vision 2030 will transform Namibia into a healthy and food-secure nation, in which all preventable, infectious, and parasitic disease (including HIV/AIDS) are under secure control; people enjoy high standards of living, a good quality life, and have access to quality education, healthcare and other vital services. All of these aspirations translate into a long life expectancy and sustainable population growth.

www.tech.na/vision2030.htm

Tech/NA! is the Education Ministry's ICT component of the larger education improvement program in support of Vision 2030, which has as its vision:

The Ministry of Education has undertaken a sector improvement programme, the Education and Training Sector Improvement Programme (ETSIP), to increase the efficiency of the education and training system. ETSIP aims to increase the number of skilled and employable Namibians through a strong focus on improving educational quality.

www.tech.na/initiative.htm

Rwanda

The education vision of Rwanda is built on a national economic vision, called Vision 2020, which states:

Given that the major aspiration of Vision 2020 is to transform Rwanda's economy into a middle income country (per capita income of about 900 USD per year, from 290 USD today), this will require an annual growth rate of at least 7 percent. This will not be achieved unless we transform from a subsistence agriculture economy to a knowledge-based society, with high levels of savings and private investment, thereby reducing the country's dependence on external aid.

www.gesci.org/assets/files/Rwanda_Vision_2020.pdf

Based on this, the Education Sector Strategic Plan for 2010–2015 states:

Only a workforce with a sufficient number of people with the necessary skills to operate in an increasingly sophisticated and continuously adapting business environment will allow Rwanda to become the competitive and diversified economy it aspires to be. The Nine-Year Basic Education programme is the foundation for human resource development, while improved access to and quality of upper secondary schools, teacher training colleges, Technical and Vocational Education and Training (TVET) institutions, and Higher Learning Institutions will supply the demand for higher level skills and competencies.

<http://mineduc.gov.rw/IMG/pdf/ESSP.pdf>

ASIA

Cambodia

In Cambodia, the vision is part of the Education for All National Plan (2003-1015):

The long-term vision of Education for All in Cambodia is to ensure equal access to quality basic education for all citizens and to prepare its citizens to play an active role in reconstructing the country as well as integrating Cambodia to the knowledge-based global community. The Ministry of Education, Youth and Sport (MoEYS) is introducing various initiatives to facilitate greater integration of information and communication technology (ICT) to improve the effectiveness of education at all levels and to produce the technologically literate, productive, and critically thinking workforce for the country.

www.moeys.gov.kh/old_moeys.gov/en/education/ict/vision_goals.htm

Hong Kong

In Hong Kong, the vision of schools and classrooms of tomorrow is:

Students, teachers, schools, and other stakeholders will use IT effectively as a tool for enhancing the effectiveness of learning and teaching, with a view to preparing our students for the information age, turning schools into dynamic and interactive learning institutions, and fostering collaboration among schools, parents, and community.

www.info.gov.hk/archive/consult/2004/wayforward-e.pdf

India

India's education vision is linked to the government's economic development goals:

Education system is in continuous alignment to her economic-GDP 2020 vision of 44 percent of national GDP from agricultural income, 21 percent of GDP from manufacturing sector and 35 percent of GDP from the services sector.

www.csdms.in/gesci/ict-policy-everonn_%20paper_susha.asp

Japan

In Japan, the Ministry of Education, Culture, Sports, Science and Technology (MEXT) is coordinating a set of "Information Society" policies to "informatize" education, science, technology, sports, and culture:

Taking into account the development of broadband Internet services and other remarkable developments in information and communications technology in recent years, MEXT, in line the "e-Japan Strategy" which aims to make Japan the most advanced IT nation in the world by 2005, is actively formulating a variety of policies to promote "informatization" in education, science and technology, sports, and culture.

In school education, MEXT is implementing information education in order to cultivate the information literacy which is an important element of the "zest for living" of children and is promoting the effec-

tive utilization of IT in all school subjects in order to realize “Easy-to-understand lessons”. MEXT is also promoting measures with the full cooperation of the public and private sectors such as development of intra-school networks in ordinary classrooms and promotion of the improvement of instruction ability utilizing IT.

www.mext.go.jp/english/org/struct/009.htm

Papua New Guinea

Papua New Guinea’s Gender Equity in Education Policy states:

Schools have a role and a responsibility to contribute to the achievement of equality between males and females and in improving conditions of life for girls and women¹. All schools in Papua New Guinea should ensure that what is being taught and learned does justice to girls and women, as well as boys and men, taking account of and respecting the range of cultural, linguistic, socio-economic, and positive differences found in society in Papua New Guinea. What is taught and learned should be equally valuable for female students and male students and value both females and males equally.

http://planipolis.iiep.unesco.org/upload/Papua%20New%20Guinea/Papua_New_Guinea_gender_equity_guidelines.pdf

Singapore

Singapore has a long history of ICT in Education Policy that builds capacity over a 15-year period but stays focused on the same vision:

The Ministry of Education has developed the third Masterplan for ICT in Education (2009-2014). The third Masterplan (mp3) continues the vision of the first and second Masterplans to enrich and transform the learning environments of our students and equip them with the critical competencies and dispositions to succeed in a knowledge economy.

<http://ictconnection.edumall.sg/cos/o.x?c=/ictconnection/pagetree&func=view&rid=665>

South Korea

The vision of South Korea’s educational technology plan is:

... promotion of ICT in education in 2007 is to “establish a new education system to enhance national competitiveness.” The aim of the plan is to improve accessibility to education, promote local education, and improve education welfare by revitalizing public education, renovating academic education, disseminating lifelong education, and augmenting the benefits of education welfare.

<http://english.mest.go.kr/web/1712/en/board/enview.do?bbsId=261&boardSeq=1769&mode=view>

EUROPE

Finland

Finland’s vision, as articulated by the Government Resolution on the Objectives of the National Information Society Policy for 2008-2011 states that by 2015:

Finland is an internationally recognized, competitive, competence-based service society with a human touch. In the increasing global competition it has been successful in providing individuals and organisations with opportunities for a good life by developing competencies, know-how and creativity and by adopting substantial reforms in structures and operating models.

A strong national vision and state of will, and investments in the information society development have led into a positive circle that has brought Finland from producing and exploiting information and communications technology to generating growth as one of the global forerunners. Finnish businesses and public sector are among the international leaders in utilising information and communications technology and making use of the new, global business opportunities provided by the information society development.

The Finnish information society is based on balanced social and regional information society development; a compatible, information-secure and accessible information society infrastructure; and great trust in the involved actors and services. The information society is flexible and user-oriented in all everyday situations.

Finland has transformed into a knowledge-based service society in a way that improves businesses’ competitiveness, provides high-quality services in public and private sectors, and promotes the well-being of society and individuals. This has called for significant changes in service provision, innovation systems, and work life.

www.arjentietoyhteiskunta.fi/files/38/periaatepaatos_tietoyhteiskuntapolitiikan_tavoitteista_engl_.pdf

Netherlands

The Netherlands has a decentralized approach to policy in which they encourage individual schools to develop their ICT vision:

In primary education almost three-quarters of all schools have developed a vision on the use of ICT centrally. In secondary education six out of ten schools have an explicit vision on ICT.

To a considerable extent, the attitudes within a school toward the structuring and organization of learning processes determines which ICT application will or will not tie in with the educational objectives. The ICT yield is related to the match between educational vision and choice of ICT. A mismatch between educational vision and ICT application means, in practice, that teachers use educational materials not developed for the learning situation in which they are deployed.

<http://downloads.kennisnet.nl/onderzoek/fourinbalancemonitor2007.pdf>

Portugal

Portugal's Technological Plan for Education states:

The vision defined and shared by the agents in the educational community is clear: to place Portugal among the five most advanced European countries in terms of technological modernisation of education.

http://www.pte.gov.pt/idc/idcplg?IdcService=GET_FILE&dID=15018&dDocName=002839

LATIN AMERICA**Chile**

The mission of the Ministry of Education is to ensure the educational system's equity and quality and that it contributes to the integral and continuous education of people and the development of the country, through the design and implementation of policies, norms, and sectorial regulations.

La misión del Ministerio de Educación es asegurar un sistema educativo equitativo y de calidad que contribuya a la formación integral y permanente de las personas y al desarrollo del país, mediante la formulación e implementación de políticas, normas y regulación sectorial.

The Mission of Enlaces is to: "integrate ICTs in the educational system to achieve improvement in learning and the development of digital competencies in all the actors."

www.enlaces.cl/index.php?t=44&i=2&cc=1883&tm=2

"Integrar las TIC en el sistema escolar para lograr el mejoramiento de los aprendizajes y el desarrollo de competencias digitales en los diferentes actores."

Uruguay

A vision for the role of ICT in the development of young people is articulated by the Agency for eGovernment and the Information Society in Uruguay:

For the majority of the urban young people, the contribution of ICT played to the possibilities of personal development has been as significant as the contribution to change that paper played to in the reproduction of societies. Some of the aspects of personal development affected by ICT are:

- a. The extension of their opportunities for social interaction beyond physical spaces (the house, the neighborhood, the school and the places of relaxation and work).
- b. The strengthening of their autonomy and privacy in interaction with friends and partners, in the virtual world, and opportunities to define their own problems and solution strategies, with greater independence of parents or teachers.
- c. The increase of their capacities to identify and select people and groups who share attitudes and various interests.

d. The expansion of their opportunities to train the association between efforts and achievements and, therefore, the confidence in their own capacities to reach goals.

e. The emergence of a range of ways to display their creativity and individual development, where senders and receivers of messages can act at the same time like, with the possibility of incorporating the personal stamp of each of them.

www.agesic.gub.uy/innovaportal/v/115/1/agesic/que_es.html

www.ceibal.org.uy

MIDDLE EAST**Jordan**

Jordan's vision was articulated by King Abdullah and linked education reform to economic development such that in the future:

The Hashemite Kingdom of Jordan has the quality competitive human resource systems that provide all people with lifelong learning experiences relevant to their current and future needs in order to respond to and stimulate sustained economic development through an educated population and a skilled workforce.

www.ibe.unesco.org/National_Reports/ICE_2008/jordan_NR08.pdf

NORTH AMERICA**Canada (Alberta)**

In Canada, education policy devolves to the provinces. This is the ICT in Education Policy vision for the province of Alberta:

Information and communication technology supports Alberta's globally recognized learning community by enhancing learning delivery, knowledge and skill acquisition, learning system management, and innovation.

<http://education.alberta.ca/media/822425/landtpolicyframework.pdf>

United States

A vision of education is articulated in the U.S. National Education Technology Plan:

Education is the key to America's economic growth and prosperity and to our ability to compete in the global economy. It is the path to good jobs and higher earning power for Americans. It is necessary for our democracy to work.

With this in mind, America needs a public education system that provides all learners—including low-income and minority students, English language learners, students with disabilities, gifted and talented students, early childhood learners, adult workforce learners, and seniors—with engaging and empowering learning experiences. Our education system also should help learners set goals, stay in school despite obstacles, earn a high school diploma, and obtain the further education and training needed for success in their personal lives, the workplace, and their communities.

www.ed.gov/sites/default/files/netp2010.pdf

Resource: Idea Starters

To help you with your thinking about your national vision, here are some potential idea starters:

- Increase economic growth
- Create high skilled jobs
- Create a highly-skilled labor force (entrepreneur, higher-skilled talent pool, and jobs from eLearning program)
- Increase social well-being and global citizenship
- Reduce the digital divide and increase digital inclusion
- Improve socioeconomic and gender equality
- Create a knowledge economy
- Improve national competitiveness
- Level the playing field between rural and urban communities

And here are some idea starters that are more specific to an education vision:

- Increase higher education matriculation rates
- Increase education access to girls
- Increase graduation rates
- Make schools more relevant to students
- Improve examination scores
- Reduce the attendance or performance gap between females and males
- Develop 21st century skills
- Increase access to high-quality education for both females and males
- Increase access to educational tools, such as ICT, for low-income families and both females and males
- Increase motivation of students and teachers
- Increase parental involvement
- Improve communication among teachers, students, parents, and administrators
- Enable sharing information, best practices, content, etc.
- Empower teachers to create content
- Create an anywhere/anytime teacher/learning environment
- Enable distance learning
- Enable more advanced teachers to mentor less advanced teachers
- Improve efficiency and effectiveness of teachers
- More easily manage larger volumes of students and classrooms

Resource: Vision Videos

Below are a set of school and educational programs in the United States where curriculum and assessment, teaching and learning, and school organization are being redefined. ICT is enabling these changes. These videos can help you come up with ideas for visions of how schools might look in the future in your country. As you view them, notice:

- What is taught and how it is assessed
- The practices of teachers
- The activities of students
- Where learning occurs
- Who is involved in teaching and learning
- How teachers, students, and others interact and share knowledge
- How ICT supports learning

In-Depth Case Studies

High Tech High, San Diego, California

Team teaching

www.edutopia.org/high-tech-high-team-teaching-video

Connecting with the outside world

www.edutopia.org/high-tech-high-team-teaching-video

Role of ICT

www.edutopia.org/projects-portfolio-assessments

Ferryway School, Malden, Massachusetts

Integrated curriculum

www.edutopia.org/integrated-studies-overview-video

Role of ICT

www.edutopia.org/ferryway-ironworks-integrated-studies-video

Build San Francisco, San Francisco, California

Connecting with the outside world

www.edutopia.org/build-sf-learning-design-civic-education-video

Assessment

www.edutopia.org/build-sf-assessment-video

Aviation High School, Seattle, Washington

Connecting to the outside world

www.edutopia.org/engineering-success-aviation-pbl-video

Designing a multidisciplinary project

www.youtube.com/biepbl#p/c/3AA6ADD734414F11/8/CB9ffc5YFXE

Collaborative projects

www.youtube.com/biepbl#p/c/3AA6ADD734414F11/12/pBwd8JM-wmRU

Assessment of 21st century skills

www.youtube.com/biepbl#p/c/3AA6ADD734414F11/10/Wftj1rGsjj0

High Tech High, Napa, California

Developing 21st century skills

www.youtube.com/biepbl#p/c/8EAE0FBB6693F00E/11/YjKpD7qh7Ac

Assessing 21st century skills

www.youtube.com/biepbl#p/c/3AA6ADD734414F11/7/n2WKCbxexU

The Kahn Academy

<https://www.youtube.com/watch?v=x28uXrwHNZE>

Innovative Learning around the World

Canada

www.youtube.com/biepbl#p/c/3AA6ADD734414F11/5/D84sjwKVwoE

<http://vimeo.com/60202771> access code: learning21

<http://vimeo.com/album/2029774/video/47757100>

Chile

<https://www.youtube.com/playlist?list=PL906F18D905E13FDD>

China

www.youtube.com/biepbl#p/c/A2479A72F70546A6/6/OchlZqoMI_M

England

www.youtube.com/watch?v=a63XApw4gwM

Finland

www.youtube.com/watch?v=Ctuo7ibEWZI

www.youtube.com/watch?v=_lW8ihhWBZA

www.youtube.com/watch?v=Rq6qM-y_hrM

Singapore

www.youtube.com/biepbl#p/c/A2479A72F70546A6/2/8VTuLobed60

<http://ictconnection.moe.edu.sg/cos/o.x?c=/ictconnection/pagetree&func=view&rid=1011>

United States

www.youtube.com/watch?v=OPVXg8fmdM

www.youtube.com/watch?v=2Mug66WnoSk

www.edutopia.org/build-sf-learning-design-civic-education-video

www.edutopia.org/king-middle-school-expeditionary-learning-video

www.edutopia.org/biotech-academy-school-career-video

www.edutopia.org/school-environmental-studies-project-learning-video

www.youtube.com/biepbl#p/c/8EAE0FBB6693F00E/3/ovkW8M8vD5o

www.youtube.com/biepbl#p/c/3AA6ADD734414F11/0/9VzhStQwQSI

www.youtube.com/watch?v=SkDlklQbols

Uruguay

www.pearsonfoundation.org/great-learning/programs/plan-ceibal.html

Video Presentations and Discussions of Education Transformation

<http://itec.eun.org/web/guest;jsessionid=43BA8DE4AA9E3BC3976AD93106946586>

www.youtube.com/watch?v=zxJgPHM5NYI

<https://www.youtube.com/watch?v=zDZFcDGpL4U>

<https://www.youtube.com/watch?v=dmd1Kmjs7NE>

Video Presentations and Discussions Related to Gender Equity

www.youtube.com/watch?v=YJc9xaQQ4ZI

www.youtube.com/watch?v=y3PkyRudACO

www.youtube.com/watch?v=GptX9220hhl

Additional Video Resources

George Lucas Education Foundation: www.edutopia.org/video. The foundation, through its web site, provides a variety of resources on education reform and project-based learning, much of it supported by technology. The resources include videos, articles, blogs, case studies, and discussions. Most resources pertain to education in the U.S., but increasingly they are becoming international.

Buck Institute for Education: www.bie.org. The institute, through its web site, provides a variety of resources on education reform and project-based learning that include videos, articles, and case studies. Most resources pertain to education in the U.S.

EdVisions Schools: www.edvisions.com. The organization, through its web site, provides a variety of resources on education reform and project-based learning that include videos, articles, and case studies. Most resources pertain to education in the U.S.

Pearson Foundation: <http://pearsonfoundation.org/oecd>. The foundation presents video case studies of 10 national or provincial education systems that have made great system-wide improvements, particularly on PISA scores. The videos analyze the factors behind the success, sometimes including the use of ICT.

Resource: Jordan Case Study

In 2010, the Ministry of Education in Jordan asked a consulting team⁵ to aid in formulating its second ICT master plan to accompany its revised education reform program, Education Reform for the Knowledge Economy II (ERfKE II). The consulting team used the model presented here in the Intel Policy Development Toolkit. Indeed, the Toolkit was based on the process used in Jordan.

Early on in the process, the consulting team met with a group representing a number of departments in the Ministry of Education, including those responsible for ICT, curriculum, teacher training, and school organization. The team conducted an envisioning exercise, much like the one provided here in the Toolkit. The group generated the following detailed ideas related to each of the themes:

Theme: School Policy, Organization, and Management

The teacher and the students will make decisions regarding the school day, timing, meetings, ways of learning, evaluations, and monitoring.

To achieve this, we need to build the infrastructure everywhere in the country, give all sectors the chance to use technology, and encourage all sectors to be innovative in technology, and interact with and use ICT as a supportive tool and not a science to be learned.

The teaching and learning process should be geared toward distant learning so that learning can take place everywhere—at home, at the workplace, etc. There should be no longer classrooms, so that the PC desktop will mimic a classroom. There should be no need for books.

Theme: Curriculum and Assessment

The curriculum will be organized according to outcomes only—teachers can choose their own resource.

A rich educational environment provides students with different learning resources, taking into consideration varied student needs. This rich environment (curricula) will help to involve them in real life and open different opportunities as basic input to sustainable economic growth.

It is important to focus on “soft skills” by adopting lifelong learning to produce knowledge, and to encourage students to design their own activities and determine the courses by themselves.

Student learning will be measured using authentic evaluation in real-life situations based on real and tangible results.

The students will be assessed frequently since the students will do self-assessment

The performance indicators will be used for assessment so that teachers make valid and fair evaluations. The students' portfolios will be used effectively.

ICT will support these changes through various online strategies for assessments that focus on self-assessment, indicator-based assessments, and students' work portfolios, as opposed to grades and reliance on “pencil and paper” and traditional examinations methods.

Theme: Professional Development, Teaching, and Learning

Teachers need to be good project managers, and good evaluators of students' projects. Teachers should be skilled in self-learning, able to advise students in any subject, and have good communication, monitoring, and evaluations skills.

Teachers need to know about psychology, self-learning, class management, and class-based evaluation. The teachers also need to know how to use all sorts of hardware and software and how to use these resources in education and in real-life applications.

Teachers can learn by sharing and collaborating with each other, with the cooperation of educators and experts in technology, and through universities. They can also learn through their supportive communities or through web-based learning, as self-learners.

The teachers' roles will change so that they help students get the information that they need. The teachers will provide students with distant support by operating through their PCs to inspect students' projects and comment on them, in support of creative projects.

The students' roles will change so that they search for resources independently.

Parents and the community play a supportive role, by availing at least one PC with connectivity per student.

Other supportive human resources include technical assistants and other governmental associations.

ICT can support these changes by linking the type of required resources to the intended outcome, and by linking those applications to real-life situations and focusing on practical applications.

Resource: Korea Case Study

Currently, the Republic of Korea is seen as a leader in education and ICT. Korea consistently scores at or near the top on PISA. The Ministry of Education, Science, and Technology has received international prizes from UNESCO and the IMS Global Learning Consortium for its innovative approaches to the use of ICT. Nonetheless, the goal set out by the ministry is to become an “education superpower” through the effective use of ICT. This goal is driven by the desire to foster a knowledge-based society by developing the nation’s human resource base. The premise is that knowledge is changing so fast that the economy demands people with outstanding communication abilities who can swiftly acquire new knowledge and technology and solve problems with creativity. Furthermore, in Korea, every citizen has a right to access eLearning, as enshrined in the constitution.

Explore Korea’s ideas for the future of its education system at this web site: <http://future.keris.or.kr/eng/index.html>

See how Korea is using ICT to stimulate a creative approach to learning that gives students access to education materials wherever and whenever they want:

<http://www.pearsonfoundation.org/oecd/korea.html>

Resource: Cases of Innovative Schools

The following are resources that describe innovative classrooms and schools:

Crescent Girls’ School: Mobilizing for Student-Directed Learning. This case study of Singapore’s Crescent Girls’ School describes how mobile technology can support student self-directed learning. www.samsung.com/sg/business-images/resource/RR-CS/2012/07/ITS_1208_Notebook_CrescentGirlsSchool_CS-0.pdf

eLearning Case Studies. This examination of 10 schools in Hong Kong in different stages of eLearning looks at their school vision, their teaching and learning focus, and the ways technology supports them. <http://elep.cite.hku.hk/casestories/en/acknowledgement.asp?school=&cata=ack>

Inventory Cases. The Center for Education Research and Innovation at OECD has collected case studies of innovative schools from around the world. www.oecd.org/edu/cei/inventorycases.htm

Pedagogical integration of ICT: Successes and challenges from 100+ African schools. An analysis of ICT implementations in schools in 12 sub-Saharan African countries. www.observatoiretic.org/documents/2011-11_livre_en.pdf

School of One. An innovative project in New York City that uses technology to transform teaching and learning. <http://schoolofone.org/concept.html>

Singapore’s Future Schools. This report describes learning and teaching practices in Singapore’s Future Schools. <https://www.google.com.sg/url?sa=t&rct=j&q=&esrc=s&source=web&cd=9&cad=rja&ved=0C HIQFjAI&url=http%3A%2F%2Fedulab.moe.edu.sg%2Fcos%2Fo.x%3Fc%3D%2Fedulab%2Fpagetree%26func%3Ddownload%26rid%3D160&ei=FJkhUZqrJY3JrAffgoDoAQ&usg=AFQjCNFQz5lvJK0J2vtXPnm8Rjgg3xoMgw&sig2=5dtaotm96sbrRFgnbM5G9A&bvm=bv.42553238,d.bmk>

Exercise: Sharpening Your Vision**Theme: School Policy, Organization, and Management**

Look 15 years into the future. How will education be different in your country when it is infused with technology? Here, we would like you to focus on school policy, organization, and management. Think quite broadly but among your thoughts include these questions:

- 1. Where will learning take place? Will school buildings look different?**

- 2. Will classrooms look different? Will there even be classrooms?**

- 3. Will there be age-based grades?**

- 4. When will learning occur? Will the school day or school year be scheduled differently?**

- 5. What will be done to provide a learning environment that is socially and culturally supportive of female as well as male students?**

- 6. How will teachers be incentivized to perform their best?**

- 7. Will there be a larger spectrum of actors formally participating in education process (mentors, technicians/practitioners, scientists, professionals, and business people)?**

- 8. Will teachers interact with each other and with principals differently?**

- 9. What will be the role of the school leaders?**

- 10. Which instructional decisions will be made by the school administrators, teachers, and even students, and which made by the MoE or directorate? Give examples of each.**

- 11. What information will be needed to make these instructional decisions and where will it come from?**

- 12. How will ICT support these changes? How will anyplace, anytime resources change when and where education happens? How will social media affect who is involved in the education process? Give examples. What ICT resources will be needed to accomplish this?**

Theme: Curriculum

Again, look 15 years into the future. Here, we would like you to focus on curriculum: what is taught and what students are expected to learn. Think quite broadly but among your thoughts include these questions:

- 1. What kinds of knowledge and skills will students need to learn?**
- 2. Will school subjects still be important? Will they be taught separately or learned in a combined way?**
- 3. If subject skills are taught, how will they connect with “soft skills” or 21st century skills such as collaboration, communication, and complex problem solving?**
- 4. How will the curriculum be organized?**
- 5. Will there be a national curriculum? How will this be different from the current curriculum?**
- 6. Who will decide what students learn? How will that decision be made?**
- 7. How will ICT support these changes? How will online resources change the curriculum? How does ICT support the learning of “soft skills” or 21st century skills?**
- 8. What will be done to ensure the curriculum has relevance for both males and females?**

Theme: Assessment

This time, look 15 years into the future and focus on assessment: how student learning will be measured. Think quite broadly but among your thoughts include these questions:

- 1. How is student learning measured? What do assessments look like?**
- 2. How often will students be assessed?**
- 3. Who will determine the quality of student work? What role do teachers, peers, and outside experts play in this process?**
- 4. Will there be national assessments or evaluations?**

- 5. Where will information on student learning be stored? Who will have access to it and how will it be used? What will be done with this information?**
- 6. How will ICT support these changes? How will ICT-adaptive tests, simulations, and multimedia real-world cases change the nature of assessments? How will social media change who is involved in assessments? Give examples. What ICT resources will be needed to accomplish this?**

Theme: Professional Development

When you look 15 years into the future, what will teacher professional development and improvement look like? Think quite broadly but among your thoughts include these questions:

- 1. What pedagogical skills and knowledge will teachers need? What ICT skills will they need?**
- 2. Who will become teachers and how will they prepare? How will teachers be selected? What will their qualifications be?**
- 3. What standards must teachers meet before they begin their teaching career? Do the standards need to be maintained?**
- 4. Will teachers have a defined career path?**
- 5. How will they continue to learn and improve?**
- 6. How will teachers work together and support each other?**
- 7. How will ICT support these changes? How will simulations, multimedia resources, handheld devices, productivity and creativity tools, and social media change how teachers learn? Give examples. What ICT resources will be needed to accomplish this?**

Theme: Teaching and Learning

Again look 15 years into the future. How will education be different in your country when it is infused with technology? This time, focus on teaching and learning. Think quite broadly but among your thoughts include these questions:

- 1. Think of a “day in the life” of a school. What kinds of things will happen during learning? What will students be doing? What will be the student’s role?**
- 2. What will teachers be doing? What will be the teacher’s role?**

- 3. How will teachers support the learning of both female and male students? How will they support cultural and linguistic minorities? How will they support economically disadvantaged students?**

- 4. What role will parents and the community play? How might both mothers and fathers be more involved in their children's education?**

- 5. What about other human resources, such as business people, scientists, and other experts? How might both females and males participate in helping students?**

- 6. What kind of technology and digital learning resources will students have? What resources will teachers have? Who will create these? How will students and teachers access and use them? What will be done to ensure equal access and use for males and females?**

- 7. How will ICT support these changes? How will simulations, multimedia resources, handheld devices, productivity and creativity tools, and social media change how students learn and teachers teach? Give examples. What ICT resources will be needed to accomplish this?**

Research and Evaluation

This time, when you look 15 years into the future, focus on research, evaluation, and the use of information. Think quite broadly but among your thoughts include these questions:

- 1. What information will be used to make education improvement decisions? How will this information be used?**

- 2. What decisions will be made at the ministry, district, school, and class levels? Who will be involved in making decisions?**

- 3. What information will be needed to understand the participation, achievements, and retention of both female and male students? Of low-income or minority students? How will this information be used?**

- 4. Where will this information come from? How often will it be collected and by what agencies?**

- 5. How will ICT support these changes? How will networking and anytime access to information change how decisions are made and who makes them? How will all-the-time collection of data and data-visualization and analysis tools change the decision process? Give examples. What ICT resources will be needed?**

Step: Define Government’s and Stakeholders’ Missions

Overview

Goal

The goal of this activity is to identify stakeholders for your ICT plan and define their missions. These are the groups that must share the future vision of education, if they are to help transform the system. Many ministry departments are involved in educational transformation—the departments of curriculum, assessment, teacher training, and ICT (perhaps among others) are all important contributors. Other ministries might include the ministries of telecommunications, economic development, higher education and research, and youth and social services. Other stakeholders can make important contributions, as well—private-sector industries and businesses, parent and community groups, professional organizations and unions, NGOs, and donors. It is important to identify all the stakeholders and specify their missions. This will provide information needed to analyze the socio-ecosystem and identify potential partners for change.

Resources

In addition to the exercise here, you have the Jordan case study and output from the Creating a Vision step.

Output

As a result of this step, you will have a list of key stakeholders and their missions. You will also have input into the vision statement, and a revised vision statement, based on this input.

Identifying Stakeholders

Look at the Jordan case study in the Appendix, which describes the stakeholders involved in Jordan’s education transformation.

Identify your own stakeholders from among the categories listed below—other agencies or organizations that would affect, be interested in, or be affected by ICT in Education Policy:

- King’s/president’s/prime minister’s office
- Legislature or legislative committees
- Ministry of education departments
- Ministry of higher education and/or universities
- Other ministries or their departments
- Parent or community groups
- Professional organizations and unions
- Private-sector enterprises and organizations
- NGOs and donors
- Girls’ and women’s organizations

Specifying Missions

Now, for each stakeholder, identify and describe their mission. This is a statement that spells out the overall goal of the organization, provides it with a sense of direction, and guides decision-making. Often these are formally stated in the organization’s brochures or web sites. If not, you may need to do a bit of reading on the organization and infer the mission from that.

Analysis of Stakeholders and their Missions:

Enter a summary mission statement for each stakeholder:

Stakeholder	Mission Statement

Step: Define Government’s and Stakeholders’ Missions

Now, in the table below, note the common points across missions. Pick out key words from your mission summaries and enter these along the top. List the stakeholders along the left side. In each box, put a check if a particular stakeholder has that key word in its mission.

Stakeholder	Key Term	Key Term	Key Term	Key Term	Key Term	Key Term	Key Term

Sharing the Vision

Now, next to each mission statement, provide your analysis of how that mission relates to your vision statement and the role that the stakeholder may play in advancing the vision, in general, or each of the components (school management, curriculum, assessment, teacher professional development, etc.).

Stakeholder	Mission Statement	Role in Advancing Vision

If there are any stakeholders that were not involved in generating the vision statement, pick those groups that you think are important to share your vision. Circulate your draft statement with them to get their input. Ask them how they relate to the vision and how this vision relates to or overlaps with theirs. You may want to share your analysis of their mission and ask for their feedback.

List suggested changes in the vision statement, based on feedback from key stakeholders:

Coming to a shared vision:

If it would help to align the visions of the various stakeholders, bring key representatives together to discuss their agreements and differences. List the common elements of the vision across stakeholders:

Revised Vision Statement

With the input that you receive from key stakeholders, revise the vision statement to reflect a shared vision.

Step: Define Government's and Stakeholders' Missions

Resource: Jordan Case Study

As part of the work for the Ministry of Education in Jordan to help them generate their ICT plan and strategy, the consultants identified potential stakeholders and described their missions. While this is not a comprehensive list, these departments and organizations were all involved in the Education Reform for the Knowledge Economy, one of the king's important initiatives.

Ministry of Education**Queen Rania Center**

This is a Directorate within the Ministry of Education that has as its mission the support of eLearning and teaching, including all the necessary resources for students, teachers, schools, and the local community. The center is responsible for implementing the ministry's ICT plan.

Directorate of Information Technology

Closely related to the Queen Rania Center, this Directorate is responsible for deploying and maintaining equipment in schools. Currently, the same person is the director of both agencies, and there is discussion about combining them organizationally.

Directorate of Planning

This Directorate works across the other divisions to collect and maintain data on attendance, grades, and other official student and teacher information. They also generate reports used for decision-making. They are currently leading a component of the Education Reform for the Knowledge Economy (ERfKE) related to school-based decision-making.

Directorate of Training, Qualifications, and Supervision

This Directorate is responsible for all in-service teacher training and preparing new hires to become teachers. That is, in Jordan, people do not receive formal training as teachers prior to hiring by the Ministry of Education. Rather, the ministry hires people with degrees in other fields and then trains them to become teachers. They are currently leading a component of ERfKE to revise teacher standards and redesign teacher training based on these.

Directorate of Curriculum and Textbooks

This Directorate specifies the curriculum and publishes textbooks. They are currently leading a component of ERfKE that revises the curriculum around standards.

Directorate of Tests and Examinations

This Directorate is responsible for developing, administering, and analyzing student assessments. They are currently experimenting with ICT-based assessments.

Other Stakeholders**Jordan Education Initiative**

This is one of Queen Rania's nonprofit organizations. They are supporting innovation within Jordanian public schools, particularly among a set of "Discovery Schools" that they have identified. These schools are test beds for ICT-based innovative practices.

National Center for Human Resources Development

NCHRD is concerned with the enhancement and promotion of human resource development and improving relevance of outputs of education and training programs. They are typically the "outside evaluators" for many programs in the Ministry of Education.

Ministry of Information and Communications

This ministry sets the ICT in Education Policy for the nation.

Overview

Goal

While the outcome of the envisioning exercise is a clear, shared vision and a concrete set of images of what the future might be like, the “socio-ecosystem analysis” brings the policy planning process back to the current world. The goal of this step is to analyze the situation as it is right now: What does the current situation in schools look like? What are the strengths of the system? What are the weaknesses or gaps between the current situation and the desired situation? What are the local and global demands and local expectations? Are there differences in male and female access to education and use of education and educational tools, such as ICTs? What are the barriers to education and science and technology training, particularly for females versus males? What are the challenges and impediments to change?

Resources

In addition to this step, you have access to the Jordan case study and the shared vision for the future of education that you generated in previous exercises. You may also want to acquire some of the background readings listed at the end of this exercise.

Output

As a result of this step, you will have an articulated analysis of the current state of education in your system and will have identified key differences between the current state and your vision.

Analyzing the Current State

Even though your policy is focused on a particular area—ICT—the socio-ecosystem analysis should consider the current state of all the components of the education system: curriculum and assessment, pedagogy, teacher professional development, and school organization and management. The analysis may also go beyond the immediate focus of the policy to include the broader context within which the policy is being made, including world-class standards and global educational, social, and economic trends.

You may already have all the needed information in your head. But often the socio-ecosystem analysis requires reading reports, visiting schools, observing classrooms, and interviewing teachers, school leaders, and other ministry officials. In any case, the socio-ecosystem analysis is an opportunity to organize and write down all of the relevant information about the current status and trends that can affect policy and its implementation.

Read the resource materials in the Appendix for Jordan and elsewhere. Now lay out your knowledge about the current status and trends in your system.

- If alone, go through each of the themes in the exercise and return here upon completion.
- If you are in a group, have each member select one of the themes below to create his or her own image of a future education system from the perspective of professional development, pedagogy, curriculum, assessment, or school organization and management. All individuals should do the ICT theme. Upon completion, share the different perspectives within the group.
- If you are working in multiple groups, have each group work on a theme and share the results with the other groups.

But first, consider the following:

What major social conditions currently affect education, related to social and gender equity, social services, human relationships, human capital development, etc.?

What major economic conditions currently affect education, related to the structure of the economy, broad-based prosperity, the distribution of wealth and resources, etc.?

What major technological conditions currently affect education, related to the power and ease of use of devices, the availability of devices, networking, multimedia, social media, etc.?

What are past future visions that have not materialized? Why do you think they did not come to be? What can you learn from these experiences?

Identifying Strengths, Weaknesses, and Differences

Look at Analyzing Your Current State in the Appendix. Based on the exercise, list the strengths and weaknesses of the components of your current system as compared to the vision that you generated in previous steps:

Component	Current Strengths	Current Weaknesses	Summary of Differences Between Current and Long-Term
Organization and Management			
Professional Development			
Teaching and Learning			
Curriculum and Assessment			
Evaluation and Research			
ICT			

Summarize the extent to which ICT supports the current education system. Give specific examples.

What are the current ICT resources in education? What are the limitations and challenges with these?

Resource: Jordan Case Study

As part of work with the Ministry of Education in Jordan to develop a five-year ICT plan and strategy, the ministry asked the consulting team to do what they called a “situation analysis.” They wanted to be sure that the consultants understood how the plan they were recommending fit with the current situation in Jordan and moved it forward toward the ministry’s vision of an education system that supported the knowledge economy. The consulting team spent several weeks reading reports, visiting schools, interviewing principals and teachers, and meeting with the staff of various organizations and ministry directorates. The following summarizes their findings.

The Socio-Ecosystem in Jordan Education System

Jordan is considered to have one of the better education systems in the Arab region. Literacy and education participation among the general population is quite high. Government investment in education is significant. For the past eight years, Jordan has been committed to a systemic education improvement policy called Education Reform for the Knowledge Economy. ERfKE efforts address all parts of the education system. The ministry is now entering the second phase of this reform effort (ERfKE II). The ICT plan and strategy is part of ERfKE II.

Professional Development, Teaching and Learning

Both the pre-service and in-service professional development of teachers is the responsibility of the Ministry of Education. With the exception of teachers in the self-contained classes in grades 1 through 3, teachers are not hired from a pool of applications selected by the Civil Service Bureau. These applicants may have no formal preparation as teachers. The MoE must provide training both for these new teachers and for currently practicing teachers. Teacher professional development was a key component of ERfKE I, and several initiatives were deployed as part of this reform policy. ICT training was an important part of this and teacher pay increases and promotions have been tied to ICT training. In 2006, the National Teacher Professional Standards were developed. In 2010, the MoE produced the Policy and Strategic Framework for Teacher Preparation, Utilization and Career Development to provide a coherent policy framework and structured process for teacher professional development.

Currently, pedagogy in Jordan is very traditional. The large majority of classes are organized with the teacher lecturing and students taking notes or providing oral, often choral, responses to the teacher’s questions about content-related facts. ICT is rarely used in courses other than those on ICT literacy. Teachers do not currently have a model for how to integrate ICT into their teaching.

Curriculum and Assessment

The curriculum is also quite traditional, specifying topics to be covered rather than skills to be learned. However, as part of the Education Reform for the Knowledge Economy (ERfKE), the Directorate of Curriculum and Textbooks is leading an effort to revise the curriculum around outcome standards. Among the outcomes are:

- Communicate effectively with others in a variety of ways
- Work collaboratively with others in groups and teams
- Use information and communication technologies to locate, manage, analyze, and communicate information and to generate and apply knowledge
- Engage in reflective and creative thought about important topics and issues
- Use critical-thinking, problem solving and decision-making skills in an effective way

Jordan participates in both international student assessment programs: PISA and TIMSS. Student score very low in both programs. The new National Assessment of Knowledge Economy Skills (NAfKE), has been conducted by the NCHRD Monitoring and Evaluation Team for ERfKE I, in conjunction with the Directorate of Examinations and Tests, on a representative sample of grade 5, 9, and 11 students. It was found to be limited in its scope of evaluation of the full range of knowledge economy skills and was confined to three areas: mathematics, science, and Arabic reading. The Directorate of Examinations and Tests is experimenting with ICT-delivered assessments.

School Policy, Organization, and Management

Education is highly centralized in Jordan. The ministry sets all the policies, and school principals are responsible for implementing them, as reported to Regional Directorates. Schools are also highly structured. Teachers have relatively little decision-making authority and few discretionary resources. Classes are traditionally structured.

However, an important part of ERfKE II is a movement toward school-based management in which school headmasters would formulate local school policies and make decisions about school policy based on available data.

Research and Evaluation

Currently, evaluation of educational programs and initiatives is conducted either by the National Center for Human Resources Development, an agency independent of the Ministry of Education, or some other contract agency. Evaluations are done on an ad-hoc basis, rather than as a regular part of the planning process. However, the Directorate of Planning within the Ministry of Education does collect data on attendance, grades, and other official student and teacher information that is used as part of the planning process.

There is little research on education reform that is done within the Ministry of Education in Jordan or by outside academic research groups.

ICT

ICT has been a key component of ERfKE I. Jordan has invested heavily in educational ICT and almost all schools in the country now have at least one computer lab. The Ministry of Information and Communications has been involved in an effort to connect schools to the Internet. However, school computer labs are used mostly for ICT and technology courses. Very few teachers use ICT as part of their teaching, and there is no pedagogical model for the use of ICT.

Social and Economic Trends

Economic development is a major focus of the government in Jordan. Several national economic development plans have focused on developing ICT as both a sector and a productive factor. The major economic development goal is to move Jordan to a knowledge economy and develop the ICT sector so that Jordan is an ICT regional hub. Education improvement is also part of the economic development plan and education reform is couched in this rhetoric—Education Reform for the Knowledge Economy.

Resource: Situation Analyses

GeSCI (2011). African leadership in ICT: Assessment of environmental, institutional, and individual leadership capacity needs for the knowledge society in Africa: A situational and needs analysis in four countries. An analysis of ICT needs in four African countries: Mauritius, South Africa, Tanzania, and Zambia. www.gesci.org/assets/files/Country_Needs_Analysis_Summary.pdf

Swarts, P. & Wachira, E. (2009). Kenya: ICT in education situational analysis. An analysis of the policy context and the state of ICT in education in Kenya. www.gesci.org/assets/files/Knowledge_Centre/Kenya ICT4E Situational Analysis_Final Copy.pdf

The e-Learning Africa 2012 report. This report examines the current status of ICT in Africa from the perspectives of eLearning professionals and a range of other stakeholders across 41 different countries on the continent. It addresses such questions as: What are the most popular eLearning technologies in Africa? How is technology changing the way that African students learn? www.elearning-africa.com/pdf/report/ela_report_2012.pdf

Situation Analysis Related to Gender Issues:

Helping Bridge the Gender Gap in Computing Careers

Only 29 percent of future computer scientists will be women. What needs to be done to bridge the gender gap in technology careers? www.youtube.com/watch?v=xnEjp8ef_sE

Gender and Education Project

Reaching for equity in science education
www.youtube.com/watch?v=swv-wTo93ck&feature=related

Teachers Turn Trendsetters in Rural Nigeria

Increasing female teachers and role models in a patriarchal community
www.youtube.com/watch?v=z5ivW4XTn0A

Daniel Koretz on Gender and Education

Exploration of the gender gap in education
www.youtube.com/watch?v=GZYC_tgurX4

Huyer, S. (2003) "Gender, ICT, and Education" in Engendering ICT.

This document provides an overview of gender-related barriers to access and use of ICTs, and strategies to improve female participation in scientific and technology education. It includes case studies from various countries of efforts to improve female participation in a range of ICT education initiatives.

<http://digitalknowledgecentre.in/files/2012/02/Gender-ICT-and-Education1.pdf>

Swedish Agency for Development Evaluation (SADEV). (2011). Gender equality in and through education. Karlstad: SADEV. (See Appendix 2 Obstacles to and opportunities for female education)

This evaluation seeks to illustrate how gender equality can be and is promoted through support to education and also aims at assessing how support to the education sector is used as a channel to promote gender equality. Appendix 2 examines gender barriers related to educational parity, curriculum, school environment, and socioeconomic context, as well as actions to overcome these barriers.

http://erc.undp.org/unwomen/resources/docs/genderequality/SADEV_Gender%20equality%20in%20and%20through%20education_2010.pdf

Exercise: Analyzing your Current State

Theme: School Policy, Organization, and Management

1. Where does learning currently take place?

2. What do classrooms look like? How do they operate?

3. How are students assigned to grades or classes? Are females and males treated differently? Are minorities treated different?

4. When does learning occur? How is the school day and school year structured?

5. How do teachers interact with each other and with principals?

6. How are teachers incentivized to perform their best? Are female and male teachers incentivized differently?

7. Are there other actors formally participating in education process (mentors, technicians/practitioners, scientists, professionals, and business people)?

8. What is the role of school leaders?

9. Which instructional decisions are made by school, teachers, and students? Which are made by the MoE or Directorate?
Give examples of each.

10. What information is used to make these instructional decisions?

11. How does ICT support these trends? Give examples.

Theme: Curriculum

- 1. What kinds of knowledge and skills are students expected to learn?**
- 2. What subjects are important? Are “soft skills” or 21st century skills such as collaboration, communication, and complex problem solving currently taught? If so, when and how are they built into the curriculum?**
- 3. How is the curriculum organized? Are they taught separately or learned in a combined way?**
- 4. Who decides what students learn? How are these decisions made?**
- 5. How does ICT support these trends? Give examples.**
- 6. Are females and males treated differently in the curriculum?**

Theme: Assessment

- 1. How is student learning measured? What do assessments look like?**
- 2. How often are students assessed? Who determines the quality of students’ work?**
- 3. Are there national assessments or evaluations?**
- 4. How does ICT support these trends? Give examples.**

Theme: Professional Development

- 1. What kinds of pedagogical skills and knowledge do teachers typically have? What are their current ICT skills?**
- 2. How do teachers acquire these skills? How do teachers support each other in these efforts?**
- 3. How are teachers selected? What are their qualifications?**

4. What are the standards that teachers must meet before they begin their teaching career? Do standards need to be maintained?
5. Do teachers have a career path?
6. What role do parents and the community play in education?
7. What kind of technology and digital learning resources do teachers typically have? How does ICT support teacher learning and improvement? Give examples.

Theme: Teaching and Learning

1. Think of a “day in the life” of a school. What kinds of things happen during learning? What do students do during learning activities? What is the student’s role?
2. What are teachers doing? What is the teacher’s role?
3. How do teachers support the learning of both female and male students? How do they support cultural and linguistic minorities? How do they support economically disadvantaged students?
4. What role do parents and the community play in education? Is the role different for mothers and fathers?
5. What about other human resources, such as business people, scientists, and other experts? What role, if any, do they play? Do both females and males participate?
6. What kind of technology and digital learning resources do students typically have? What resources do teachers have? How do students and teachers access and use them in the classroom?
7. How will ICT support these trends? Give examples.

Theme: Research and Evaluation

- 1. What information is used to make education improvement decisions? What decisions are made at the ministry, district, school, and class levels? Who is involved in making decisions?**

- 2. Where does this information come from? How often is it collected?**

- 3. What information is collected to understand the participation, achievements, and retention of both female and male students? Of low-income or minority students? How is this information used?**

- 4. Where will this information come from? How often will it be collected and by what agencies?**

- 5. How does ICT support these conditions? Give examples.**

Resource: Additional**GENERAL**

Edutopia.org. This web site is a collection of videos, articles, blogs, and discussions about education reform and innovative schools and classroom practices, often supported by ICT.

Epic-Ed. An online community of practice provides a dynamic environment for educators to collaborate, share their expertise, and access resources to strengthen their ability to plan, implement, and sustain technology-enabled learning initiatives. www.epiced.org

Fullan, M.(2010). All systems go: The change imperative for whole system reform. Thousand Oaks, CA: Corwin.

The book presents a rationale for whole-system education reform and discusses what can be done to bring it about. It analyzes the characteristics of an effective school district, using several districts as examples. It then presents strategies for achieving whole school reform at the district and school level, the state or national level, and the personal level.

Kozma, R. (ed.) (2011). Transforming education: The power of ICT policies. UNESCO. This book is a collection of chapters that address the potential of education and ICT to transform education in support of social and economic development. The book includes case studies of educational ICT policies in Jordan, Namibia, Rwanda, Singapore, and Uruguay. <http://unesdoc.unesco.org/images/0021/002118/211842e.pdf>

McKinsey & Co. (2007). How the world's best performing school systems come out on top. London: McKinsey & Co. <http://mckinseysociety.com/how-the-worlds-best-performing-schools-come-out-on-top>

This is a study of the conditions that support the performance of the world's best education systems, among them Singapore and Finland. The study found that funding was not the determinant factor but teacher quality. It concluded that high-performing systems attract the best people to teaching, provide them with skills, and assure that the system is able to deliver the best possible instruction to every student.

McKinsey & Co. (2010). How the world's most improved school systems keep getting better. London: McKinsey & Co. <http://mckinseysociety.com/how-the-worlds-most-improved-school-systems-keep-getting-better/>

This is a follow-up study of the conditions that support the performance of the world's best and most improved education systems. The report identifies the reform elements that are replicable for school systems everywhere as well as what it really takes to achieve significant, sustained, and widespread gains in student outcomes.

West, D. & Bleiberg, J. (2013). Education technology success stories. Washington, D.C.: Brookings. This paper looks at technology trends—such as robot-assisted language learning, massive open online courses, and computer-adaptive testing—and analyzes how they are impacting education around the world. www.brookings.edu/~media/research/files/papers/2013/3/20-education-technology-success-west-bleiberg/download-the-paper.pdf

AFRICA

Butcher, N. & Associates (2011). ICT, Education, Development and the Knowledge Society, GeSCI. Describes the key features of a knowledge society, from an African perspective, and the role of education and ICT in its development. [www.gesci.org/assets/files/ICT, Education, Development, and the Knowledge Society%281%29.pdf](http://www.gesci.org/assets/files/ICT_Education_Development_and_the_Knowledge_Society%281%29.pdf)

Gaible, E. (2010). Education Leadership and the Knowledge Society, GeSCI. Describes the importance and challenges to African countries of becoming knowledge societies and the role that education and ICT can play in that transformation. [www.gesci.org/assets/files/Education change, leadership and the knowledge society.pdf](http://www.gesci.org/assets/files/Education_change_leadership_and_the_knowledge_society.pdf)

GeSCI (2011). Africa and the Knowledge Society. This is a video of experts speaking about the Knowledge Society and Africa as it relates to education, skills development, access to information, and indigenous knowledge. <https://www.youtube.com/watch?v=3tz3TuLR-vM>

GeSCI (2011). Skills for employability: The role of information and communications technologies. A discussion of the role of ICT in economic development in Africa and the implications of this for skills development and education. [www.gesci.org/assets/files/Knowledge Centre/GeSCI_Skills_Development_paper_May2011.pdf](http://www.gesci.org/assets/files/Knowledge_Centre/GeSCI_Skills_Development_paper_May2011.pdf)

Pan-Africa Research Agenda. Observatory. An interactive collection of ICT educational practices from around Africa. www.observatoireict.org/default/use

ASIA

Ministry of Education, Singapore (2010). FutureSchools@Singapore. <https://www.google.com.sg/url?sa=t&rct=j&q=&esrc=s&source=web&cd=9&cad=rja&ved=0CHIQFjAI&url=http%3A%2F%2Fedulab.moe.edu.sg%2Fcos%2Fo.x%3Fc%3D%2Fedulab%2Fpagetree%26func%3Ddownload%26rid%3D160&ei=FJkhUZqrjY3JrAffgoDoAQ&usg=AFQjCNFQz5lvJKOJ2vtXPnm8Rjgg3xoMgw&sig2=5dtaotm96sbrRFGnbM5G9A&bvm=bv.42553238,d.bmk>

LATIN AMERICA

Enlaces. (2012). Enlaces, innovación y calidad en la era digital. 20 años impulsando el uso de las TIC en la educación. Santiago: Ministerio de Educación de Chile. www.enlaces.cl/tp_enlaces/portales/tpe76e-b4809f44/uploadimg/File/PDF/publicaciones/mem2013_baja.pdf

Hinojosa, J. E., Brun, M., Labbé, C., San Martín, E., Vargas, J., Fryer, M., and Obidah, J. (2011). The relation of the availability and use of computers with students' and teachers' performance in secondary schools in Barbados. Washington, D.C.: Inter-American Development Bank; Office of Evaluation and Oversight.

Sunkel, Guillermo, Trucco, Daniela, & Espejo, Andrés. (2013). La integración de las tecnologías digitales en las escuelas de América Latina y el Caribe. Una mirada multidimensional. Santiago, Chile: Comisión Económica para América Latina y el Caribe (CEPAL). www.eclac.org/cgi-bin/getProd.asp?xml=/publicaciones/xml/6/49396/P49396.xml&xsl=/publicaciones/ficha.xsl&base=/publicaciones/top_publicaciones.xsl

Sunkel, Guillermo, Trucco, Daniela, & Möller, Sebastián. (2011). Aprender y enseñar con las tecnologías de la información y las comunicaciones en América Latina: potenciales beneficios Políticas Sociales (pp. 67). Santiago: Comisión Económica para América Latina y el Caribe (CEPAL). www.eclac.org/cgi-bin/getProd.asp?xml=/publicaciones/xml/9/42669/P42669.xml&xsl=/dds/tpl/p9f.xsl&base=/cooperacion/tpl/top-bottom.xslt

Claro, Magdalena, Espejo, Andrés, Jara, Ignacio, & Trucco, Daniela. (2011). Aporte del sistema educativo a la reducción de las brechas digitales: Una mirada desde las mediciones PISA Documentos de proyecto (pp. 39). Santiago: Comisión Económica para América Latina y el Caribe (CEPAL). www.eclac.cl/cgi-bin/getProd.asp?xml=/publicaciones/xml/4/45634/P45634.xml&xsl=/dds/tpl/p9f.xsl&base=/dds/tpl/top-bottom.xslt

Hinojosa, J. Enrique, & Labbé, Christian. (2011). Policies and practices for the use of information and communications technologies (ICTs) in education in Latin America and the Caribbean. Políticas Sociales. Santiago: Economic Commission for Latin American and the Caribbean (ECLAC). www.eclac.org/cgi-bin/getProd.asp?xml=/publicaciones/xml/5/45415/P45415.xml&xsl=/dds/tpl/p9f.xsl&base=/socinfo/tpl-i/top-bottom.xslt

EUROPE

eFIT Austria. Initiative of the Austrian Ministry for Education, Science and Culture for future-oriented ICT projects in education and training. Components: eEducation, eScience, eTraining, and eCulture. www.bildung.at

ELEMÉR. The introduction of an interactive tool to support policy-making has been followed by evaluation studies from the start. Case study should include the development of the tool and its modifications based on user experiences. <http://ikt.ofi.hu/english>

European Schoolnet. European Schoolnet (EUN) is a network of 30 ministries of education in Europe and beyond. EUN was created 15 years ago to bring innovation in teaching and learning to its key stakeholders: Ministries of education, schools, teachers, and researchers. European Schoolnet's activities are divided among three areas of work: Policy, research, and innovation; schools services; and learning resource exchange and interoperability. www.eun.org/web/guest/home

Midoro, V (ed., 2005). European teachers toward the Knowledge Society. Edizioni Menabo Didactica, Ortona. Ortona, Italy: Edizioni Menabo Didactica. These collections of studies discuss results of a European research project to describe basic competence areas for pre- and in-service teacher education. Resources include the Teacher ICT Competence Framework, knowledge, skill and competence descriptions, and case studies about developing them from 14 European countries.

NORTH AMERICA

Fullan, M. (2012). Great to excellent: Launching the next stage of Ontario's education agenda. Reviews the 10-year progress of the Province of Ontario toward a top-performing education system and the factors behind this success. www.edu.gov.on.ca/eng/document/reports/FullanReport_EN_07.pdf

Overview

The updated Intel Policy Development Toolkit consists of 12 sets of materials organized around the four-phase model of the policy development process:

1. Envision the Future
2. Develop a Master Plan
3. Implement Initiatives
4. Evaluate and Adapt

The materials for this second phase—Develop a Master Plan—are organized around four steps:

1. Create a Long-Term ICT Plan
2. Look for Levers
3. Build Multi-Stakeholder Alignment
4. Design Strategies

Goal

The materials for the Develop a Master Plan phase are designed to help you create a long-term, 15-year roadmap that implements your vision. But the focus is on the more immediate next five years.

The materials will help you identify key strengths in your current system and opportunities that can be used as levers. The materials will also help you build alignment among stakeholders so you can move toward your vision. Finally, the materials will help you design a set of strategies, programs, and initiatives to realize your vision.

Current Status

To take advantage of the materials in this phase, you should have a long-term vision of your future education system that is your goal. You should also have an analysis of the current situation in your country. If you have not articulated such a vision or analysis, you should begin with the Envision the Future phase in these materials. Some users may be able to reference a current ICT in Education Policy or plan during the exercises that follow.

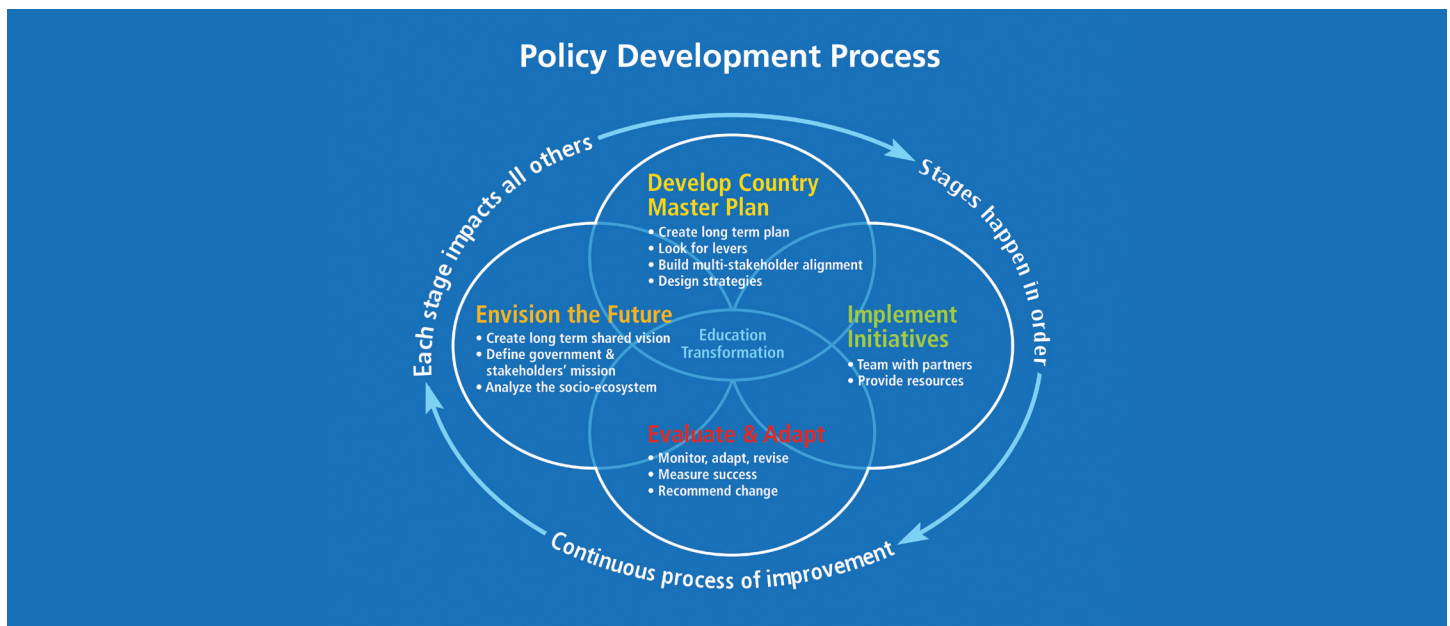
Resources

Each step includes a set of resources (such as exercises, videos, readings, and case studies) that will help you create usable outputs and achieve your goals for this phase. Be sure that you bring with you to these materials a detailed vision of the future of your educational system.

Output

At the end of this Develop a Master Plan phase, you will have:

- A long-term roadmap with a detailed plan for the next five years
- A set of strategic levers that you can use together to launch change
- A plan for using these levers to align contributions of key stakeholders and elements of the educational vision
- A set of strategies and actions that will allow you to accomplish your plan and realize your vision



Overview

Goal

The goal of this step is to help you move from vision to realization. You will look at the vision you have for 15 years from now and chart a path to achieve that vision.

Resources

In addition to this exercise and its list of readings, you have access to your vision statement and detailed case studies from Korea, Singapore, and Jordan. If you used the materials in the Envision the Future phase, you will use the outcomes from those exercises to inform this phase.

Output

As a result of this exercise, you will have a long-term, 15-year roadmap to accomplish your vision and a shorter-term, five-year detailed plan.

Begin with Your Vision

ACTION STEP: ➔ **Input your vision statement.**

Look at your vision, which you either brought with you or developed in the Envision the Future phase. Summarize the key components of your vision below, identifying up to five features for each.

If you complete this exercise in a group from the same country or province, use the discussion of key features as an opportunity to create additional consensus around your shared vision.

Given your vision and your analysis of the current situation, what changes are desired in your education system at the end of the next 15 years?

Component	Desired Changes at the End of 15 Years
School Organization and Management	
Professional Development	
Teaching and Learning	
Curriculum and Assessment	
Evaluation and Research	

How will ICT integrate with and support these changes?

Component	Desired Changes at the End of 15 Years	How will ICT Support Changes
School Organization and Management		
Professional Development		
Teaching and Learning		
Curriculum and Assessment		
Evaluation and Research		

Turning the Vision into a Plan

Now look in the Appendix at the visions and plans for the three attached case studies: Korea, Singapore, and Jordan.

Realize that your vision will take time—education transformation takes many years. This is likely to require a series of policies or plans. Notice how Singapore has worked toward its vision over a 15-year period with three “Master Plans.” Each subsequent plan builds on the accomplishments of the previous one; all moving the country toward its ultimate vision. Similarly, Korea had a series of master plans over nearly 20 years that built on each other and moved the country toward its vision. Notice how the proposed strategic plan for Jordan moves along a 15-year roadmap or trajectory from “Knowledge Acquisition” to “Knowledge Creation,” which was their ultimate vision in support of the knowledge economy.

Each intermediate phase or plan for of these countries has different implications for the use of ICT. In the case of Singapore, the emphasis in the first phase of the Master Plan (mp1) was on the development of ICT skills and the large-scale deployment of ICT in schools and classrooms. In the second phase (mp2), the emphasis was on the integration of ICT into the curriculum and its use for professional development. And finally, in the third phase (mp3), the emphasis was on pervasive ICT to support widespread collaborative learning and self-directed learning.

Jordan is moving from the current emphasis on basic education and school participation to an increased acquisition of knowledge and school-based management. By 2015, the principal and all teachers will have their own computer, and each classroom will have a computer with a projector to support blended learning, in which traditional instruction is supplemented by the regular use of ICT. As the education system moves toward knowledge deepening, by 2020, every classroom will have one or more computer cluster and other digital devices to support collaborative, project-based pedagogy. By 2025, the education system will be based on knowledge creation, in support of the knowledge economy. All students will have immediate access to a wide range of digital devices and resources.

From a Vision to a Roadmap

ACTION STEP: Input your table of desired changes and ICT support from above.

Look at your 15-year vision. Break it into three five-year periods that back up from the 15-year vision to the next five years. Describe the key features or changes that will characterize the education system at the end of each five-year period.

Analyze the list of changes from your previous exercise and break them down into those that are likely to happen in the next five- and 10-year periods:

Component	Desired Changes at the End of 15 Years	Desired Changes at the End of 10 Years	Desired Changes at the End of 5 Years
School Organization and Management			
Professional Development			
Teaching and Learning			
Curriculum and Assessment			
Evaluation and Research			

How does each set of changes build on the previous five-year step and move you toward your long-term vision?
What role can ICT play in supporting each phase of your long-term vision?

Component	How ICT Will Support Change in 15 Years	How ICT Will Support Change in 10 Years	How ICT Will Support Change in 5 Years
School Organization and Management			
Professional Development			
Teaching and Learning			
Curriculum and Assessment			
Evaluation and Research			

From a Roadmap to a Plan

The focus now is on the first five years of the plan. The goal with this exercise is to state the desired outcomes at the end of the first five years and elaborate on the role that technology will play in achieving those outcomes. You will use these outcomes in a later step in which you design strategies to accomplish these outcomes.

In that part of the process, you will also make decisions on priority and feasibility of the various elements of your plan and how components can be strategically used as levers to bring about systemic change. With this goal in mind, examine some of the sample ICT plans from various countries, which are located in the Appendix.

Having examined the plans of various countries and other resources, pick a plan (or two) that is closest to your current thinking. What are the key features that characterize the plan? What technologies are used in these countries, and how do they enable and support changes in these areas:

Component	How ICT Supports Changes
School Organization and Management	
Professional Development	
Teaching and Learning	
Curriculum and Assessment	
Evaluation and Research	

ACTION STEP: Input your table of desired changes and ICT support after five years from above.

Now, return to the plan for your own country. List the changes generated above at the end of five years, and elaborate on how ICT will be used to enable and support these changes in each area below. Since this will be the core of your ICT plan, be very specific with this description. For example, how will simulations, multimedia resources, handheld devices, productivity and creativity tools, and social media contribute to these changes? Give examples.

Component	Desired Changes at the End of 5 Years	How Will ICT Support Change in 5 Years	Specific Examples
School Organization and Management			
Professional Development			
Teaching and Learning			
Curriculum and Assessment			
Evaluation and Research			

What ICT resources will be needed to accomplish the goals listed in the table above?

If you have a current ICT in Education Policy or plan, what changes in the use of ICT could improve this plan?

Draft Statement of Your ICT Master Plan

Based on your responses above, write a first draft. This is a three- to five-page statement of your ICT plan for the next five years. Include in your draft:

Vision for the Future of Education

Current Situation

Desired Changes

Long-Term Roadmap

Five-Year Plan

Role of ICT

Next, go to the Appendix and review the Master Plan Checklist. Based on a review of your revised draft plan, use the checklist to make any necessary changes in your draft.

Resource: Singapore Case Study

Singapore's Vision

Singapore has a long history of ICT in Education Policy that builds capacity over a 15-year period while remaining focused on a consistent vision.

The Ministry of Education has developed the third Master Plan for ICT in Education (2009-2014). The third Master Plan (mp3) continues the vision of the first and second Master Plans to enrich and transform the learning environments of our students and equip them with the critical competencies and dispositions to succeed in a knowledge economy.

<http://ictconnection.edumall.sg/cos/o.x?c=/ictconnection/pagetree&func=view&rid=665>

Singapore's Long-Term Plan

Video overviews of Singapore's Master Plans:

<http://ictconnection.moe.edu.sg/cos/o.x?c=/ictconnection/pagetree&func=view&rid=664>

PowerPoint presentation on Singapore's Master Plans:

<http://www.itsc.org.sg/upload/download/elearning2011/Master-plan%20for%20ICT%20in%20Education%20presentation%20at%20SIM%20111111>

Singapore began working toward this vision in 1997, with its first ICT Master Plan, and built on this effort with two subsequent plans:⁶

The First ICT Master Plan (mp1: 1997-2002)

The four overarching goals in Master Plan 1 (mp1) were to:

- Enhance linkages between the school and the world around it
- Generate innovative processes in education
- Enhance creative thinking, lifelong learning, and social responsibility
- Promote administrative and management excellence in the education system

The key achievements of mp1 were:

- Students learned basic skills to complete ICT-based projects or assignments.
- Teachers learned basic ICT competencies and were receptive to the use of ICT as a pedagogical tool.
- Schools gained basic infrastructure for ICT-based teaching and learning. The student-to-computer ratios were 6.6:1 for primary schools and 5:1 for secondary schools and junior colleges.
- Sporadic good practices have been identified in the use of ICT for teaching and learning in various schools.

ICT Master Plan 2 for Education (mp2: 2003-2008)

The second Master Plan (mp2) focused on pedagogical applications of ICT, particularly engaging students in learning. The plan encour-

aged the effective and pervasive use of ICT to enhance educational processes and structures. The six desired outcomes for mp2 were:

1. Pupils use ICT effectively for active learning.
2. Connections between curriculum, instruction, and assessment are enhanced using ICT.
3. Teachers use ICT effectively for professional and personal growth.
4. Schools have the capacity and capability to use ICT for school improvement.
5. There is active research in ICT in education.
6. There is an infrastructure that supports widespread and effective use of ICT.

Research on this phase documented the achievements of mp2:

- Students possessed competencies in basic ICT tools, including the use of Internet, e-mail, word processing, and presentation software.
- Teachers, likewise, possessed these basic competencies, and two-thirds of the teachers were comfortable in using existing resources to support classroom teaching.
- About 80 percent of the schools met the outcome expectation of mp2, and 15 percent of teachers performed better than expected outcomes.
- Schools possessed flexible network environments. All schools have sufficient funding to support student-to-computer ratios of 6.5:1 for primary schools and 4:1 for secondary schools and junior colleges.

ICT Master Plan 3 for Education (mp3: 2009-2014)

The third and current ICT Master Plan (mp3) was launched in August 2008. Four broad directions and goals were laid out to prepare students for participation in the knowledge economy:

1. Strengthen students' competencies for self-directed learning. The use of ICT could help develop skills that are critical for survival in the knowledge age, including self-directed learning, collaborative skills, and critical evaluation of information.
2. Tailor learning experiences according to the way each student learns best. Teachers need to develop the capacity to design learning activities with ICT that allow individual students to learn in the ways they learn best so students can develop their potential to the fullest.
3. Encourage students to go deeper and advance their learning. ICT tools are leveraged to engage students in authentic and meaningful learning activities for deep learning. For example, ICT can be used to engage students in collaborative analysis of authentic multimedia sources for humanities topics, so the students gain deeper understanding and appreciation of different perspectives.
4. Enable students to learn anywhere. Students can use wireless and mobile technologies to extend learning beyond the physical confines of classrooms and also benefit from structured in-school curriculum time.

Resource: Korea Case Study

The vision set by the Ministry of Education, Science, and Technology in Korea is to become an “education superpower” through the effective use of ICT. This vision is driven by the desire to foster a knowledge-based society by developing the nation’s human resource base. The premise is that because knowledge is changing so fast, the economy demands people with outstanding communication abilities who can swiftly acquire new knowledge and technology and solve problems with creativity. Furthermore, every Korean citizen has a right to access eLearning, as enshrined in the constitution. Toward this vision, Korea has generated a series of educational ICT plans.

The education ICT master plans in Korea have advanced in three stages: initial stage (1996–2000), ex-panding and stabilizing stage (2001–2005), and advanced stage (2006–2010).

Major achievements of the first Master Plan for ICT in Education (1996–2000):

- The establishment of an organization, the Korean Education and Research Information Service (KERIS), to promote ICT in education
- The launch of major education information services, such as EDUNET, and education broadcasting by satellite
- Construction of a world-class ICT infrastructure for education to improve information access

Major achievements of the second Master Plan for ICT in Education (2001–2005):

- The increase of teaching and learning by ICT
- The spread and increasing popularity of social awareness of eLearning
- Improvement in the efficiency of educational administration through implementation of the National Education Information System (NEIS)
- Provision of high-quality academic information through the academic information distribution system

- Implementation of projects for resolving the information divide, such as the Cyber Home Learning System

Major achievements of the third Master Plan for ICT in Education (2006–2010):

- Promotion of field-centered ICT in education through advancement of eLearning-based teaching and learning systems, and enhancement of teachers’ expertise
- Implementation of various model projects to provide a student-based learning system by creating a ubiquitous learning environment and maximizing the educational use of new technologies
- Increase in international cooperation projects, such as policy and project consulting for ICT in education for developing countries, to promote Korea as a global leader of ICT in education

- Establishment of an ICT support system for low-income families, the disabled, etc., as part of educational welfare, to resolve the knowledge and information divide and secure knowledge and information stability
- Increase in cooperation and the sharing of information, based on Web 2.0 services, through national education academic information services, such as EDUNET, RISS, etc.; in addition, u-Learning model schools launched and various projects for the commercial use of digital textbooks implemented
- Research and development conducted on future education systems in Korea

The current educational ICT Master Plan consists of two efforts.

Master Plan for ICT in Education, Science, and Technology (2010–2014):

The Ministry of Education, Science, and Technology announced the Master Plan for ICT in Education, Science, and Technology. The Master Plan consists of 62 tasks in four areas:

- Nurturing creative talents: Increasing educational use of cutting-edge information technology and expanding the all-around education system to promote lifelong education
- Strengthening researchers’ capabilities, advancing the research environment, and broadening the base of the science and technology field
- Creating an environment where education and science can fuse and communicate
- Establishing infrastructure for ICT in education, science, and technology

SMART Education Strategy (2011–2015):

The strategy for Promoting SMART Education is being implemented in parallel with the Master Plan for ICT in Education, Science, and Technology. The goals of the SMART Education strategy include:

- Developing and applying digital textbooks
- Introducing online classes and online assessment system
- Improving the copyright system for free use of educational content
- Augmenting teachers’ capabilities for implementing SMART Education
- Establishing wireless Internet environment in all schools

KERIS (2011). Adapting education to the information age: White paper. Seoul, Korea: Ministry of Education. http://english.keris.or.kr/whitepaper/WhitePaper_eng_2011_wpap.pdf

Resource: Jordan Case Study

Jordan’s Vision

Jordan’s vision was articulated by King Abdullah and links education reform to economic development such that in the future:

The Hashemite Kingdom of Jordan has the quality competitive human resource systems that provide all people with lifelong learning experiences relevant to their current and future needs in order to respond to and stimulate sustained economic development through an educated population and a skilled workforce.

www.ibe.unesco.org/National_Reports/ICE_2008/jordan_NR08.pdf

A Long-Term Plan

The Ministry of Education

The Ministry of Education in Jordan asked a team of consultants⁷ to advise them on their long-term ICT plan and strategy, in support of the king’s vision. The consultants used a developmental model⁸ that moves the education system from Basic Knowledge to Knowledge Creation in support of economic and social development.

Using this model, the consultants proposed a 15-year plan to take the education system in Jordan through Knowledge Acquisition (2011–2015) to Knowledge Deepening (2016–2020) and on to Knowledge Creation (2021–2025). We described a vision for each phase and a set of goals associated with these visions.



Basic Education	Knowledge Acquisition	Knowledge Deepening	Knowledge Creation
Now	2015	2020	2025
	Phase I Knowledge Acquisition 2011–2015	Phase II Knowledge Deepening 2016–2020	Phase III Knowledge Creation 2021–2025
<ul style="list-style-type: none"> Increased participation ICT as subject ICT literacy Traditional pedagogy Central control 	<ul style="list-style-type: none"> Blended learning ICT embedded in the curriculum Digital content School-based decisions Empowering ERfKE II 	<ul style="list-style-type: none"> Project-based learning Real world problem solving No paper text/test School autonomy and accountability 	<ul style="list-style-type: none"> Knowledge-building pedagogy Communities of practice Continuous innovation
<ul style="list-style-type: none"> Many schools have one computer lab, used mostly for ICT instruction. 	<ul style="list-style-type: none"> All schools have two computer labs. All teachers have a computer. Each classroom has an Internet-connected computer and display. 	<ul style="list-style-type: none"> All classrooms have at least one cluster of computers, printer, digital camera, probeware, and other peripherals. 	<ul style="list-style-type: none"> All students have immediate access to a wide range of digital devices and content. Classrooms have specialized equipment and digital resources appropriate to needs of specific courses.

This plan was used to design detailed five-year strategies—a set of goals and programs—for the Knowledge Acquisition phase.

Resource: Example ICT Plans

Example Master Plans and Strategies

Bakia, M., Murphy, R., Anderson, K., & Trinidad, G. (2011). International experiences with technology in education. Washington, D. C.: U.S. Department of Education.
www2.ed.gov/about/offices/list/os/technology/iete-full-report.doc

This Department of Education-sponsored report examines the ICT policies of 22 education systems. The report serves primarily to inform U.S. policy, so the systems selected are typically developed countries from North America, Europe, and Asia, with a few additional emerging countries that were selected for their informative value. The report includes case studies from each of these systems, based on review of online resources and interviews with a national participant, typically from the ministry or a university. The case studies and subsequent cross-case analyses are organized around country context issues and policy issues that are of particular interest to the Department of Education: the use of ICT to improve student learning, the use of ICT to improve teaching, and the use of data systems for continuous education improvement. A particular focus of the report is on measurement indicators related to each of these issues and the implications of these for department participation in national and international studies.

Farrell, G., and Issacs, S. (eds.) (2007). Survey of ICT in education in Africa. Washington, D.C.: infoDev.
www.infodiv.org/en/Publication.354.html

This two-volume set describes and analyzes ICT policies in education in 53 African countries. The first volume presents summary findings across topics, such as infrastructure, initiatives at the higher education and primary and secondary levels, activities and issues related to non-formal education, and issues related to gender equity. The second volume presents the 53 case studies, organized by a common template: the education system, ICT policies, current ICT initiatives and projects, and implementing ICT in education: what helps and what hinders.

GeSCI (2011). ICTs in education: Policies and plans worldwide.
www.gesci.org/assets/files/Knowledge_Centre/country-policies.pdf

This downloadable, searchable database of educational ICT policies and plans in 194 countries and territories worldwide includes hotlinks to the actual documents.

Koh, T. S., and Lee, S. C. (2008). Information communication technology in education: Singapore's ICT masterplans, 1997–2008. Singapore: World Scientific.

This book presents a detailed description of the goals and components of each of the country's master plans and then continues with chapters that detail their approach to teacher training, content development and distribution, and infrastructure. Various ICT-based projects and programs are also discussed.

Kozma, R. (ed.) (2011). Transforming education: The power of ICT policies. Paris: UNESCO.

unesdoc.unesco.org/images/0021/002118/211842e.pdf

This edited volume includes an introductory chapter on the social and economic drivers of education reform and a framework for developing ICT policies that support education reform in the service of social and economic development. The book goes on to present ICT in Education Policy case studies of five countries: Jordan, Namibia, Rwanda, Singapore, and Uruguay. The final chapter features a cross-case analysis with implications for ICT in Education Policymaking.

Latin America and Caribbean education policies and plans.

https://docs.google.com/spreadsheet/ccc?key=0AjFAkwSrQ381dDdUYU1iT1pUd05GVIZLNfktWDILWgc&authkey=Clzns_kM&hl=en&authkey=Clzns_kM#gid=0

This is a subset of a GeSCI downloadable, searchable database of educational ICT policies and plans that focuses on Latin America, with hotlinks to the actual documents.

Tjeerd, P., Anderson, R., Law, N., and Quale, A. (eds.) (2009). Cross-national information communication technology: Policies and practices in education (second edition). Charlotte, NC: Information Age Publishing.

This is a comprehensive collection of education ICT in Education Policy case studies, written by researchers from each of 37 countries in North America, Latin America, Europe, Africa, and Asia. Each case study uses a standard format that includes the structure of the education system, ICT policies and practices, and special issues. In addition, there is an introductory chapter and two cross-case analyses: one that looks at curriculum and staff development and another that looks at infrastructure.

World Bank.

<http://siteresources.worldbank.org/EDUCATION/Resources/278200-1221666119663/saber.html>

A web site for a current project that will report on the educational ICT agencies and implementation plans in 10 countries: Armenia (NaCET), Australia (EdNA), Chile (Enlaces), Costa Rica (Omar Dengo Foundation), Indonesia (Pustekkom), Malaysia (Smart Schools), Korea (KERIS), Philippines (loose coalition of actors), Portugal (eEscola), Thailand (NECTEC), U.K. (Becta), and Uruguay (Plan Ceibal).

World Bank, SABER list of educational ICT policies.

http://siteresources.worldbank.org/EDUCATION/Resources/WBworkingdraft6_ICTEducationpolicydocs-public.pdf

A list of countries and educational ICT documents around the world.

Gender Project in Australia⁹

www.mceecdya.edu.au/verve/_resources/genderframwk1-22.pdf

The framework draws upon growing understandings about the construction of gender and its implications for policy and practice, as well as developments in education that examine the differences in the experiences and outcomes of schooling for both girls and boys, and for different groups of girls and boys. The framework is based on five strategic directions for action in the areas of:

- Understanding the process of construction of gender
- Curriculum, teaching, and learning
- Violence and school culture
- Post-school pathways
- Supporting change

Gender project in Bangladesh!⁰

www.moedu.gov.bd/old/edu_system__edu_policy.htm

Bangladesh has made significant progress, especially in regard to increasing access and gender equity, both at primary and secondary levels. Gross primary enrollment rates rose from 90 percent in the late 1990s to 98 percent in 2003, while a corresponding increase in enrollment rates at the secondary level rose to 44 percent. Gender parity in access to primary and secondary education has also been achieved. These achievements are particularly spectacular when compared to countries in the South Asia region and other countries at similar levels of per-capita income. To address issues at the secondary and higher levels, the Ministry of Education has developed a medium-term framework for the secondary education sub-sector, focusing on quality improvements, policy measures, and specific actions needed to reform the system. The main objective of reforms being proposed is to address systemic governance issues aimed at raising the quality and cost-effectiveness of service delivery, and improving equity of access in secondary education.

Resource: Master Plan Checklist for a Good ICT Plan

- The ICT plan fits into a long-term trajectory (15 years).
- The ICT plan is focused on the next five-year period.
- The ICT plan's desired contributions to national and educational visions are explicit.
- The ICT plan is explicitly coordinated with other education changes:
 - Professional Development
 - Teaching and Learning
 - Curriculum and Assessment
 - School Policy Organization and Management
 - Research and Evaluation
- The ICT plan specifies how ICT will contribute to each of these changes and move towards realizing the vision.
- The ICT plan is designed to benefit females and males equally.

Overview

Goal

In the previous step, you laid out a long-term plan to realize your vision. As you begin to develop strategies that will help you realize this plan, look for levers that will help bring about change. The goal of this step is to help you analyze the current situation and identify a set of levers that you can use to launch change and realize your vision.

Resources

In addition to this exercise, you should use your vision statement. If you conducted a socio-ecosystem analysis as part of the Envision the Future phase, this will also help you.

Outputs

As a result of going through this analysis, you will have a set of identified levers that you can use to design strategies and programs that will help you realize your vision.

Two Approaches

One approach to launching change—perhaps the most often used—is the “low-hanging fruit” approach. With this approach, you look for the easiest, most feasible changes to implement, taking into account the priority or importance of the changes. This approach is used primarily because it is relatively inexpensive, yet has an impact on important goals. But it is not systemic. Often the easiest, least expensive changes have relatively little effect on the rest of the system.

The second approach is a more-strategic, systemic approach that is still feasible: find a small set of changes that will make the biggest impact on all the other components of the system, even if the initial changes are more challenging to begin with. That is, you find a strategic lever that amplifies a change in one or two parts of the system to bring about changes in all the other parts. This is transformational change.

This second approach is made feasible by drawing on the strengths that already exist in the system. Having analyzed the socio-ecosystem, you have a picture of the weaknesses of your system, as well as its strengths—those components that are closest to the target goals in your vision. Building on these strengths can provide you with a strategic lever to make changes in all other parts of the system.

ACTION STEP: ➔ **Input your summary of education changes for the first five years from above.**

Low-Hanging Fruit

In this exercise, you will identify those changes that would be easiest, yet still important.

Taking your work from the previous step, list again the desired changes at the end of five years for each component and rate each change according to “ease” and “importance”:

Component	Desired Changes at End of 15 Years	Rate Ease of Change (1 Easy; 5 Very Difficult)	Rate Importance of Change (1 Easy; 5 Very Difficult)
School Organization and Management			
Professional Development			
Teaching and Learning			
Curriculum and Assessment			
Evaluation and Research			

Based on this analysis, which changes would you make first?

ACTION STEP: ➔ **Input your table of strengths and weakness from your analysis of the socio-ecosystem, and input your list of changes at the end of year five from above.**

Identifying Strategic Levers for Change

The exercise above gave you a list of relatively easy-to-implement yet important changes. The following exercise will help you identify changes that are strategically important in bringing about education transformation.

Education is a complex system, and as with all complex systems, it comprises a constellation of interlocking, mutually reinforcing components that make the system robust. This interconnection also makes it very difficult to change the system because a change in one component has implications for all the others. And the status quo in all these components creates resistance that is a major barrier to change. Education change, particularly education transformation, means changing many things, sometimes the whole system. Yet everything cannot change at once. The challenge is where to start. The answer is often opportunistic and always depends on the situation.

The introduction of a new component to the system, such as ICT, can be used to launch change in other components. However, it is important to keep in mind that merely introducing new technology will not bring change by itself. It is best to link new technology with other changes. The key then is to connect ICT with one or more other components of the system to form a change strategy.

In the case of Jordan, the ICT strategy connected increased investments in technology with teacher training and a new pedagogical model—blended learning. Currently, many teachers in Jordan have received training in the use of ICT (a strength) but very few teachers use ICT on a regular basis (a weakness). Almost all schools have a computer lab, but the labs are used almost exclusively for ICT courses. Over the first five years of the proposed ICT plan for Jordan, the strategy calls for providing each teacher with a computer, an Internet connection in the classroom and training in blended learning pedagogy. The intent is to increase teachers’ use of ICT to supplement their current instructional approaches. Ultimately within the plan, this will also be accompanied by an increase in school-based decision making that will engage principals and teachers in the use of the Ministry’s Education Management Support System to make decisions related to instruction.

Take the list of table of changes you generated above in your five-year plan and the list of strengths generated in your analysis of the socio-ecosystem as part of the Envision the Future phase.

Identify which strengths you can build on to accomplish change in other areas:

Component	Desired Changes at End of 5 Years	Current Strengths	How Can These Strengths be Used as a Lever for Change?
School Organization and Management			
Professional Development			
Teaching and Learning			
Curriculum and Assessment			
Evaluation and Research			

Based on this analysis, which changes would you make first?

Next, describe how ICT can be used in combination with these strengths as a set of levers to help bring about movement toward your vision.

Overview

Goal

The goal of this step is to help you develop a strategy that brings all of the key stakeholders and components of the educational system into a new, mutually reinforcing alignment that moves toward your vision.

Resources

In addition to this exercise, you will use the materials you've developed so far: your vision, your long-term roadmap and short-term plan, and your list of levers.

Output

As a result of this exercise, you will have a list of prospective strategies for developing alignment over time among the components of the education system and creating alignment among stakeholders, so that all are moving in the same direction toward the vision.

Building Alignment

The key element in designing a policy strategy is to use the levers you identified to realign the other components and move toward your goals and vision. Identified levers are where you start but over the years of your plan you want to bring about changes in other components to create a new constellation of mutually reinforcing components. Consequently, the strategies you design should bring all the stakeholders and components into an alignment that works toward the defined goals and vision. It is easy to underestimate how difficult it is to create alignment among disparate agencies and organizations. But this process is facilitated to the extent these stakeholders—especially stakeholders representing different social and political organizations—are included in the process and can come to some consensus around a shared vision.

In the recommendations made to the Jordanian Ministry of Education, the strategic lever was ICT, building on teachers' current ICT

skills (a strength) and providing a computer to each teacher, along with training in blended learning pedagogy to increase the use of ICT in classes (a weakness). The intent was to use ICT as a lever to align teacher training and pedagogy. Parallel efforts would ultimately align these changes with changes in curriculum and assessment to support students' knowledge acquisition. This would also align with school-based decision-making, supported by principal and teacher access to an electronic Education Management Support System. Another strategy was aimed at working with a set of more advanced schools (a strength) to create a set of Lead Schools that would focus on project-based learning. These schools would work with schools using traditional pedagogy (a current weakness) and provide a lever to move the system toward more innovative pedagogical, curricular, and assessment approaches that would prepare students for the knowledge economy.

These strategies required involvement of a number of different departments within the Ministry of Education that were responsible for different components of the system. These included the departments responsible for teacher training, curriculum, assessment, and of course, ICT. Consequently, aligning the components also meant aligning the different departments within the system, all of which were ultimately committed to moving Jordan toward a knowledge economy.

ACTION STEP: Input your table of strengths and weaknesses from your analysis of the socio-ecosystem.

ACTION STEP: Input your list of changes at the end of year five and the ways ICT can support them from above.

Building Alignment among Components

Consider the strengths or "levers" that you identified above, particularly those that have been successful in the past. How can they be used to address weaknesses or gaps identified earlier and bring alignment among the components over time?

Component	Desired Changes at End of 5 Years	Current Strengths	Current Weaknesses	How Strengths Can Address Weaknesses
School Organization and Management				
Professional Development				
Teaching and Learning				
Curriculum and Assessment				
Evaluation and Research				

In your current system or with your current ICT plan, how do weaknesses stop change?

Based on this analysis, which strengths would you use first to address weaknesses or gaps, align the various components of the system, and bring about movement toward your vision?

Looking at your previous table of how ICT can enable change, describe how ICT can play a role as a lever for change in combination with your current strengths.

Component	Desired Changes at End of 5 Years	Current Strengths	How Strengths Can be Used to Address Weaknesses	How ICT Can be Used in Combination with Strengths to Enable Changes
School Organization and Management				
Professional Development				
Teaching and Learning				
Curriculum and Assessment				
Evaluation and Research				

Based on your analysis above, what are the first things you would do with ICT to help bring about change?

ACTION STEP: Input your table of stakeholders and missions from your analysis of the socio-ecosystem.

ACTION STEP: Input your table of changes from above.

The various components of the system need to be aligned to bring about transformational change. But so do the various agencies and actors related to the system. The goal is to have these agencies and actors work in a coordinated way, reinforcing each other’s efforts and working together to achieve the vision. This coordination will be greatly facilitated to the extent that they all share the vision that has been created, as addressed previously.

Building Alignment among Stakeholders

Using the tables from your previous work, list the desired changes for the first five years for each of the components of the system. Then review the missions of your relevant stakeholders and indicate which stakeholders can contribute to each of the desired changes.

What role can each stakeholder play in achieving the vision?

Component	Desired Changes at End of 5 Years	Stakeholder's Role			
		King's/President's Office	Legislature	Various Ministry of Education Departments	Other
School Organization and Management					
Professional Development					
Teaching and Learning					
Curriculum and Assessment					
Evaluation and Research					
ICT					

With previous ICT efforts in education, were there ways in which agency efforts worked against each other?

Based on this analysis and what you have learned from the past, how can they better work together now?

Share your analysis of the ways that stakeholders can contribute to change with the corresponding stakeholder organization, and acquire their feedback.

Based on the feedback you have received from stakeholders, generate a revised analysis:

Component	Desired Changes at End of 5 Years	Stakeholder's Role			
		King's/President's Office	Legislature	Various Ministry of Education Departments	Other
School Organization and Management					
Professional Development					
Teaching and Learning					
Curriculum and Assessment					
Evaluation and Research					
ICT					

Overview

Goal

The goal of this exercise is to extend your plan to include detailed strategies and eLearning programs and initiatives that will help you move along your path and realize your vision for a future education system enabled by technology. You will focus on your plan for the next five years, turning the vision into measurable goals, and specifying initiatives and programs that will help realize them.

Resources

In addition to this exercise, you have access to a collection of strategies from countries around the world, as detailed in the case studies of Singapore, Korea, and Jordan (see Appendix). You will also use the output from previous exercises. You may want to examine the InfoDev Toolkit for Policymakers and the Intel eLearning Deployment Guide for additional exercises related to strategy design.

Output

When you complete this exercise, you will have a very detailed, year-by-year specification of strategies and actions that correspond to a set of measurable goals or outcomes.

From Plan to Strategies

View the case studies located in the Appendix, as well as the Example Strategies from Around the World.

In its current master plan, Singapore designed strategies to strengthen integration of ICT into the curriculum, provide differentiated professional development, improve the sharing of best practices, and enhance ICT resources in schools. Singapore turned these strategies

into actions by creating a number of initiatives for each. Similarly, Korea designed a number of ICT initiatives related to school management and organization, teacher professional development, and teaching and learning.

The proposed plan in Jordan built on other efforts the Ministry of Education was engaged in as part of its policy, which was called Education Reform for the Knowledge Economy (ERfKE). The first phase of the plan centered on blended pedagogy where teachers regularly use ICT and digital content to supplement their traditional teaching approaches across the curriculum. It also emphasized the development of school-based decisions, where principals and teachers use data on a regular basis to make managerial and instructional decisions. The strategies and actions included increasing the number of computer labs in schools, providing each school principal and every teacher with a computer, developing digital content, and providing professional development in both ICT skills and blended learning pedagogy. Computer-based assessments of knowledge economy skills would allow stakeholders to measure the impact of these changes on student learning.

ACTION STEP: ➔ **Input the table of changes and ways that ICT can bring alignment from above.**

After looking at the strategies in Jordan and elsewhere around the world, it is now time to turn the uses of ICT that you have identified into specific strategies and actions that will support change.

Building on the strengths that you have identified, generate strategies that you feel would move toward realizing your vision at the end of the next five years:

Component	Desired Changes at End of 5 Years	How Strengths Can be Used to Address Weaknesses	How ICT Can be Used in Combination with Strengths to Enable Changes	ICT Strategies
School Organization and Management				
Professional Development				
Teaching and Learning				
Curriculum and Assessment				
Evaluation and Research				

From Strategies to Actions

For each strategy above, list a set of actions, initiatives, or programs that would support the strategy. For instance, for the first strategy, you might list the following:

Strategy 1:

Action 1:

Action 2:

Action 3:

Etc.

Measurable Goals

Take a look at the Jordan case study in the Appendix. Notice that measurable goals were specified for each action in the final year of the plan. Then progress measures were estimated for each subsequent year.

Now, for year five of your plan, specify measurable goals for each of the strategies and actions above and complete the following table, extending your work from Step 10:

Component	Desired Changes at End of 5 Years	Measurable Goals				
		Year 5	Year 4	Year 3	Year 2	Year 1
Strategy 1: Action 1						
Strategy 1: Action 2						
Strategy 1: Action 3						
Strategy 2: Action 1						
Strategy 2: Action 2						
Etc.						

ACTION STEP: Input your initial draft ICT Plan from above.

Revise ICT Plan

Now elaborate on your ICT Plan to include a description of the strategies, actions, and measurable goals:

Vision for the Future of Education

Current Situation

Desired Changes

Long-Term Roadmap

Five-Year Plan

Role of ICT

ICT Strategies and Actions

Measurable Goals

Expanded Checklist

Based on a review of your revised draft plan, use the Expanded Checklist in the Appendix to make any necessary changes in your draft.

Resource: Singapore Case Study

Four broad strategies are at the core of Singapore's Master Plan 3 (mp3), all of them aligned around preparing students for the knowledge age. This overarching goal has implications not only for learning but also for teaching and teacher professional development, school leadership, and ICT. Four strategies are at the core of mp3, which aim to:

- Strengthen integration of ICT into curriculum, pedagogy, and assessment to enhance learning and develop competencies for the 21st century
- Provide differentiated professional development that is more practice-based and models how ICT can effectively be used to help students learn better
- Improve the sharing of best practices and successful innovation
- Enhance ICT provision in schools to support the implementation of mp3

The strategies will be implemented through the following five key initiatives:

1. ICT in Curriculum, Pedagogy, and Assessment

- Embedding ICT-enriched learning experiences into syllabi
- ICT for assessment
- The ICT Connection: a platform that supports the growth of ideas and innovations in schools by facilitating dialogue among educators
- Baseline ICT standards for students

2. Cyber Wellness

- Cyber Wellness framework for curriculum integration
- Cyber Wellness research
- Student Ambassador program: leverage positive peer influence to promote cyber wellness
- Cyber Wellness resource and development

3. Professional Development

- ICT-PD Framework: Defines the respective roles, responsibilities, and corresponding set of competencies for the different groups of school personnel implementing ICT in schools
- ICT Mentors: Teachers who will mentor other teachers on ICT use for learning and teaching in their respective disciplines
- Consultancy and support for schools through customized development programs
- Recognition program for teachers

4. Research and Development

- EduLab: Research to strengthen teachers' pedagogical understanding of ICT use by translating research and innovation into learning and teaching practices
- FutureSchools@Singapore: Pushing the frontier of teaching and learning at a school level to fully harness ICT to engage students in learning
- Interactive and Digital Media (IDM): Prototyping and studying IDM-based learning environments

5. ICT Infrastructure

- Bandwidth provision: Upgrade bandwidth of all schools to 20 Mbps
- ICT provision norms: Improve student-computer ratios to facilitate independent, collaborative, and customized learning
- Interoperability standards for Learning Management Systems (LMS): Use of LMS in all schools

<http://ictconnection.edumall.sg/cos/o.x?c=/ictconnection/pagetree&func=view&rid=748>

Resource: Korea Case Study

Within Korea's current ICT plan, Edunet provides integrated services and digital resources that support teaching and learning related to the school curriculum. Cyber Home Learning System (CHLS) supports learning at home, including online tutors who are in-service teachers. The Digital Textbook project targets a rollout of interactive digital content for all primary and secondary students in 2013, delivered in a one-to-one scheme on a range of devices. Edu-Café is the Ministry's online professional community for teachers. The National Education Information System collects information on ICT use and connects teachers with the parents of their students.

The Digital Textbook pilot project is the most significant initiative in the current ICT plan. In the Korean approach, a digital textbook provides various digital resources and interactive functions that include didactic text, reference works, dictionaries, interactive workbooks, video clips, animations, and virtual reality environments that can be accessed at school or at home, any time of day or night. The project is based on the assumption of a one-to-one environment where each student has his or her own device. The pilot project started in 2004 with the development of fifth-grade social studies and science textbooks for the web, CD-ROMs, and PDAs. Next digital textbooks were developed for mathematics in grades 5 and 6. These were field tested in schools in 2006–2007. In 2007, textbooks for music and art were developed in the "freestyle" method, in which the contents of existing texts were redesigned for the capabilities of the technology. Texts in the other subjects were essentially digitized versions of traditional texts but combined with various digital functions to enhance their effectiveness. In 2008, digital textbooks were developed in additional subjects. The plan is to go nationwide with the project in the 2013 school year.

Resource: Jordan Case Study

When Jordan's Ministry of Education asked a team of consultants to help them design an educational ICT plan and strategy,¹¹ the team proposed a 15-year plan to achieve their vision and provided a detailed set of strategies and actions for the first phase that covered the years 2011–2015. Using a conceptual model,¹² the consultants designed strategies to take the education system from its current state, focusing on Basic Education, to one focused on Knowledge Acquisition, followed in subsequent phases by Knowledge Deepening and Knowledge Creation. The emphasis in the Knowledge Acquisition phase was on:

- Blended learning pedagogy
- ICT embedded in the curriculum
- Digital content
- School-based decisions
- Empowering Jordan's Education Reform for the Knowledge Economy (ERfKE)

In supporting ERfKE, the strategies connected with all the key areas of Jordan's education reform—teacher professional development, pedagogy, curriculum, assessment, and school organizations—as well as ICT.

The team of consultants then identified the following three strategies and a set of actions for each:

Strategy 1: Implement Blended Learning Pedagogy

- Action 1: Train all teachers and principals in the use of blended learning pedagogy
- Action 2: Embed blended learning materials and assessments throughout the curriculum
- Action 3: Provide each teacher with a computer and high-speed Internet access

Strategy 2: Implement School-Based Management

- Action 1: Conduct an information needs assessment
- Action 2: Train all principals and teachers in the use of the Education Management Support System (EMSS)
- Action 3: Assure that all principals and teachers have easy access to EMSS
- Action 4: Require all schools to submit school-based ICT plans

Strategy 3: Assess Knowledge Economy skills

- Action 1: Develop and field test ICT-based assessments of knowledge economy skills

The team of consultants also recommended a fourth strategy to support the transition from the first phase, Knowledge Acquisition, to the second phase, Knowledge Deepening, scheduled for 2016–2020.

Strategy 4: Institute a Lead School Program

- Action 1: Set up a "Lead Schools" program to support school-based innovation
- Action 2: Work with Lead Schools to begin to develop project-based training and materials
- Action 3: Provide additional resources to Lead Schools and hold schools accountable for their use

The consultants then proposed target goals for each year in the first phase, for each of the areas:

	Measurable Goals for Each Phase				
	2011	2012	2013	2014	2015
Professional Development	<ul style="list-style-type: none"> UNESCO ICT Teacher Standards adopted Training materials developed or identified for the "Technology Literacy Standards" MoE developed or identified teacher training materials for blended-learning pedagogy 	<ul style="list-style-type: none"> 25% of teachers trained in blended-learning pedagogy MoE developed EMSS training for principals and integrated it into school-based decision-making 	<ul style="list-style-type: none"> 50% of teachers and principals trained in blended-learning pedagogy Training materials developed or identified for UNESCO "Knowledge Deepening Standards" and project-based learning 50% of principals trained on using the EMSS to support school planning 	<ul style="list-style-type: none"> 75% of teachers and principals trained in blended-learning pedagogy 50% of teachers in Lead Schools trained in project-based learning 75% of principals trained on using the MIS to support school planning 	<ul style="list-style-type: none"> 100% of teachers and principals trained in blended-learning pedagogy 100% of teachers and principals in Lead Schools trained in project-based learning 100% of principals and teachers trained on using the EMSS to support school planning
Pedagogy	<ul style="list-style-type: none"> Survey constructed and field tested on ICT-based pedagogy 	<ul style="list-style-type: none"> 25% using blended pedagogy in 1 lesson per week 	<ul style="list-style-type: none"> 50% using blended pedagogy in 1 lesson per week, 25% in 2 or more lessons 	<ul style="list-style-type: none"> 75% using blended pedagogy in 1 lesson per week, 50% in 2 or more lessons 50% of Lead School teachers using project-based pedagogy in 1 lesson per week, 25% in 2 or more lessons 	<ul style="list-style-type: none"> 90% using blended pedagogy in 1 lesson per week, 70% in 2 or more lessons 80% of Lead School teachers using project-based pedagogy in 1 lesson per week, 50% in 2 or more lessons
Curriculum	<ul style="list-style-type: none"> 30% of students demonstrate ICT literacy MoE develops standards for blended learning curriculum materials and begins identifying or developing content that implements these standards MoE begins integrating ICT in standards across the curriculum 	<ul style="list-style-type: none"> 60% of students demonstrate ICT literacy MoE identifies or develops content that implements blended learning for 40% of the curricula 	<ul style="list-style-type: none"> 90% of students demonstrate ICT literacy MoE identifies or develops content that implements blended learning for 60% of the curricula 	<ul style="list-style-type: none"> 100% of students demonstrate ICT literacy MoE identifies or develops content that implements blended learning for 80% of the curricula 40% of teachers creating supplemental curriculum materials MoE develops standards for project-based curriculum materials and begins identifying or developing content that implements these standards 	<ul style="list-style-type: none"> MoE identifies or develops content that implements blended learning for 100% of the curricula 70% of teachers creating supplemental curriculum materials MoE identifies or develops content that implements project-based pedagogy for 20% of the curriculum and makes these available to Lead Schools
Assessment	<ul style="list-style-type: none"> Assessments developed to measure student and teacher ICT literacy MoE identifies one national assessment to be delivered via ICT and begins working on items and procedures 	<ul style="list-style-type: none"> MoE field tests targeted ICT-delivered assessment online 	<ul style="list-style-type: none"> MoE provides the option of taking targeted ICT-delivered assessment online 	<ul style="list-style-type: none"> MoE provides the option of taking targeted ICT-delivered assessment online MoE identifies a second national assessment to be delivered via ICT and begins working on items and procedures 	<ul style="list-style-type: none"> MoE offers at least one targeted assessment delivered only online MoE provides a 2nd targeted assessment that can be optionally taken online MoE develops and field tests an ICT-based assessment of KE skills At least 25% of the students taking this test demonstrate mastery, and at least 60% of students in Lead Schools

	Measurable Goals for Each Phase				
	2011	2012	2013	2014	2015
School Organization and Management	<ul style="list-style-type: none"> MoE conducts an information needs assessments; generates specifications for EMSS, assessment, and instructional system; and contracts with vendor 	<ul style="list-style-type: none"> An integrated EMSS, assessment, and instructional system in place in the MOE 	<ul style="list-style-type: none"> 50% of principals using EMSS to support school-based planning and decision-making 25% of principals and supervisors engage in instructional leadership 	<ul style="list-style-type: none"> 75% of principals using EMSS to support school-based planning and decision-making 50% of principals and supervisors engage in instructional leadership 	<ul style="list-style-type: none"> 100% of principals using EMSS to support school-based planning and decision-making 75% of principals and supervisors engage in instructional leadership
ICT	<ul style="list-style-type: none"> All current computers in schools checked and any non-operating or out-dated computers replaced 50% of teachers have an e-mail account 25% of students have an e-mail account 25% of teachers have immediate access to a computer 100% of principals have access to a computer in the office 	<ul style="list-style-type: none"> 10% of classrooms have at least one networked computer and projection equipment 20% of schools have two or more computer labs 40% of schools have high-speed connections to the Internet 75% of teachers have an e-mail account 50% of teachers have immediate access to a computer 50% of students have an e-mail account 	<ul style="list-style-type: none"> 30% of classrooms have at least one networked computer and projection equipment 40% of schools have two or more computer labs 75% of schools have high-speed connections to the Internet 100% of teachers will have an e-mail account 75% of teachers will have immediate access to a computer 75% of students will have an e-mail account 	<ul style="list-style-type: none"> 50% of classrooms have at least one networked computer and projection equipment 60% of schools have two or more computer labs 100% of schools have high-speed connections to the Internet 100% of students have an e-mail account 70% of classrooms have at least one networked computer 100% of teachers have immediate access to a computer 	<ul style="list-style-type: none"> 70% of classrooms have at least one networked computer and projection equipment 80% of schools have two or more computer labs 100% of schools have high-speed connections to the Internet

Resource: Chile Case Study¹³

Chilean ICT in Education Policy 2007–2018

For a Spanish version of the current strategies see: www.enlaces.cl/tp_enlaces/portales/tpee371c23bs52/uploadimg/File/libro_enlaces.pdf

Strategies

Since 2007, Enlaces has been implementing a plan called “Technologies for Quality Education” (in Spanish: Tecnologías para una Educación de Calidad) for preschool, primary, and secondary levels. The aim of the TEC plan is to improve the quality of education by taking advantage of the world of opportunities offered by digital technologies. To do this, besides increasing the availability of ICT infrastructure in the educational system, TEC seeks to ensure its adequate pedagogical and communitarian use, as well as the appropriate management and maintenance of these resources. The overall strategy of the TEC plan is presented in Figure 1.

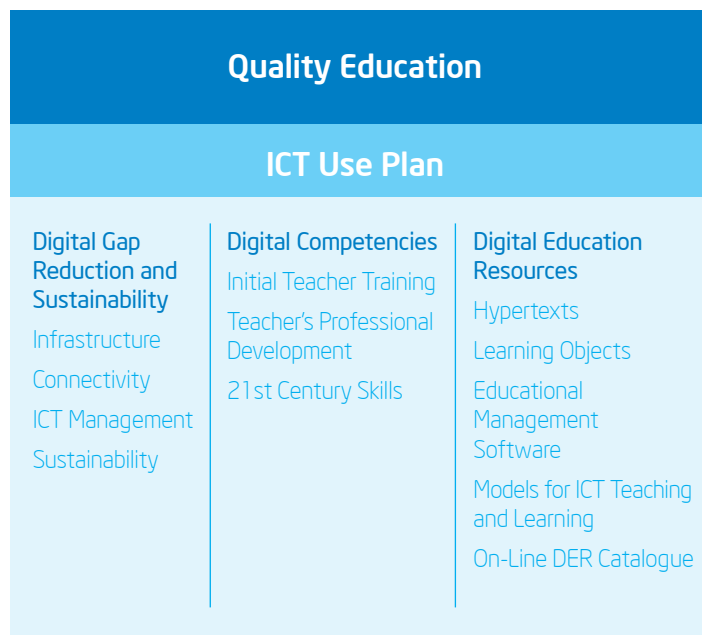


Figure 1. Components of the ICT in Education Policy

Source: Enlaces internal documentation

The policy focuses on improving the quality of education. To achieve this, it considers the following strategies:

- **ICT use plan.** This strategy consists of creating an ICT use plan that each school completes, establishing commitments regarding the use of ICT in different areas (teaching, learning, management, etc.). Where applicable, the requirement is that this ICT use plan be aligned with schools’ overall educational improvement plans.
- **Digital gap reduction and sustainability.** This strategy consists of the provision of a variety of ICT infrastructure and the development of an ICT infrastructure management plan in each school.
- **Digital competencies.** This strategy aims to develop a range of digital competencies¹⁴ in all involved actors, including student-teachers, teachers, and students. It also considers action lines to evaluate these competencies using an interactive test.
- **Digital educational resources.** This strategy seeks to provide resources for the schools, with a goal of ensuring the availability of, or access to, a set of digital educational resources that can be used to deliver the curriculum.

These strategies benefit from experience gained after more than 10 years of experience, including the results of the national and international evaluations of the program (see, for example: Contreras, 2003; Hinojosa, Guzmán, & Isaacs, 2002; Kozma, 2003; OECD, 2004) and international experience in the field (see, for example: Balanskat, Blamire, & Kefala, 2006; Becta, 2006; Carnoy, 2002; Istance, 2002; Kinelev, Kommers, & Kotsik, 2004; Kozma, 2005; Kugemann, 2002; Pelgrum, 2001; Pelgrum & Law, 2003; UNESCO, 2003, 2004).

The next sections describe the specific action lines considered in each strategy.

ICT Use Plan

The ICT Use Plan strategy includes the following action lines:

- **Development of the ICT use plan in each school.** This action line aims to encourage and guide the use of ICT in each school. To do this, each school engages in a process to define and formalize the school’s commitment to the Ministry of Education (particularly Enlaces) regarding the use of ICT in the areas of teaching and learning, educational management, and students’ digital competencies during the school year.¹⁵ The different dimensions and types of ICT use that the school owner is asked to commit with are predefined in a web-based form that allows choosing the intensity of ICT use (frequency) and the specific focuses of ICT use in different areas (teaching and learning, management). Personnel from Enlaces’ technical and pedagogical support network help schools with the definition and formalization process. In those schools that receive preferential students’ subsidy, the ICT use plan is intended to complement the school’s educational improvement plan.¹⁶

▪ **Monitoring and support for the implementation of the plan.**

Enlaces defined a set of support services to help schools implement their plans. These services are provided by Enlaces' technical and pedagogical support network.

Digital Gap Reduction and Infrastructure

This strategy considers the following action lines:

▪ **Amendment/improvement plan of the school's physical infrastructure.**

This action line seeks to ensure that the physical infrastructure of the schools that applied to receive ICT equipment fulfills the requirements (electrical installation, network, security, etc.). To do this, a technician of Enlaces' technical and pedagogical support network visits each school. During this visit, the technicians review the existing facilities, and, based on the conditions, prepare an infrastructure adaptation (construction) plan. Once the plan is agreed upon, the school receives funds to implement the required corrections and installations. Funds are estimated based on the student population of the school and comparing their existing ICT infrastructure with the infrastructure standards defined by Enlaces (these standards define a certain number of computers that should be available in different areas of the school and other related issues. Finally, during a second visit from the technician, the installations are reviewed, and if they correspond with standards, formally approved.

▪ **Management and maintenance plan of the ICT infrastructure.**

This action line aims at ensuring that the ICT infrastructure is adequately managed and maintained. To do this, based on the size of the ICT infrastructure, each school owner must commit to fulfill and finance several conditions to ensure the correct management of the ICT infrastructure (have a contracted ICT coordinator, schedule the use of computer labs, have ICT integrated in the schools' strategic plan, etc.) and its maintenance (ensure availability of technical support, inventory of the equipment, etc.¹⁷ Personnel of the Enlaces' technical and pedagogical support network verify the fulfillment of the conditions. Approval of this and the previous procedure are prerequisites for the school to receive the ICT equipment.

▪ **Technical support.** Enlaces provides a number of technical support services to the schools in Enlaces, considering both on-site visits for repairs or pre-emptive maintenance and remote support through help desks.¹⁸

▪ **Provision of ICT infrastructure.** This action line considers the acquisition and installation of the ICT equipment to install in the schools.¹⁹ The equipment includes:

- Computer labs. Each lab is equipped with between 12 and 22 computers, one projector, one computer for the teacher, a scanner, and printers. The aim is to reach a standard that specifies that in each school there should be at least one computer lab for every 16 courses, and in each lab, the number of computers should be enough to accommodate not more than two students per computer.
 - Computers for rural schools. The aim is for each rural school to have at least one computer and a printer for each course, with a minimum of two computers and one laptop and a projector.
 - Computers for teachers' rooms. The aim is to reach a standard in which each teacher's room has at least one computer for every four courses.
 - Computers for the library. The aim is to reach a standard in which each primary and secondary school has at least two or four computers, respectively.
 - Mobile computer labs for grade 3: The standard is for these labs to have between 15 and 45 netbooks, one notebook for the teacher, one server, a Wi-Fi hub, and a trolley to secure, charge, and transport the equipment.
 - Laptops and projectors to be used in the classroom. The aim is to reach a standard that specifies that in each school there should be one laptop and projector for every four courses.
 - Computers. The aim is to have PCs, notebooks, or netbooks for high-achieving students from grade 7 (as a recognition).²⁰
 - Laptops. The aim is for laptops to be awarded to outperforming teachers.²¹
- **Digital educational network.** This action line aims at providing high-speed Internet access to the schools and to build a nationwide educational intranet. To implement this network, Enlaces will contract an Internet service provider (ISP) company to provide the service (2010).²²

Digital Competencies

This strategy considers the following action lines:

- **Teachers' professional development system.** This action line aims at equipping teachers with the required digital competencies to effectively use ICT. To do this, Enlaces developed ICT standards for teachers, and according to them, offers courses classified as: basic (mainly ICT skills); general (general use of ICT in teaching and learning); differentiated (use of ICT for different professional profiles in schools, such as teachers, administrators, principals, etc.); and specialized (use of ICT to teach specific subjects, such as mathematics, science, language). These courses are delivered using face-to-face, online, and blended learning strategies. To participate in these courses, teachers' competencies are evaluated and, depending on the result, specific courses are suggested to the teachers.

Many of these courses are offered on-line by the national Center for Teachers' Professional Development (Centro de Perfeccionamiento, Experimentación e Investigaciones Pedagógicas²³), and others are offered by Enlaces' technical and pedagogical support network using blended learning strategies.²⁴

Additionally, since 2004, Enlaces has been implementing Intel's teacher training program, "Teach to the Future." An evaluation of this initiative showed positive impacts on teachers' abilities to effectively integrate ICT in their teaching strategies (Hinostroza, Hepp, & Cox, 2009).

- **ICT competencies for initial teacher training.** Enlaces defined a set of digital competencies that student-teachers should acquire during their training. The competencies are grouped in five areas: Pedagogical (plan and design learning environment with ICT, use ICT for the creation of educational materials, implement teaching strategies with ICT, etc.); Social and Ethics (awareness about the impact of ICT in society, copyright, etc.); Technical (use computers, productivity software, and Internet); Educational Management (use ICT to develop administrative tasks); and Professional Development (abilities to reflexively incorporate ICT in the teaching practice, use ICT to communicate and collaborate with colleagues). These competencies are being promoted among the initial teacher training institutions and incorporating it into the national teacher accreditation standards (Programa Inicia) is also being considered. Additionally, Enlaces is participating in the OECD-CERI study, "ICT and Initial Teacher Training," which is part of the New Millennium Learners project. The objectives of the study are to:
 - Provide a detailed picture of how technology is used in initial teacher training, from a comparative perspective. This is implemented through a research review.
 - Analyze the views of the main stakeholders regarding the present and future use of technology in initial teacher training. This is implemented through national surveys to initial teacher training institutions and case studies.
 - Issue a number of policy recommendations both for teacher training institutions and governments in this domain.

The aim of Enlaces in this area is to design and implement an ICT in Education program for initial teacher training institutions. This program is currently in its design stage.

- **ICT competencies for students.** Enlaces defined a set of aims and contents related to digital technologies that students should acquire in secondary education. These definitions were incorporated in the curriculum as one "transversal" aim in 1998. During the last period (2007-2009), Enlaces initiated the definition of standards for students' ICT skills²⁵ and developed an evaluation system to measure these competencies. Due to external factors, both the definition and evaluation instruments are under revision for an eventual redefinition. In addition, Enlaces is participating in the OECD-CERI's project, New Millennium Learners, and in this framework, it is developing a definition of students' digital competencies and developing an interactive test to assess them.

Digital Educational Resources

This strategy considers the following action lines:

- **Hypertexts.** The aim of this action line is to provide digital textbooks for students to use and include in them links to relevant resources and contents available on the Internet.
- **Learning Objects.** The aim of this action line is to ensure the availability of a large number of digital resources aligned with curriculum that can be used to teach and learn specific content. To do this, Enlaces contracted the development of a large number of digital learning objects to be used in the classroom by the teacher or by students elsewhere.
- **Educational Management Software.** The aim of this action line is to provide digital tools for teachers to register and manage their classroom practice.
- **Models for ICT Teaching and Learning.** The aim of this action line is to develop ICT-based pedagogical models for teaching and learning specific subjects (see section 4.1). These models are the result of a research and development process in which external institutions bid to obtain funds to design these models (explorations), try them out (pilots), and finally produce a version of the model that can be transferred to the system (models), usually as an ICT integration service for schools.
- **Online Digital Educational Resources Catalogue** (www.catalogo-red.cl). The aim of this initiative is to ensure that all schools have access to a large variety of free and paid resources. Resources are described and organized based on the contents and aims of the Chilean curriculum. In addition, Enlaces provides funds for the schools to acquire a number of resources that they find useful. The long-term aim of this initiative is to foster the emergence of a digital educational resources market in Chile.

- **Educational Portal** (www.educarchile.cl). The aim of this action line is to promote, encourage, and facilitate student, teacher, and parent access to, and exchange of, a large variety of educational material, including multimedia resources (images, videos, sound, feeds, etc.), articles, lesson plans, discussion groups, and other collaborative and communication tools. The portal is organized in sections specially designed for its audience: teachers, principals, students, parents, and researchers. Each section provides a rich collection of resources and materials related to education. One of the main outreach successes of the Ministry of Education regarding this initiative has been the creation of a Latin-American network of educational portals called (www.relpe.org). The network allows sharing of digital educational resources, which are stored using the same data structure as that in the locally designed educational portals. Participating countries are therefore able to share lesson plans and other materials without fear of losing their respective national identities. Currently, 17 countries participate in this network, and several have already implemented shared educational portals (Hinostroza, et al., 2009).

Additionally, Enlaces also collaborates in the integration of ICT in other educational programs of the Ministry of Education, such as the numeracy and literacy campaign (Campaña de Lectura, Escritura y Matemáticas - LEM).

National Technical and Pedagogical Support Network

Although it is not an action line, an important element of Enlaces strategy was the creation of the Technical Assistance Network. This network was built upon a strategic alliance between the Ministry of Education and 24 universities across the country. The network's mission is to train teachers and provide them with technical and educational support. To carry out the massive training activities required by Enlaces, universities put together a network of technicians and trainers comprising nearly 400 primary and secondary school teachers specialized in educational information technology (Hinostroza, Hepp, Cox, & Guzmán, 2003).

The national technical and support network was set to be redefined during 2010 to incorporate additional institutions and diversify the service providers.

Enlaces Coverage Goals 2009-2010

Considering the action lines described in the previous sections, Enlaces defined the following coverage goals for 2009 and 2010.

Action Lines	2009	% of Total	2010	% of Total
Management and maintenance plan of the ICT infrastructure	8,000	72%	9,500	86%
Schools receiving Internet connection subsidy	3,000	27%	3,500	32%
Schools with ICT use plan	4,560	41%	8,500	77%
Classrooms with ICT	12,000	14%	16,500	19%
Students attending to classrooms with ICT	325,000	10%	412,500	12%
Teachers participating in differentiated and advanced ICT integration courses	24,000	15%	20,000	13%
Learning objects produced	450	NA	500	NA
Interactive educational resources produced	112	NA	172	NA
Computers purchased	166,000	NA	261,000	NA

Table: Enlaces Coverage Goals 2009-2010

Note: The percentages of totals were calculated using the estimations of Table 1 in section 4.2.

Source: Elaborated based on data provided through personal communications with Enlaces

Evaluation

During implementation, Enlaces developed a variety of initiatives to evaluate and monitor the ongoing activities of the project as well as its products and (possible) impacts. In regard to its monitoring initiatives, Enlaces developed web-based systems that enabled schools and service providers to directly register the provision, reception, installation, and configuration of computer networks, and to annotate technical-support visits and training activities developed in the schools. These systems allowed the national coordinators of the program to follow up the status of the main activities of the project at any time. To evaluate the quality of the services provided to the schools, Enlaces applied periodic surveys, which were answered by the teachers and principals of the schools. These surveys asked the respondents to give their perceptions of the quality of the technical support, training, and equipment provided to the schools. Enlaces then used this information to negotiate with the institutions working for the project, and the content and quality of the services provided in the following period (Hinostroza, et al., 2009).

Another dimension evaluated by Enlaces was the accomplishment of its goals and aims. This process involved asking principals, teachers, computer laboratory coordinators, and students to answer survey questionnaires. The main issues considered in these surveys were the ICT infrastructure present in schools, ICT-related activities, hours of use of ICT infrastructure, teacher professional development, ICT-related policies at school level, self-perception of ICT skills, and obstacles for ICT uptake. So that the results of these surveys could be used for comparative purposes, the surveys were designed and implemented following international guidelines (i.e., SITES-Module 1²⁶ and the UNESCO ICT international study²⁷). Some of the most interesting results provided by these studies were the high number of self-purchased computers present in secondary schools and teachers' homes; the very high percentage of students with mobile phones; the extensive amount of time computer laboratories were used (particularly revealing was the considerable amount of time spent on non-pedagogy-related activities), and the enormous impact that the project was having in providing low-income students with access to ICT (Hinostroza, Jara, & Guzmán, 2003). Results of surveys were used mainly to inform the Ministry of Education about the general achievements of the project and point out gaps and challenges.

Several other studies were also carried out under the auspice of Enlaces with the aim of defining and identifying teaching- and learning-related impacts. For example, Enlaces participated in the international evaluation of SITES-Module 2,²⁸ which researched case studies about innovative pedagogical practices using technology. The other studies included ethnographic examinations of the use of software in the schools and statistical analyses of the educational results of the students influenced by the Enlaces program. The main results of these studies showed no evidence that ICT had influenced students' learning achievement as defined in the national curriculum and measured by the national students' assessment tests.²⁹ However, they did show that teachers and students using ICT were acquiring

abilities and competencies defined as cross-curricular in the Chilean curriculum (students' conception of the world, social relations beyond the school), and that ICT had changed parents' conceptions of the school (Hinostroza, et al., 2002).

Additionally, results of the evaluation of the Chilean Educational Reform performed by the OECD in 2004, which also included Enlaces, indicated that:

Evaluations reveal that Enlaces has permitted broad, although still insufficient, access among teachers and students to new technologies; that teachers view this use of ICT in the schools positively; that teachers and students use these resources daily for a wide range of educational and, to a lesser degree, administrative purposes; and that some interesting pedagogical innovation has arisen hand in hand with these resources. Similarly, evaluations warn that on average teachers and students are still a long way from acquiring the technological skills hoped for; that teachers still feel insecure when faced with these new media; that more computers, educational software and better Internet access are needed; and that teachers need more concrete and applied support to reinforce the integration of these resources into their teaching practices.

(OECD, 2004, p. 27)

In this framework, the OECD suggests that there three types of problems conspiring to prevent the expansion and improvement of the use of information technology resources in schools (OECD, 2004, pp. 27-28):

- Pedagogical. Insufficient knowledge about each learning sector
- Institutional. Administrative restrictions that make it difficult for teachers and students to appropriate these technologies
- Material limitations. Issues of costs, in terms of quantity of computer equipment available

Reinforcing also the fact that the most complex challenge today is to fully integrate ICT into the curriculum, the OECD stated, "the team would encourage Enlaces in its future work to build up more practical guidelines for teachers, provide materials for concrete situations, and disseminate exemplars of good practice in the use of ICT in teaching and learning" (OECD, 2004, pp. 120-121).

Enlaces used these results mainly to inform the design of future stages of the project and refine the surveys to implement. Accordingly, in 2005, Enlaces decided to participate in a second international study—SITES 2006.³⁰ Early results from this study show that Chilean students in grade 8 frequently use ICT in schools to work at the same pace (answering tests or completing worksheets) and to do presentations, while mathematics and science teachers use ICT to search for information and teaching resources. Teachers said they considered the main impact of ICT in schools was increased motivation and self-esteem among students and improvement in students' ICT skills. To a lesser degree, but still mentioned, were improvements in subject-related knowledge and better results in evaluations. Complementing these important sources of information about achievements from

Enlaces are the findings of external evaluations and studies carried out by national and international institutions (see: Hinostroza, Hepp, et al., 2003).

The main lessons learned from the studies of and information gathered in relation to the Enlaces program can be summarized as follows:

- Design longitudinal studies that look at the impact on students and teachers over a period of years, given that uptake of ICT in schools is a long process, and it takes years for teachers to fully appropriate the technology and even longer to be able to effectively integrate ICT into their teaching routines.
- Ensure early implementation and use of a monitoring system for the program. Consider the information needed to measure a set of relevant indicators (internationally comparable) as well as the variables and procedures that will allow reporting relevant feedback on the activities carried out by the institutions involved in the implementation.
- Define an observatory of external sources of information. Results of studies about the program, carried out by national and international institutions, can be used to improve the program's management procedures as well as to enrich and complement the visions set down for the achievements and impact of the program.
- Use international standards. It is advisable, when comparing the evolution of the implementation of the program over the years, to use international indicators and evaluation procedures.
- To isolate the impact of ICT from external interventions (i.e., educational reforms), consider an array of different types of evaluations (case studies, surveys, and others) that could help in drawing a fuller and more reliable picture of the project's impacts.
- The ICT in Education policy can contribute to social equity, particularly providing access to ICT to the low-income students, diminishing the digital gap.

Currently, Enlaces is implementing an ICT in Education Survey that will be applied in all the subsidized schools in the country (Census) and in a sample of private schools. Results will be available at: <http://idde.enlaces.cl>

Additionally, Enlaces is implementing several evaluations of different action lines such as the provision of mobile computer labs and computers for students.

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Resource: Example Strategies from Around the World**Austria**

In the year 2000, soon after the Lisbon Council, Austria launched a long-term policy aimed at the integration of IT in the fields of education, culture, and science. E-Education was given a key position as a cooperative schema to prepare educational institutions and all people involved in the Austrian educational system for the knowledge society and the use of information technology. eFit Austria was an initiative of the Austrian Federal Ministry for Education, Science, and Culture from 2001 to 2007. It promoted the use of new information and communication technologies in the areas of education, science, and culture.

eFit was an open platform for projects and initiatives to pursue this aim. eFit emphasized the following issues: eEducation, eScience, eTraining, eCulture, and eAdministration, and three cross-cut areas: eContent management, the education portal, and provision of ICT-Infrastructure. For a sound implementation of eFit Austria, a steering-group of field managers was set up that is directly responsible to the Minister of Education, Science, and Culture. The initiative hosted an eLearning portal and supported the development of relevant infrastructure.

The educational IT strategy covered the whole educational system from primary schools to universities, as well as training centers of teachers, institutions for adult education, science and research, and the sites of culture such as museums, libraries, and art galleries. About 180 specific projects, mostly for students, teachers, and school/university partners have been launched since 2001.

In the second phase of the project, between 2004–2007, the focus shifted from technology, which was previously dominant, toward education-driven approaches. ICT was considered from a holistic point of view to raise the quality of educational systems at a whole.

From 2001 to 2003, the Austrian government contributed EUR 72 million for educational IT activities. From the beginning of the year 2004, explicit funding within the normal budget was provided.

www.elearningeuropa.info/en/project/efit-austria

Finland

As part of its National Information Society Policy, Finland stated:

Utilisation of ICT in education

A project OpetusTIME will be implemented. Projects requiring national architecture, solutions or guidelines will be carried out in ICT-centred areas of technological infrastructure in education. These include projects regarding information service for education service providers, teaching material service, national intellectual capital register, information service for education and training applicants, and electronic search. The use of ICT in teaching and studying will be promoted.

www.arjentietyhteiskunta.fi/files/38/periaatepaatos_tietoyhteiskuntapolitiikan_tavoitteista_engl_.pdf

Hong Kong

In support of its vision, Hong Kong specified a five-year strategy.

The first Five-year Strategy has successfully provided the necessary infrastructure for IT in education to take off. Building upon the current strengths and having regard to the barriers identified, the next strategy will focus on the following:

(a) using IT as a lever to support and advance the Education Reform initiatives;

(b) fostering the development of leadership capacities in schools to develop holistic and strategic school plan for making effective uses of IT to realize the school's vision and goals;

(c) better integration of IT into the curriculum as well as the learning and teaching processes;

(d) defining Information Literacy levels to set targets for students to develop IT skills and use them for learning and communication; and

(e) building partnership among various stakeholders to undertake initiatives, and pooling efforts, funding and expertise from various parties to sustain the momentum.

www.info.gov.hk/archive/consult/2004/wayforward-e.pdf

Namibia

Among the strategies identified in Namibia's Education Sector Training and Improvement Programme are those in the areas of:

The quality of general education (grades 1–12) is to be improved through a wide range of measures. The curriculum will be revised to ensure that it meets the demands of a knowledge-based economy. The supply of textbooks and other learning materials will be increased. New standards will be enforced. Systems of performance management and accountability will be introduced, including licensing of teachers and performance targets for each school. National tests will be introduced in grades 5 and 8 to supplement existing national examinations at grades 10 and 12. Support for teachers will be stepped up through re-organised inspection and advisory services, and the cluster system, in terms of which 4 - 8 schools in one vicinity are grouped together. Special education will be enhanced, initially through policy development.

Information Communication Technology will be rapidly spread throughout the sector to enhance learning and administration.

The curricula will be revised to make ICTs a cross-curricular tool as well as a subject. Staff will be trained, and ICT services and support structures developed, so that technology can be deployed and maintained. Education management will also be enhanced through the use of ICTs.

www.tech.na/etsip.htm

Portugal

In supporting its vision, Portugal designed a plan with three strategic components:

1. Technology:

- Technology kit: Increased number of computers and support equipment inside and outside classroom
- High-speed broadband Internet
- Internet in the classroom
- School Card: Electronic report card
- School Safety: Electronic safety system

2. Content:

- School Portal: School portal with content sharing, distance learning, and collaborative tools
- Simplex School: Management support electronic tools
- Institutional Portal: Communication platform between citizens and the Ministry of Education

3. Training:

- ICT Competencies Training and Certification: Restructuring teachers' ICT training
- Electronic Assessment: Use of computers in student assessment
- ICT Internships: Opportunities for student internships in the ICT field
- ICT Academies: Training of staff, teachers, and students to certification by industry standards

www.pte.gov.pt/idc/idcplg?IdcService=GET_FILE&dID=15018&dDocName=002839

Rwanda

Rwanda's Education Sector Strategic Plan, 2010-2015, lists these strategies for educational ICT:

1. Promoting an ICT in education culture—through the development of outreach material and the building of a common platform designed to raise awareness of the benefits and limitations of ICT in education, share ICT in education resources and good practices, and position Rwanda with regard to international standards and the EAC in particular.
2. Fostering and managing ICT in education initiatives through development of a framework and guidelines to build and strengthen partnerships between different stakeholders and encourage participation of local institutions (private, public and civil society) in ICT in education.
3. Expanding ICT infrastructure to increase access through providing power, connectivity and equipment to educational institutions, particularly at the primary and secondary levels and outside the main cities and maintaining and upgrading existing infrastructure.

4. Developing capacity to integrate the use of ICT into education practices through training of teaching staff on integrations of ICT into the teaching practice, development of ICT standards and competencies and provision of technical and pedagogical support in schools.
5. Developing and distributing quality digital content and ensuring that this content is adapted to the Rwandan context and aligned with the national curriculum.
6. Establishing Open, Distance and e-Learning (ODEL) through development of an ODeL policy and cost strategy, building on existing initiatives at the higher education level through development of bridging courses for entry into NUR and using the Rwanda Education Commons programme as a vehicle for increasing teachers' knowledge and pedagogical skills through ODeL. Training institutions in underserved areas will be particularly targeted as will learners at the secondary level who have dropped out of the education system. As ICT in education is a particularly dynamic field, innovative solutions in the areas of infrastructure, capacity and digital content development will be fostered whenever possible to answer needs in those rural areas where alternative ICT in education solutions are required.

<http://mineduc.gov.rw/IMG/pdf/ESSP.pdf>

Uruguay

Plan Ceibal is central to Uruguay's vision of the future.³¹ The plan consists of four components:

1. One laptop for every child and teacher of all public schools: Participation in the One Laptop per Child program, with XO computer and Sugar operating system for each child
2. Wireless connectivity in public schools: Server for each school and subsidized Internet connections in schools and town public squares
3. ICT training for teachers and ICT support for families: Technical support and technical and pedagogical training for teachers
4. Generation of digital educational resources: Educational portals that provide digital content and support the exchange of experiences and good practices among teachers

Resource: Extended Checklist for a Good ICT Plan

- The ICT plan fits into a long-term trajectory (15 years).
- The ICT plan is focused on the next five-year period.
- The ICT plan's desired contributions to national and educational visions are explicit.
- The ICT plan is explicitly coordinated with other education changes:
 - Professional Development
 - Teaching and Learning
 - Curriculum and Assessment
 - School Policy Organization and Management
 - Research and Evaluation
- The ICT plan specifies how ICT will contribute to each of these changes and move towards realizing the vision.
- The ICT plan is designed to benefit females and males equally.
- The ICT plan uses strengths and ICT resources to align components of the system to bring about systemic change.
- The ICT plan coordinates the efforts of stakeholders to move toward the shared vision.
- The ICT plan describes specific strategies and actions and specifies measurable goals.

Additional Resources

School Organization and Management

ICT for Change. Responding to the Learning and Developmental Needs of Out-of-School Adolescents. <http://itforchange.net/sites/default/files/ITfC/notes from the field.pdf>

ISTE. National Technology Standards for Administrators. www.iste.org/standards/nets-for-administrators

UNESCO. Role of ICT in Education: Distance and Online Learning. [www.unescobkk.org/education/ict/online-resources/portal-for-teachers/viii-distance-and-online-learning/?utm_campaign=cdcc4a7343-Newsletter_5_30_125_30_2012&utm_medium=email&utm_source=Master Newsletter List](http://www.unescobkk.org/education/ict/online-resources/portal-for-teachers/viii-distance-and-online-learning/?utm_campaign=cdcc4a7343-Newsletter_5_30_125_30_2012&utm_medium=email&utm_source=Master%20Newsletter%20List)

Teacher Professional Development

Commonwealth of Learning. ICT in Education: Teacher Professional Development Toolkit. <http://ccti.colfinder.org/toolkit/ict-toolkit/index.html>

Creating Teacher Communities of Learning. [www.itforchange.net/sites/default/files/ITfC/Creating Teachers Communities of Learning - Subject Teacher Forum Karnataka January 2013.pdf](http://www.itforchange.net/sites/default/files/ITfC/Creating%20Teachers%20Communities%20of%20Learning%20-%20Subject%20Teacher%20Forum%20Karnataka%20January%202013.pdf)

GeSCI. ICT Teacher Professional Development Framework Video. www.gesci.org/knowledge-tools.html

GeSCI. Teacher Development in the 21st Century. www.gesci.org/assets/files/Synthesis_Report_ICT-CFT_Draft_Final_191011.pdf

Intel. Intel Teach. www.intel.com/content/www/us/en/education/k12/intel-teach-ww.html

ISTE. National Technology Standards for Teachers. www.iste.org/standards/nets-for-teachers

National Institute of Education, Singapore. Teacher Education Model for the 21st Century. www.nie.edu.sg/files/spcs/Te21_online_ver.pdf

UNESCO. ICT in Teacher Education: Policy, Open Educational Resources and Partnership. <http://unesdoc.unesco.org/images/0019/001936/193658e.pdf>

UNESCO. Role of ICT in Education: Training of Teachers. www.unescobkk.org/archive/education/ict/themes/training-of-teachers

Teaching and Learning

Enlaces Multimedia. <https://www.youtube.com/playlist?list=PL906F18D905E13FDD>

European SchoolNet study of 1:1 computing in 5 countries. <http://1to1.eun.org/web/acer/evaluation>

Intel. Computer Clubhouse Network. www.intel.com/content/www/us/en/education/computer-clubhouse-network.html

Intel. Intel Learn Program. www.intel.com/content/www/us/en/education/k12/intel-learn.html

Ministry of Education, Singapore. Self-Directed Learning with ICT. <http://ictconnection.moe.edu.sg/ictconnection/slot/u200/mp3/monographs/self-directed-learning-with-ict.pdf>

OECD. International Experience Interactive Whiteboards. www.oecd-ilibrary.org/docserver/download/5k49chbsnmls.pdf?expires=1367085889&id=id&accname=guest&checksum=1A3B47C65A27C6D78FFD4C633EE2BC38

UNESCO. Role of ICT in Education: Innovative and Successful Practices. www.unescobkk.org/en/education/ict/online-resources/portal-for-teachers/i-the-role-of-ict-in-education/successful-and-innovative-practices/

UNESCO. Role of ICT in Education: New Roles for Teachers in the ICT Environment and How ICT Supports Teachers and New Ways of Teaching and Learning. www.unescobkk.org/en/education/ict/online-resources/portal-for-teachers/iii-teachers-roles/

UNESCO. Role of ICT in Education: Teaching Ideas, Lessons and Curriculum Materials. www.unescobkk.org/education/ict/online-resources/portal-for-teachers/v-ideas-lessons-and-curriculum

Curriculum and Assessment

ATC21S. Policy Frameworks for New Assessments. <http://atc21s.org/wp-content/uploads/2011/11/5-Policy-Framework.pdf>

GeSCI. Development of 21st Century Skills for Innovation and Enterprise. [www.gesci.org/assets/files/AKE_research - Full Report.pdf](http://www.gesci.org/assets/files/AKE_research_Full_Report.pdf)

ISTE. National Technology Standards for Students. www.iste.org/standards/nets-for-students/nets-student-standards-2007

Partnership for 21st Century Skills. Framework for 21st Century Learning. www.p21.org/overview/skills-framework

Evaluation and Research

UNESCO. Role of ICT in Education: Indicators for Assessing ICT Impact in Education. www.unescobkk.org/archive/education/ict/themes/measuring-and-monitoring-change/

Blamire, R. and Kárpáti, A. (2008): CALIBRATE Learning Resources for Schools Project — Final Validation Report. Bruxelles: European Schoolnet. http://calibrate.eun.org/shared/data/calibrate/deliverables/D4_2_Final_Validation_ReportFinal.pdf

Kárpáti, A. and Blamire, R. (2008): CALIBRATE Learning Resources for Schools Project — Final Evaluation Report. Bruxelles: European Schoolnet. http://calibrate.eun.org/shared/data/calibrate/deliverables/D4_3_Evaluation_ReportFinal.pdf

Gender Considerations

African Development Bank Group. (2009). Checklist For Gender Mainstreaming In The Education Sector With A Special Focus On Higher Education, Science And Technology Sub Sector. African Development Bank Group. www.afdb.org/fileadmin/uploads/afdb/Documents/Policy-Documents/Gender_education_checklist_-_sunita-12-01-09.pdf

Aikman, S. and Unterhalter, E., eds. (2007). Practising Gender Equality in Education. Dorset: Oxfam. www.ungei.org/resources/files/Proglns_wholebook.pdf

Corner, L. (2008). Making MDGs work for all. UNIFEM. www.unifem.org/attachments/products/Making_MDGs_work_for_all_complete.pdf

Gill, K. et al. (2010). Bridging the Gender Divide: How Technology Can Advance Women Economically. Washington, DC: International Center for Research on Women. www.icrw.org/publications/intel-learn-program-through-gender-lens

Ring, S. (2008). Tech gURLs: Closing the Technological Gender Gap. Edutopia.org. www.edutopia.org/computer-science-technology-gender-gap

Tømte, C. (2008). Return to Gender: Gender, ICT, and Education. Oslo: OECD. Background paper for OECD Expert meeting hosted by the Norwegian Ministry of Education and Research Oslo, Norway 2-3 June 2008. www.oecd.org/edu/cei/40834253.pdf

General

Connected Educators. <http://connectededucators.org>

infoDev (2007). ICT in education toolkit for policy makers, planners, and practitioners. <http://www.infodev.org/articles/ict-education-toolkit-policy-makers-planners-and-practitioners>

This online toolkit of six “toolboxes” and a total of 19 tools provides interactive instruments and step-by-step guidance to assist users in mapping the national situation; creating a master plan; formulating interventions; planning for implementation, evaluation, and adjustment; and scaling.

Intel (2009). Intel eLearning deployment guide: How to integrate ICT in education for the 21st century. Santa Clara, CA: Intel Corp. www.intel.com/Assets/PDF/designguide/Intel_elearning_Deployment_Guide.pdf

A guide to planning and deployment of ICT resources in the context of systemic education reform and long-term success. The guide covers the ICT needs of teachers, students, parents, and school administrators in the context of changes in teacher professional development, teaching and learning, and curriculum.

Ministry of Education, Singapore. ICT Mentor’s Companion: Self-Directed and Collaborative Learning. <http://ictit2012-jobe.wikispaces.com/file/view/The+ICT+Mentor’s+Companion.pdf>

UNESCO. Turning on Mobile Learning: Global Themes. <http://unesdoc.unesco.org/images/0021/002164/216451E.pdf>

Overview

The updated Intel Policy Development Toolkit consists of 12 sets of materials organized around the four-phase model of the policy development process:

1. Envision the Future
2. Develop a Master Plan
3. Implement Initiatives
4. Evaluate and Adapt

The materials for this third phase—Implement Initiatives—are organized in two steps:

1. Team with Partners
2. Provide Resources

Goal

The materials for this Implementing Initiatives phase are designed to help you move from plans and action and on to implementing your plan by teaming with partners and specifying and mobilizing resources.

Current Status

To take advantage of these materials, you should have a detailed master plan. If your country (state or municipality) has not already developed one, you should look at the materials in the Develop a Master Plan phase. You should also have an analysis of stakeholders and an analysis of the socio ecosystem. If you do not have this, you should turn to the materials in the Envision the Future phase.

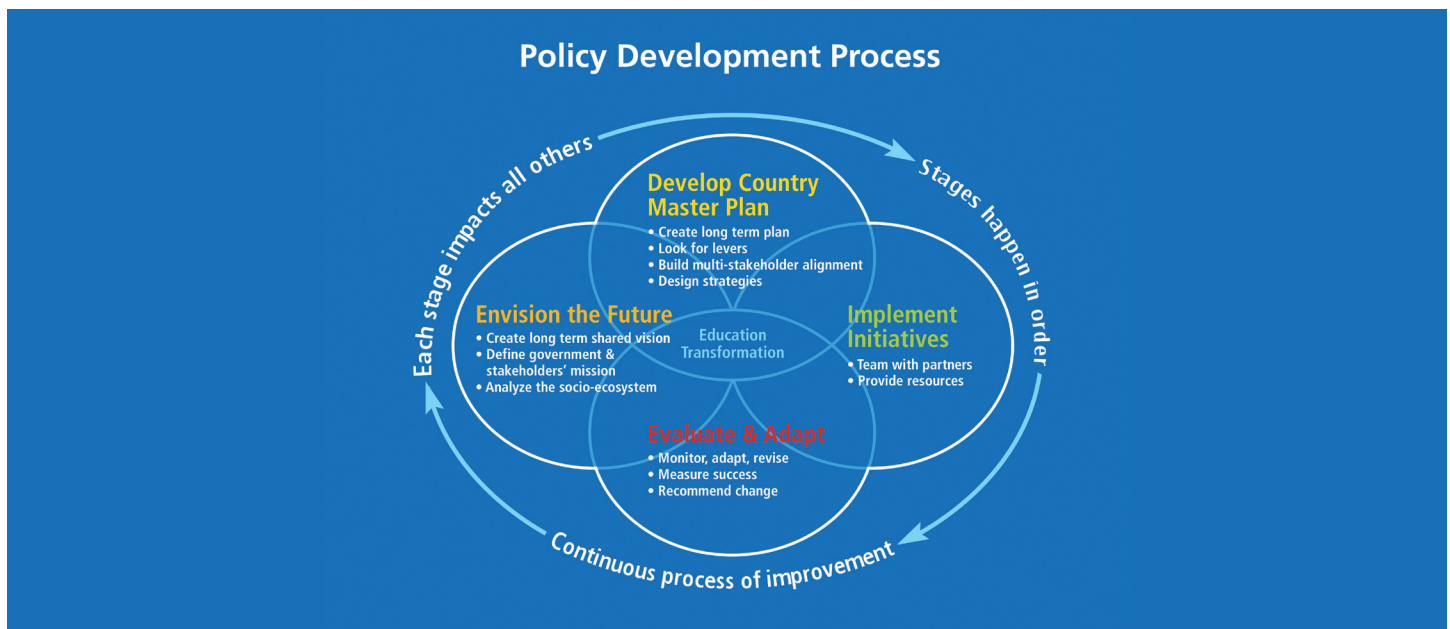
Resources

Each step in this phase includes a set of online documents (exercises, readings, case studies, and other resources) that will help you create usable outputs and achieve your goals for the phase.

Output

At the end of the Implement Initiatives phase, you will have:

- Identified a set of partners and designed a management structure that will allow you to implement your master plan
- Created an implementation timeline
- Specified a set of resources, developed a budget, and identified a set of potential funding sources for your plan



Goal

Implementing a five-year strategy can be a daunting task. It requires a management plan and, often, partners. Educational change—particularly transformational change—cannot be done with only one agency or only by the government. Many partners are needed. The goal of this step is to identify partners and design a management structure that can help you implement your plan.

Resources

In addition to this exercise, you have access to the Jordan case study in the Appendix. You should also have your detailed master plan, your Stakeholder Analysis, and your Socio Ecosystem Analysis, developed in previous phases.

Output

As a result of going through this exercise, you will develop a management plan, including a list of partner organizations, along with a way of coordinating those partners.

ACTION STEP: Input your analysis of stakeholders from the Develop Master Plan phase.

ACTION STEP: Input your listing of strategies and actions from the Develop Master Plan phase.

Organizational Structure

All your great planning will make a difference only if you make it work. You have to have the organizational partners and structure in place to implement the plan. In Singapore, the Department of Educational Technology was charged with developing and implementing their Master Plan and recruiting colleagues in other departments to help make it work. In Korea, the Ministry of Education created a unit—the Korean Education and Information Service (KERIS)—to implement their first plan and coordinate with the various other organizational units involved.

Read over the Jordan case study in the Appendix. You will see that Jordan’s proposed ICT plan recommended that the Queen Rania Center—the educational technology unit in the Ministry of Education—lead a cross-departmental team from departments responsible for teacher training, curriculum, assessment, and school management to implement the plan.

Building on your list of strategies and stakeholders, and your list of actions from the Develop a Master Plan phase, list the organizational partners that would best implement that action, filling in the following table:

Strategy and Action	Responsible Organizational Partner
Strategy 1: Action 1	
Strategy 1: Action 2	
Strategy 1: Action 3	
Etc.	

Management Plan

Can you rely on current organizational structures to implement all of the actions of your plan? If not, what additional organizational structure must be created?

If you need to create a new organizational structure or structures, please indicate why it is needed, what the structure will be, where it will be organizationally placed (who it will report to), and specifically what its responsibilities will be.

In the management plan, will both men and women participate equally? If not, what measures can be taken to work toward their equal participation?

In the case of Jordan, the proposed ICT plan was monitored by a cross-departmental, cross-sector board, headed by the Director of the Queen Rania Center, who was also responsible for implementing the ICT plan. The board included the directors of the other key departments, as well as representatives from other ministries (such as telecommunications), non-governmental organizations, and private-sector partners.

Is there a mechanism in your organization by which the implementation strategies and actions across stakeholders can be coordinated to bring them into alignment and move toward your vision? If not, what organizational structure must be created to coordinate and manage the actions across organizational partners? Where will it be organizationally placed (who will it report to)?

ACTION STEP: Input your table of strategies and actions and measurable goals from the Develop a Master Plan phase.

Timeline

Referencing your table of strategies and actions and measurable goals, create a quarterly chart for each of the next five years, detailing when various actions will begin and conclude, and identifying key milestones. A sample table for the first year is shown below:

	Q1	Q2	Q3	Q4
Strategy 1: Action 1				
Strategy 1: Action 2				
Strategy 1: Action 3				
Strategy 2: Action 1				
Strategy 2: Action 2				
Strategy 2: Action 3				
Etc.				

List the deliverables or accomplishments in the chart above and for the other four years at the key milestones.

For each of the five years, identify the crucial milestones that must be reached, even if resources of other, less crucial milestones have to be reallocated.

Resource: Jordan Case Study

As part of its effort to develop a five-year ICT plan and strategy, the Ministry of Education in Jordan asked a consulting team to recommend a management plan.³² For each of the strategies and actions, the team identified an organizational unit or partner that seemed best positioned to be responsible for that action. This is described in the table that follows. In addition, the following structure was recommended to manage the implementation of the plan.

Managerial Structure: Steering Committee and Matrix Structure

The consulting team recommended that the ICT Plan and Strategies be managed by a team of leaders from all the affected directorates that constitute a Steering Committee. As the agency most responsible for ICT in Education Policy matters, the Director of the Queen Rania Center would chair the Steering Committee. Establishing an MoE Program Management Office (PMO) would greatly aid the Steering Committee in the functions described below and facilitate the coordination and management of vendors.

To assure transparency, the Steering Committee may also include outside, non-voting members, such as the executive director of JEI or members of the private sector. The Steering Committee should meet periodically—at least quarterly and ideally monthly for the first

year of the project—to monitor progress on each of the strategies and actions. It was recommended that the chair and the Steering Committee be responsible for resources assigned to the plan. The chair would report directly to the Secretary General and the Minister of Education, and would be accountable to them for the distribution of resources and progress toward goals.

The consulting team recommended that a matrix structure be used for assigning staffing responsibilities associated with each component of the plan. Each of the strategies and actions require a diverse set of expertise that typically is not located in a single organizational unit. For example, the development of digital content requires specialized knowledge of the capabilities of the technology, specialized understanding of the student learning process, and specialized expertise in curriculum and subject matter content. The development of ICT-based assessments requires specialized knowledge of capabilities of the technology and specialized knowledge of assessment. Consequently, it was recommended that project-based teams from various directorates be formed to work on specific strategies and actions. It was recommended that the agencies might participate in these teams under each of the actions below, but it would be the responsibility of the Steering Committee—along with corresponding directors—to structure the membership and leadership of these teams.

Strategy and Action	Responsible Organizational Partner ³³
Strategy 1 Action 1: Train all teachers and principals in blended learning pedagogy	QRC, DoT, and perhaps JEI
Strategy 1 Action 2: Embed blended learning materials and assessments throughout the curriculum	QRC, DoT, and perhaps JEI
Strategy 1 Action 3: Provide each teacher with a computer and high-speed Internet access	QRC and DoIT
Strategy 2 Action 1: Conduct information needs assessment	QRC and DoP
Strategy 2 Action 2: Train all principals and teachers in the use of EMSS	QRC, DoP, and DoT
Strategy 2 Action 3: Assure that all principals and teachers have easy access to EMSS	QRC and DoIT
Strategy 2 Action 4: Require all schools to submit school-based ICT plans	QRC and Field Directorates
Strategy 3 Action 1: Set up Lead Schools program	QRC and Field Directorates
Strategy 3 Action 2: Begin developing project-based training and materials	QRC, DoT, and perhaps JEI
Strategy 3 Action 3: Provide additional resources to Lead Schools and hold them accountable	QRC
Strategy 4 Action 1: Develop and field test ICT-based assessments of knowledge economy skills	QRC, DoTE, and perhaps NCHRD

Goal

The goal of this step is to help you specify the ICT resources that will be needed to implement your plan. You will also determine a budget for these resources and identify potential funding sources.

Resources

In addition to this step, you have access to a list of additional resources that can help you consider all your potential ICT needs and costs.

Output

As a result of this step, you will have a list of needed resources for your plan, a budget, and a list of potential funding sources.

Needed Resources

The intent of this exercise is to help you think through the ICT resources that you will need to allocate in order to implement your plan. These include personnel and materials, as well as hardware, software, networks, maintenance, and technical assistance. These resources should be appropriate in scope to the goals of the plan and mobilized according to the strategy schedule. Financial resources are, of course, an important component of this.

The resources addressed here are specific to ICT. There may be additional costs associated with curriculum and assessment reform and professional development costs beyond those listed here. Because these are idiosyncratic to your specific plan, it is difficult to provide

you with guidelines for these. But the analysis below should help you estimate the significant costs—both initial and ongoing costs and both capital and personnel costs—directly associated with ICT.

But even here, it is impossible to give specific costs in a general guideline. Because labor, transportation, and even hardware costs vary significantly from country to country, the best that can be done is provide you with a general structure of costs that you can fill in, subject to the specific prices of a country. The categories below are related to the costs of implementing ICT. We provide a structure to figure the total cost of ownership (TCO), and not just the costs associated with the initial purchase. This structure will help you determine a gross estimate of costs that you can use to fund your plan. Those tasked with implementing the plan will need more specific guidelines at the time of purchase.

ACTION STEP: Input your table of how technology can be used from the Develop a Master Plan phase.

ACTION STEP: Input your list of strategies and actions from the Develop a Master Plan phase.

From Strategies and Actions to Resources

For each strategy and action, review the guidelines below and list the costs (or savings) associated with each cost category.

Component	How ICT Can Be Used	Cost Categories				
		Initial Costs	Ongoing Costs	Personnel Costs	Contracted Costs	Cost Savings
Strategy 1: Action 1						
Strategy 1: Action 2						
Strategy 1: Action 3						
Strategy 2: Action 1						
Strategy 2: Action 2						
Etc.						

Cost Category Guidelines**Initial costs**

- Hardware
 - Computer
 - Display
 - Connectivity
 - Routers
 - Servers
 - Software
 - Operating systems
 - Virus protection
 - General-purpose applications (word processing, etc.)
 - Educational management system
 - Peripherals
 - Physical infrastructure (computer desks, chairs, mobile carts, etc.)
 - Electrical system (connect to the grid, sufficient outlets, surge protectors)
- Content and applications
 - Off-the-shelf administrative and productivity software
 - Off-the-shelf instructional software
 - Custom content development
- User training and support
 - Initial administrator, teacher, and student training
- Maintenance and technical support
 - Setup and maintenance
 - Technical support call center
- Management, Monitoring, and Reporting
 - Organizational structure to deploy

Ongoing Costs

- Services
 - Electricity
 - Internet service
 - Security
 - Insurance
- Upgrade for content and applications
- Recurring training
 - Pedagogical integration
- Upgrades and planned replacement of hardware
- Ongoing management personnel

Personnel Costs

- Management
- Management support staff
- Training personnel
- Content development personnel
- Maintenance and technical support

Contracted Costs (if not done internally)

- Management data support
- Training
- Content development
- Maintenance and technical support
- Monitoring and evaluation

Cost Savings

As you are estimating costs of the plan, it is also worth estimating the cost savings of the plan. For example, in Jordan it was estimated that the Ministry of Education would save tens of millions of dollars in textbooks when all curriculum materials were put online by the end of the second phase of the plan. In addition, tens of millions more would be saved when all testing was done online during that phase.


Create a summary list of all cost savings that can be expected, as a result of the implementation of the plan:

Review the cost categories across strategies and actions, and construct an estimated line-item budget for the needed resources:

Sources of Funding

Governments, however big, are limited in their resources. Considering the stakeholders and potential partners with whom you have been working and the list below, construct a funding plan to obtain the needed financial resources.

- National funding
 - Office of the King, President, Prime Minister
 - Ministry of Education
 - Ministry of ICT and Telecommunications
 - Other relevant Ministries
 - Universal service fund
 - Government subsidy or VAT reduction
 - Spectrum auction
 - Government-backed loans
- State or provincial funding
- Donor governments and multinational organizations
- NGOs, private foundations
- Girl's and Women's organizations
- Private-public partnerships
 - Telecommunications companies
 - Banks
 - Technology companies, perhaps financing through cell phone bills
 - Subsidies or promotional incentives, from such, to increase customer base
 - Corporate Social Responsibility sources
- Funds from individual purchases by teachers, parents, students
 - Teacher salary deduction plans

ACTION STEP:  **Input your revised draft ICT Plan from the Develop a Master Plan phase.**

Revise ICT Plan

Now elaborate on your ICT Plan to include a description of partners, a management structure, timeline and milestones, an estimated budget, and potential funding sources. The space below will not be sufficient, but it is meant to get you started:

Vision for the Future of Education**Current Situation****Desired Changes****Long-Term Roadmap****Five-Year Plan****Role of ICT****ICT Strategies and Actions****Measurable Goals****Necessary Resources and Budget**

Resources: Additional

Global E-Schools and Communities Initiative (2009). Instructional manual for GeSCI TCO Tool V4.0.6. <http://inesm.education.unesco.org/files/TCO-local-Manual.pdf>

Global E-Schools and Communities Initiative (2009). Buyers' guide for ICTs in Education. www.gesci.org/old/files/docman/buyers-guide-ict-equip.pdf

Global E-Schools and Communities Initiative (2010). Practical Guide to Pilot Projects and Large-Scale Deployment of ICTs in the Education Sector. www.gesci.org/assets/files/Knowledge%20Centre/pilot-ICT-projects.pdf

infoDev (2007). ICT in education toolkit for policy makers, planners, and practitioners. www.ictinedtoolkit.org/user/login.php

Intel (2009). Intel eLearning deployment guide: How to integrate ICT in education for the 21st century. Santa Clara, CA: Intel Corp. www.intel.com/Assets/PDF/designguide/Intel_elearning_Deployment_Guide.pdf

Vital Wave (2008). Affordable computing for schools in developing countries: A total costs of ownership (TCO) model for education officials. www.vitalwaveconsulting.com/insights/articles/affordable-computing.htm

UNESCO. (2010). Gender Responsive Budgeting in Education. Bangkok: UNESCO.

www.gender-budgets.org/index.php?option=com_joomdoc&view=documents&path=resources/by-theme-issue/sectoral-application-of-grb/gender-responsive-budgeting-in-education&Itemid=822

World Bank. Knowledge Map: Costs. <http://www.infodev.org/en/Publication.159.html>

Overview

The updated Intel Policy Development Toolkit consists of 12 sets of materials organized around the four-phase model of the policy development process:

1. Envision the Future
2. Develop a Master Plan
3. Implement Initiatives
4. Evaluate and Adapt

The materials for this second phase—Envision the Future—are organized around three steps that together constitute a continuous cycle of planning, implementation, evaluation, and revision:

1. Monitor, Adapt, Revise
2. Measure Success
3. Recommend Change

Goal

The materials for the Evaluate and Adapt phase are intended to help you design an evaluation plan, specify metrics for success, and schedule periodic reviews to monitor progress and spot problems.

Current Status

To gain the most from this section, your country (state or municipality) should have already developed an education ICT master plan. If you do not yet have one, look at the materials in the second phase of the Toolkit: Develop a Master Plan.

Resources

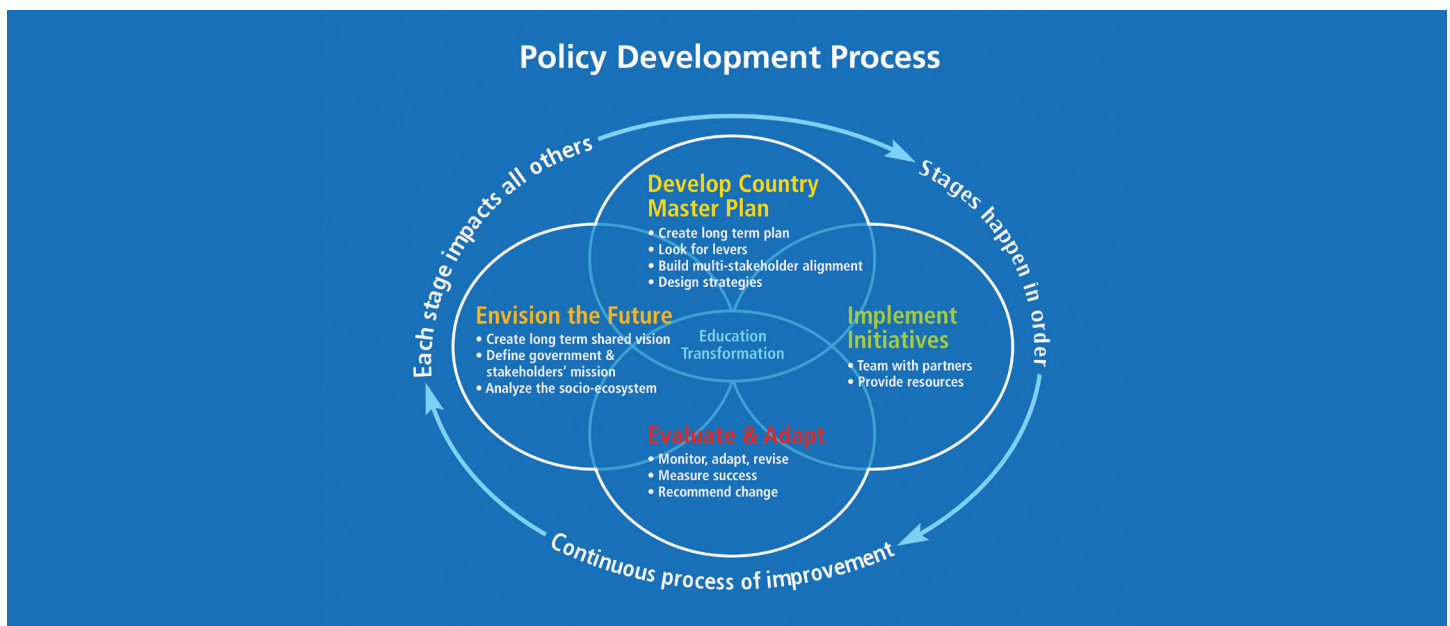
Each step includes a set of online documents (exercises, readings, case studies, and other resources) that will help you create usable outputs and achieve your goals for this phase. You should bring with you the detailed master plan and implementation plan that you developed in earlier phases.

Output

At the end of the Evaluate and Adapt phase, you will have:

- A detailed monitoring and evaluation plan
- Specifications for a set of indicators of success for your measurable goals
- A schedule of monitoring reviews that might indicate the need for change

This will complete your ICT master plan and, consequently, you will have a document that you can share with other stakeholders. It is intended that the final version would be ready for organizational and/or legislative approval, funding, and implementation.



Goal

The goal of this step is to help you develop an evaluation and monitoring plan that can help you track the success of your strategies and make adjustments across the years of the plan.

Resources

In addition to these materials, you have access to the Jordan case study and other resources in the Appendix.

Output

As a result of this step, you will have an evaluation plan that includes the study design and the specification of data collection approaches.

Designing an Evaluation

Professor Dan Wagner from the University of Pennsylvania presents a conceptual model for planning the evaluation of ICT-based initiatives.³⁴ The conceptual framework maps to the developmental trajectory of an ICT initiative—from its implementation, to its immediate influence on teacher and student practices (outcomes), to its impact on student learning and graduation, and ultimately to its long-term social or economic impact.



No one would expect an initiative to have an impact on the economy after its first or second year. And it would be inappropriate to measure impact on student learning for the first several months after deployment, particularly if the extent to which the initiative has been implemented is not known. In the early phases of the project, the emphasis should be on the extent to which the project is being implemented as planned, including whether a large majority of the teachers and schools are participating. As the project becomes widely implemented, one can reasonably expect to begin to see signs of the intended outcomes, related to teacher skills and practices and, subsequently, student skills, attitudes, and knowledge. As the program continues over the years, one can expect larger impacts on student graduation rates, post-graduation hiring, and so on. After some extended period, one could reasonably hope—although not always be able to measure—the impact of the program on economic or social development, and its contribution to realizing the country's ultimate vision for the future.

This framework is a good way of to take your strategies, as determined and refined earlier in this process, and plot out a series of evaluations appropriate to the particular phase of your initiative.

From Strategies and Actions to Evaluation

In step one, Designing Strategies, in the Develop a Master Plan phase, you laid out a set of strategies and actions over a five-year period. You also specified a set of related, measurable goals for each year over the five years. With this exercise, you will design an evaluation plan that will allow you to collect the data you need to monitor your progress during these five years.

Typically there are three sorts of designs:³⁵

1. Sample survey
2. Case study
3. Comparative study

Sample Survey

A survey is used to determine the extent to which something is happening. Because only a sample of participants is used, it can be an inexpensive yet reliable way to make such determinations and infer them to the entire population. However, to be reliable, the survey must be based on a random sample of teachers, students, etc. Because survey data are easy to quantify, they are also easy to analyze, using common statistical procedures.

However, if you want to analyze by certain groups, such as teachers versus administrators versus students, or females versus males, it is important to randomly select respondents within those groups. This allows for a much more powerful analysis. The collection of gender information, for example, can help you assess differences between male and female access to technology and technology education (for example, education program participation and retention, and access to and use of specific technologies). It can also allow you to assess how successfully educational curricula and methods benefit both females and males (for example, skill development and education outcomes). Over time, follow up through gender disaggregated data and studies can help you assess how technology education policy influences economic and social outcomes for males and females (for example, field of employment and salary level).

With surveys, you can ask teachers, school leaders, and even students to report on what is happening or what they are doing in or out of the classroom. They can also report on their attitudes about a program. Over time, this information can be used to monitor the progress of a program. Surveys can also be used to measure outcomes. However, because surveys are students' or teacher' self-reported outcomes, they are often considered to be less reliable or accurate. Self-reporting of attitudes may be unreliable because respondents may report what they think they are supposed to say. Self-reports of the amount learned may be unreliable because respondents often overestimate the amount they learned. Reliability can be increased

by asking the same question of multiple types of respondents. If principals, teachers, and students all report that students learned specific skills, the results are more reliable than if only the student reported that finding.

Surveys can be combined with a comparative study design, and the same questions can be asked of teachers or students participating in several programs or a new program and the traditional program. Again, such comparisons are particularly useful if you are considering multiple approach or treatment options.

Case Studies

Case studies collect much more-detailed information but, for practical purposes, they zero in on a much smaller sample of teachers, students, or classrooms. They often involve conducting interviews, collecting sample lesson plans and student products, and making observations in schools and classrooms, maybe even accompanied by video recordings for more detailed analysis later.

Case studies are most useful when you want process information; that is, when you want to examine not just results or self-reports of progress but also observe how a program is being implemented in the class. This will give you information on how materials and technology are used—meaning, what it is that teachers and students are doing. These observations can tell you how accurately teachers are implementing the program—information that can allow you to make revisions and modifications. These observations can also explain, for example, how male and female students are responding to particular teaching methods and whether both are actively engaging in the learning process.

The large quantity of detailed data from a case study is very difficult to analyze. It takes many hours to observe and analyze hours of classroom time. And it is often difficult draw conclusions across cases. Furthermore, because such a small sample is used, however well-drawn, it is impossible to infer conclusions from this sample and make conclusions about the larger group. Also, because the information is so detailed and it takes so much time to collect and analyze it, case studies are very expensive.

On the other hand, because they are so reflective of things that are happening in specific classrooms, case studies and particularly video recordings of good class sessions can be very useful as part of teacher training or shared best practices among teachers.

Comparative Study

A comparative study looks at the difference between two or more approaches. It is most useful when more than one approach is under consideration, although it is often used to compare a new approach with the current approach. Such studies are usually used with some direct measure of outcome, such as an assessment of teacher or student skills or knowledge. Comparative studies are often used early on in implementation with a small group of teachers or schools in a pilot test to help policymakers decide if full investment in a particular ap-

proach is warranted. It also gives you information that allows you to fine-tune the approach before full implementation. Using a comparative study allows you to say, with some confidence, that differences between groups are due to the approach or “treatment,” rather than some other consideration, such as pre-existing differences between the groups.

A comparative study can be experimental or quasi-experimental. With an experimental design, students, teachers, classes, or schools are randomly assigned to one condition or the other. Ideally, all variables are controlled or held constant, except the treatments under consideration. This set of requirements is extremely difficult to follow in real-world situations. These requirements also make experimental designs very expensive to implement.

An alternative is a quasi-experimental design, where a comparison is made but one requirement or another is not followed. This makes it much more difficult to attribute differences between the groups to the treatments, rather than to some other uncontrolled condition. For example, if students are not randomly assigned, it could be said that one group scored higher than the other because the students in that group were more knowledgeable or capable to begin with and it had nothing to do with the treatment. Special care is taken with quasi-experimental designs to eliminate these alternative explanations. For example, you may want to measure student learning after their participation in the treatments as well as before. If you compare some measure of student knowledge or capability before the study begins and you find that the groups score the same, then you can be more confident that any differences at the end of the study are not due to pre-existing capabilities or knowledge of the students. Another possibility could be that students or teachers signed up for the new treatment or program, and one could claim that it was their motivation to try something new that accounted for any differences. Consequently, the study should not allow for volunteers, or if it does, the participating teachers or schools should be picked randomly from among the volunteers, with others used as the comparison group, perhaps allowing them to start their participation in a subsequent year.

In any case, it is important to consider a treatment or approach as a whole. That is, treatments in the real world (as opposed to the experimental laboratory) are often complex combinations of interventions—for example the use of computers AND new pedagogy AND teacher training. One cannot make the claim, even with experimental studies, that it was the computer that made the difference; rather, it was the whole package of changes.

Comparative studies usually rely on direct measures of outcomes, such as assessments of student learning. As such, the data are relatively easy to collect, analyze, and report. When comparative studies gather group-disaggregated data, such as gender, they can tell you whether there are differences in learning levels between males and females, for example, thus providing another important level of comparative analysis.

Official Data

In addition to these three evaluation approaches, another source of information of use to evaluators is official information that ministries often collect. This may include enrollment figures, student attendance, teacher participation in workshops, curriculum standards, and student assessment scores.

Because this data collection is across the entire system, the conclusions drawn are for the entire population. However, when official data allow for disaggregation, such as by gender and minority status, they can provide an important source of information related to differential effects in education program participation and retention, education outcomes, and access and use of technologies, employment related to technology, etc.

From the evaluator's perspective, these data are inexpensive to collect and easy to analyze. As more and more instruction goes online, the data becomes more fine-grained. Data may include the number of hours students spent interacting with online units, the number of discussion postings made, and scores on quizzes. Given the sheer amount of information that is collected online, it is sometimes more difficult to analyze it in a meaningful way.

Choosing the Design

The uses, advantages, and disadvantages of the three types of designs can be summarized as follows:

	Uses	Advantages	Disadvantages
Survey	Determine the extent to which an approach is being implemented and determine self-reported outcomes	<ul style="list-style-type: none"> Relatively inexpensive Relatively easy to administer Data are easy to analyze Can infer results to entire population 	<ul style="list-style-type: none"> Subject to self-report biases and inaccuracies
Case Study	Determine the ways in which a program is being implemented; identify best practices and needed changes	<ul style="list-style-type: none"> Data are rich and full of examples. Very useful for training and sharing of best practices Allows you to examine in detail how program is being implemented 	<ul style="list-style-type: none"> Expensive Time consuming Cannot infer findings to larger group
Comparative Study	Determine the outcome or impact of two or more approaches or treatments	<ul style="list-style-type: none"> Allows you to compare the relative effectiveness among several options Allows you to test out the effectiveness of an approach before making a full investment Allows you to determine causality Data are easy to analyze You can infer findings to the entire population 	<ul style="list-style-type: none"> Expensive Very difficult to implement
Official Data	Track participation and outcomes	<ul style="list-style-type: none"> Allows you to track participation, progress, and outcomes Findings and conclusions relate to entire population Automatically collected within the system Inexpensive to collect Because it is quantitative, data are usually easy to analyze 	<ul style="list-style-type: none"> Amount of data, especially electronically collected data, is sometimes difficult to analyze

Jordan Case Study

Review the Jordan case study in the Appendix. You will notice that for each strategy and action, measurable goals and indicators were specified. One or more methods for collecting and analyzing were also specified, and there were three monitoring and evaluation methods used. One involved monitoring achievable goals using MoE records, including analysis of data automatically generated by the Educational Management Information System (EMSS). Surveys of teachers and assessments of students were also recommended. However, since all schools will ultimately implement the plan, no alternative approach or treatment was considered. So this was not an experimental study but a quasi-experimental study. The assessments are comparative in the sense that performance in schools that are implementing the plan earlier will be compared with those schools that will be implementing it later, or students in regular schools will be compared to students in Lead Schools.

The Jordanian plan followed a relatively low-cost evaluation and monitoring strategy. Each strategy was evaluated, but inexpensive methods were used: data routinely collected for MOE records, data collected automatically by the electronic management support system, and surveys. The more expensive assessment measures were used sparingly and for a very specific purpose. The very expensive case study methodology was not used. It was recommended, instead, that surveys be used to examine and monitor process.

ACTION STEP: Input your table of strategies, actions, and measurable goals from the Develop a Master Plan phase.

Developing Your Evaluation and Monitoring Plan

Following the Jordanian example, take your ICT strategies, actions, and measurable goals designed in the Develop a Master Plan phase, and for each strategy and action, fill in the following form with the methods you would use to measure them.

Strategy and Action	Measurable Goals for Year 5	Method
Strategy 1: Action 1		
Strategy 1: Action 2		
Strategy 2: Action 1		
Etc.		

Resource: Jordan Case Study

As part of the ICT Plan and Strategy that was submitted to the Ministry of Education in Jordan,³⁶ the consultants recommended a series of monitoring and evaluation actions.

Monitoring and Evaluation Plan**Method**

There were two purposes for the monitoring and evaluation plan: 1) monitor the implementation of the strategies, and 2) evaluate their impact. There were three methods by which these two purposes could be achieved: 1) monitor milestone events using MOE data, including data embedded in the EMSS (Education Management Support System); 2) conduct surveys of teachers' pedagogical practices and ICT use; and 3) assess student outcomes.

In the first case, specified progress and accomplishments would be compared to a schedule of specified milestone events. The data would be drawn from official MoE records related to teacher participation, computers deployed, etc. Also included here are reports generated from the EMSS, with data automatically collected at no additional monitoring and evaluation cost. In the second case, a

random or representative sample of principals, teachers, and perhaps students would be surveyed annually to determine progress. These surveys would ask for the teachers' self-reports (with principal and even student cross-validation) of classroom pedagogical practices. These measures should be taken annually to chart progress towards goals. And in the third case, all students in certain grades, or a sample of them, would be annually assessed using the ICT-based NAFKE (National Assessment for the Knowledge Economy) to measure outcomes on student achievement. This is the instrument recommended in Strategy 4 of the proposed ICT in Education Policy. Once developed, this instrument would be administered annually as well. It should be administered in coordination with the teacher survey; that is, if a sample of students is drawn for the assessment (instead of an assessment of the entire population of students) those students' teachers should be included in the survey. This would allow for correlation between pedagogical practices, as reported by teachers, and student outcomes, as measured by the assessment.

The table below summarizes the measurable goals, the method, and key indicators for each of the strategies and actions

Strategy and Action	Measurable Goals	Method	Instrument and/or Key Indicators
Strategy 1 Action 1: Train all teachers and principals in blended learning pedagogy	1. Materials developed 2. Teachers trained in blended learning pedagogy	1. MOE records 2. MOE records	1. Number of training units developed or purchased according to records 2. Percent of teachers trained according to records
Strategy 1 Action 2: Embed blended learning materials and assessments throughout the curriculum	1. Materials developed 2. Teachers using blended pedagogy materials regularly in classes	1. MOE records 2. Survey	1. Number of digital materials developed or purchased; number of curricular standards addressed 2. Teacher survey shows teachers self-report use of blended pedagogy
Strategy 1 Action 3: Provide each teacher with a computer and high-speed Internet access	1. Technology deployed 2. Teachers using computers regularly to support blended pedagogy	1. MOE records 2. Survey	1. Percent of teachers with computers, number of computers in labs, number of computers in regular classrooms, percent of classrooms with computers 2. Teacher survey shows teachers self-report regular use of computers
Strategy 2 Action 1: Conduct an information needs assessment	1. Principals and teachers participate in needs assessment 2. Changes in EMSS made	1. MOE records 2. MOE records	1. Needs assessment completed and information needs identified 2. Changes made
Strategy 2 Action 2: Train all principals and teachers in the use of EMSS	1. MoE staff, principals, and teachers trained on data-based decision making 2. MoE staff, principals and teachers using EMIS regularly for decisions	1. MOE records 2. Survey	1. Percent of principals and teacher trained 2. Principal and teacher self-report that they use EMSS to make decision and find it useful
Strategy 2 Action 3: Assure that all principals and teachers have easy access to EMSS	1. Principals have a networked computer at their desk 2. (See Strategy 1, Action 3)	1. MOE records 2. (See Strategy 1, Action 3)	1. Percent of principals with networked computers 2. (See Strategy 1, Action 3)

Table: Summary of MoE Approach for Jordan

Continued on next page.

Strategy and Action	Measurable Goals	Method	Instrument and/or Key Indicators
Strategy 2 Action 4: Require all schools to submit school-based ICT plans	1. ICT plan from each school	1. MOE records	1. Percent of schools that submitted an ICT plan
Strategy 3 Action 1: Set up Lead Schools program	1. Procedures developed 2. Schools apply to program 3. Schools selected	1. MOE records 2. MOE records 3. MOE records	1. Procedures developed 2. Number of schools applying for program and quality of applications 3. Number of schools selected
Strategy 3 Action 2: Begin developing project-based training and materials	1. Project-based materials developed 2. Principals and teachers trained in project-based pedagogy	1. MOE records 2. MOE records	1. Number of materials developed 2. Percent of Lead School principals and teachers trained
Strategy 3 Action 3: Provide additional resources to Lead Schools and hold them accountable	1. Proposals submitted 2. Additional resources provided 3. Teachers engaged in innovation 4. Other schools adopt Lead School Innovations	1. MOE records 2. MOE records 3. Survey 4. MOE records	1. Number of proposals submitted 2. Resources deployed 3. Percent of teacher self-report that they are engaged in project-based innovative projects 4. Number of innovations adopted by partner schools, according to school-provided evidence
Strategy 4 Action 1: Develop and field test ICT-based assessments of knowledge economy skills	1. Assessment tasks developed 2. Students demonstrate mastery of knowledge economy skills	1. MOE records 2. Assessment scores	1. Assessment completed and field tested 2. Percent of students showing competence on ICT-based measures of knowledge economy skills

Table: Summary of MoE Approach for Jordan

Goal

The goal of this step is to help you identify the metrics and performance levels that can be taken as evidence that your goals have been reached or sufficient progress is being made, and to identify areas where improvements can be made.

Resources

In addition to the exercise here, you have access to the Jordan case study and the additional resources listed in the Appendix. You will also need the evaluation plan that you developed in the last exercise.

Output

As a result of this step, you will have a list of specific performance levels for each of your strategies and actions that you define as constituting success or successful progress at various points of time.

From Evaluation Plans to Metrics

The principal question in this step is, what evidence can you give stakeholders that your measurable goals have been met? For each strategy and action, the metrics of success are those that you think would convince your stakeholders that you have accomplished your goals. In the area of school policy, organization, and management, the metrics could be parent participation, outside volunteer or expert participation, number of student projects that incorporate outside experiences, student learning interactions, collaborations outside class time, etc.

In the area of professional development, the metrics could be the number and gender of teachers trained, teacher skill level, number, and quality of teacher-generated materials, and the number of teachers collaborating on projects. For teaching and learning, the metrics could be teacher classroom behaviors changed; the number and gender of students engaged, as measured by lower absence; student projects produced; student scores increased, etc.

In the area of curriculum and assessment change, the metrics could be curricular frameworks developed, standards specified, materials developed, new student skills acquired, rubrics developed, new assessment tasks designed, students assessed, etc.

In the deployment of technology and its integration in support of these changes, the metrics could be an increase in the number of computers and other technology deployed, decreased student-per computer or teacher-per computer ratios, an increase in the number of networked computers, an increase in the availability of digital materials, etc.

ACTION STEP: Input your table of strategies, actions, and goals from the Develop a Master Plan phase.

Now take the strategies and actions specified in the Develop a Master Plan phase and the measurable goals, and specify the performance level that would be acceptable for each year.

Component	Desired Changes at End of 5 Years	Measurable Goals				
		Year 5	Year 4	Year 3	Year 2	Year 1
Strategy 1: Action 1						
Strategy 1: Action 2						
Strategy 1: Action 3						
Strategy 2: Action 1						
Strategy 2: Action 2						
Etc.						

Resource: Jordan Case Study

As part of the ICT Plan and Strategy that was submitted to the Ministry of Education in Jordan,³⁷ the consultants worked with ministry officials to select metrics and specify the levels of success for each. The consultants determined what would constitute success by the end of the five-year effort and worked backward to specify acceptable levels of progress at the end of each year.

Instrument and/or Key Indicators	Year 5	Year 4	Year 3	Year 2	Year 1
<ol style="list-style-type: none"> Number of training units developed or purchased according to records Percent of teachers trained according to records 	<ol style="list-style-type: none"> 100% of teachers and principals have been trained in blended-learning pedagogy 	<ol style="list-style-type: none"> 75% of teachers and principals have been trained in blended-learning pedagogy 	<ol style="list-style-type: none"> 50% of teachers and principals have been trained in blended-learning pedagogy 	<ol style="list-style-type: none"> 25% of teachers have been trained in blended-learning pedagogy 	<ol style="list-style-type: none"> UNESCO ICT teacher standards adopted and materials developed
<ol style="list-style-type: none"> Number of digital materials developed or purchased; number of curricular standards addressed Teacher survey shows teachers' self-report use of blended pedagogy 	<ol style="list-style-type: none"> MoE has identified or developed digital content for 100% of the curriculum; 70% of the teachers have created digital content 90% use blended learning in one lesson per week, 70% in two or more 	<ol style="list-style-type: none"> MoE has identified or developed content that implements blended learning in 80% of the curriculum 75% use blended pedagogy in 1 lesson per week, 50% in 2 or more lessons 	<ol style="list-style-type: none"> MOE has identified or developed content that implements blended learning in 60% of the curriculum 50% use blended pedagogy in 1 lesson per week, 25% in 2 or more lessons 	<ol style="list-style-type: none"> MOE has identified or developed content that implements blended learning in 40% of the curriculum 25% use blended pedagogy in 1 lesson per week 	<ol style="list-style-type: none"> MOE has developed standards for blended learning curriculum materials and begins identifying or developing content
<ol style="list-style-type: none"> Percent of teachers with computers, number of computers in labs, number of computers in regular classrooms, percent of classrooms with computers Teacher survey shows teachers' self-report regular use of computers 	<ol style="list-style-type: none"> 70% of classrooms have at least one networked computer; 80% of schools have two or more computer labs; 100% of schools have high-speed connections 90% use blended learning in one lesson per week, 70% in two or more 	<ol style="list-style-type: none"> 50% of classrooms have at least one networked computer; 60% of schools have two or more computer labs; 70% of schools have high-speed connections 75% use blended learning in one lesson per week, 50% in two or more 	<ol style="list-style-type: none"> 30% of classrooms have at least one networked computer; 40% of schools have two or more computer labs; 75% of schools have high-speed connections 50% use blended learning in one lesson per week, 25% in two or more 	<ol style="list-style-type: none"> 100% of teachers have immediate access to a networked computer; 10% of classrooms have at least one networked computer; 20% of schools have two or more computer labs; 40% of schools have high-speed connections 25% use blended learning in one lesson per week 	<ol style="list-style-type: none"> All current computers in schools are checked and any non-operating or outdated computers are replaced; 25% of teachers have immediate access to a computer
<ol style="list-style-type: none"> Needs assessment completed and information needs identified Changes made 	(Success metric not specified)				
<ol style="list-style-type: none"> Percent of principals and teacher trained Principals self-report whether they use EMSS to make decisions and find it useful 	<ol style="list-style-type: none"> 100% of principals and teachers trained 100% of principals use EMSS to support school-based planning 	<ol style="list-style-type: none"> 75% of principals and teachers trained 75% of principals use EMSS to support school-based planning 	<ol style="list-style-type: none"> 50% of principals and teachers trained 50% of principals use EMSS to support school-based planning 	<ol style="list-style-type: none"> Integrated EMSS in place 	

Continued on next page.

Instrument and/or Key Indicators	Year 5	Year 4	Year 3	Year 2	Year 1
1. Percent of principals with networked computers 2. (See Strategy 1, Action 3)					1. 100% of principals have access to a computer
1. Percent of schools that submitted an ICT plan				1. 100% of schools submit an ICT plan	
1. Procedures developed 2. Number of schools applying for program and quality of applications 3. Number of schools selected	1. Competition held 2. At least 200 schools apply 3. Another 100 schools chosen	1. Competition held 2. At least 200 schools apply 3. Another 100 schools chosen	1. Competition held 2. At least 200 schools apply 3. 100 schools chosen	1. Procedures developed	
1. Number of materials developed 2. Percent of Lead School principals and teachers trained	1. MoE has identified or developed content that implements project-based-pedagogy for 20% of the curriculum	1. MoE develops standards for project-based curriculum materials			
1. Number of proposals submitted 2. Resources deployed 3. Percent of teachers self-reporting that they are engaged in project-based innovative projects 4. Number of innovations adopted by partner schools, according to school-provided evidence	1. (Not specified) 2. (Not specified) 3. 80% of Lead School teachers use project-based pedagogy in one lesson per week; 50% two or more lessons	3. 50% of Lead School teachers use project-based pedagogy in one lesson per week; 50% in two or more lessons			
1. Assessment completed and field tested 2. Percent of students showing competence on ICT-based measures of knowledge economy skills	1. ICT-based assessment administered 2. 35% of students taking the assessment demonstrate mastery of knowledge economy skills; 60% of students in Lead Schools	1. ICT-based assessment developed and fielded tested	1. Standard specified for knowledge economy skills assessment		

Goal

Continuous monitoring and periodic evaluation will provide managers with the information needed to make improvements in the current plan and inform subsequent plans. The goal of this step is to plan a data collection schedule that will allow you to monitor results and make changes, if necessary.

Resources

In addition to this step, you should have developed your evaluation plan earlier in this phase.

Output

At the end of this step, you will have a schedule for collecting data that will allow you to review progress and make changes to keep you moving toward your goals and vision.

Planning for Change

In the case of Jordan, it was recommended that the Steering Committee for the ICT plan review progress monthly in the first year and quarterly in subsequent years. Since the Steering Committee is to comprise leaders from all the affected directorates as well as outside, non-voting members, it would be in a position not only to monitor progress but also to identify and implement needed changes early in the process.

In the case of Singapore, the MoE schedules periodic reviews throughout its master plans. They collect information annually and report the results. Midway through the five-year plan, they had an international review panel examine the evaluation reports and recommend changes in the plan. In the final year of a five-year plan, a summative review involves an international review panel that is charged with examining the findings across the years of the project. Based on these reviews, the international review panel makes recommendations for the next master plan.

As you finalize your plan, list a schedule of periodic reviews:

List the areas that you anticipate may need to be changed or tuned during the first years of the project:

ACTION STEP: Input your revised draft ICT Plan from above.

Revise ICT Plan

Now finish your draft ICT Plan by including your evaluation plan:

Vision for the Future of Education**Current Situation****Desired Changes****Long-Term Roadmap****Five-Year Plan****Role of ICT****ICT Strategies and Actions****Measurable Goals****Necessary Resources and Budget****Evaluation Plan and Schedule****Gather Feedback**

Share the final draft with a wider audience of stakeholders for their feedback. Based on the feedback you receive from stakeholders, generate a revised final vision. Post the revised final version of the ICT master plan to a wide audience, as the result of your work.

Resources: Additional

African Development Bank Group. (2009). Checklist For Gender Mainstreaming In The Education Sector With A Special Focus On Higher Education, Science And Technology Sub Sector. African Development Bank Group. www.afdb.org/fileadmin/uploads/afdb/Documents/Policy-Documents/Gender%20education%20checklist%20-sunita-12-01-09.pdf

Department for International Development (2005). Monitoring and evaluating information and communication for development (ICD) programmes. London: Department for International Development. www.idrc.org.sg/uploads/user-S/11592105581icd-guidelines.pdf

UNESCO (2003). Developing and using indicators of ICT use in education. Bangkok, Thailand: UNESCO. www.unescobkk.org/fileadmin/user_upload/ict/e-books/ICTedu/ictedu.pdf

UNESCO Institute for Statistics (2009). Guide to measuring information and communication technologies (ICT) in education. Montreal, Canada: UNESCO Institute for Statistics. www.uis.unesco.org/template/pdf/cscl/ICT/ICT_Guide_EN.pdf

Wagner, D., Day, B., James, T., Kozma, R., Miller, J. & Unwin, T. (2005). Monitoring and evaluation of ICT in education projects. Washington, D.C.: infoDev, World Bank. www.infodev.org/en/Document.9.pdf

1. Jones, R. (2003). Local and national ICT policies. In R. Kozma (Ed), Technology, innovation, and educational change: A global perspective (pp. 43-80). Eugene, OR: International Society for Technology in Education.
2. Kozma, R. & McGhee, R. (2003). ICT and innovative classroom practices. In R. Kozma (Ed), Technology, innovation, and educational change: A global perspective (pp. 43-80). Eugene, OR: International Society for Technology in Education.
3. For Windows: http://download.intel.com/education/transformation/Main_Win.zip
For Mac: http://download.intel.com/education/transformation/Main_Mac.zip
4. Kozma, R. (2010). Policy for educational transformation: An educational policy brief. <https://www-ssl.intel.com/content/www/us/en/education/education-transformation/policy.html?>
5. The consulting team consisted of Dr. Robert Kozma, Wayan Vota, and Reem Bsaiso, as the local expert.
6. Wong, P. (2011). ICT in education policies: Singapore. In R. Kozma (ed), ICT policies and educational transformation. Paris: UNESCO.
7. Kozma, R., Vota, W., & Bsaiso, R. (2010). ICT policy and strategy, operational [plan, monitoring and evaluation plan: 2011-2015 and moving towards 2025. Amman, Jordan: Ministry of Education.
8. Kozma, R. (2011). A framework for ICT policies to transform education. In R. Kozma (ed), ICT policies and educational transformation. Paris: UNESCO.
9. Gender Equity Taskforce for the Ministerial Council on Education, Employment, Training and Youth Affairs. (1997). Gender Equity: a Framework for Australian Schools. Canberra, A.C.T.: Publications and Public Communication for Dept. of Education and Training and Children's, Youth and Family Bureau.
10. Government of People's Republic of Bangladesh. (2013). Policies and Guidelines of Ministry of Education. Accessed from the Internet on July 4, 2013, www.moedu.gov.bd/old/edu_system_edu_policy.htm
11. Kozma, R., Vota, W., & Bsaiso, R. (2010). ICT policy and strategy, operational [plan, monitoring and evaluation plan: 2011-2015 and moving towards 2025. Amman, Jordan: Ministry of Education.
12. Kozma, R. (2011). A framework for ICT policies to transform education. In R. Kozma (ed), ICT policies and educational transformation. Paris: UNESCO.
13. This description was produced as part of a Policy Note prepared at the request of the Chilean Ministry of Finance as part of its partnership program with the World Bank. It was prepared by a team consisting of Barbara Bruns, Michael Trucano, Robert Hawkins, Juan Enrique Hinostroza (consultant), and Carla Cutolo. The team is grateful to Cristian Aedo, Felipe Barrera, and Eugenio Severin for helpful peer review comments, and to Daniela Sugg of Dirección de Presupuestos for guidance and feedback at every stage of the preparation process.
14. The competencies considered in this action line range from the basic use of computers (Internet, productivity tools) to the use of ICT for educational management (lesson planning, students marks, etc.) and teaching (use of educational software, simulations, etc.).
15. See www.redenlaces.cl/sie/index.php?id=285&no_cache=1
16. This process started in 2009, so to date there is little public information regarding the number of schools that already have a plan.
17. Currently Enlaces is largely financing the maintenance and support of the ICT equipment; however, the aim of Enlaces is to transfer this to the school owner.
18. The Ministry of Education finances these services.
19. It is important to mention that due to a Chilean government decision in late 2007, during 2008 and 2009), Enlaces doubled the number of computers acquired during the previous 15 years of implementation.
20. The students selected are the ones with the best marks in each grade and school.
21. The teachers selected are the ones with the best results in the teacher evaluation program (see: www.docentemas.cl).
22. The detailed definition of this is still being developed.
23. www.cpeip.cl
24. Teachers apply for the courses (voluntary), and for the courses offered by the CPEIP they have to pay approximately US \$20. The courses offered by Enlaces' technical and pedagogical support network are free (financed by Enlaces).
25. It needs to be considered that the Ministry of Education is engaged in the process of defining standards for students' learning; therefore, Enlaces followed this trend, defining corresponding ICT standards.
26. See www.iea.org
27. See www.unescobkk.org
28. See <http://sitesm2.org>
29. Only one study showed a significant impact on students' learning results due to the presence of Enlaces, and this was conducted at an early stage of the project. The method involved a quasi-experimental design with chronological series using successive pre- and post-tests. The sample consisted of 52 primary schools (10,500 students) and 49 secondary schools (5,600 students).
30. See <http://www.sites2006.net>
31. Hinostroza, J. E., Jara, I., & Brun, M. (2011). Case study: Uruguay. In R. Kozma (ed), ICT policies and educational transformation. Paris: UNESCO.
32. Kozma, R., Vota, W., & Bsaiso, R. (2010). ICT policy and strategy, operational plan, monitoring and evaluation plan: 2011-2015 and moving towards 2025. Amman, Jordan: Ministry of Education.
33. QRC: Queen Rania Center (responsible for educational technology)
DoP: Directorate of Planning (responsible for school organization)
DoT: Directorate of Training, Qualifications, and Supervision
DoIT: Directorate of Information Technology (responsible for equipment and networking)
DoCT: Directorate of Curriculum and Textbooks
DoTE: Directorate of Tests and Examinations
JEI: Jordan Education Initiative (an extra-Ministerial educational technology project)
NCHRD: National Center for Human Resources Development (responsible for evaluation)
34. Wagner, D. (2005). Overview (p. 5-10). In D. Wagner, B. Day, T. James, R. Kozma, J. Miller, & T. Unwin (Eds.), Monitoring and evaluation of ICT in education projects. Washington, DC: infoDev, World Bank.
35. James, T., & Miller, J. (2005). Developing a monitoring and evaluation plan (p. 57-76). In D. Wagner, B. Day, T. James, R. Kozma, J. Miller, & T. Unwin (Eds.), Monitoring and evaluation of ICT in education projects. Washington, DC: infoDev, World Bank.
36. Kozma, R., Vota, W., & Bsaiso, R. (2010). ICT policy and strategy, operational plan, monitoring and evaluation plan: 2011-2015 and moving towards 2025. Amman, Jordan: Ministry of Education.
37. Kozma, R., Vota, W., & Bsaiso, R. (2010). ICT policy and strategy, operational [plan, monitoring and evaluation plan: 2011-2015 and moving towards 2025. Amman, Jordan: Ministry of Education.