

Building and sustaining national ICT/education agencies:

Lessons from international experiences

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The *World Bank Education, Technology & Innovation: SABER-ICT Technical Paper Series* explores a variety of topics and issues related to the use of information and communication technologies (ICTs) in the education sector.

The Systems Approach for Better Education Results (SABER) initiative seeks to improve the global knowledge base related to education systems analyses, assessments, diagnoses, and opportunities for dialogue. SABER-ICT aims to improve the availability of policy-related data, information, and knowledge on what matters most in using ICTs to improve the quality of education.

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Acronyms and Abbreviations

Becta – British Educational Communications and Technology Agency

CoSN – Consortium for School Networking (CoSN)

DepEd – Department of Education (Philippines)

EAP – East Asia and the Pacific

EdNA – Education Network Australia

EMIS – Education Management Information System

FIT-ED – Foundation for Information Technology Education and Development (Philippines)

GENIE – Global Exchange of Networks in Education

ICT – Information and Communication Technology

KERIS – Korean Education Research and Information Service

JEI – Jordan Education Initiative

KEDI – Korean Educational Development Institute

KIE – Kenya Institute of Education

LATU – National Technological Laboratory of Uruguay (Spanish acronym)

MICDL – Maine International Center for Digital Learning

MLTI – Maine Learning Technology Initiative

MoE – Ministry of Education

MoIT – Ministry of Information Technology

NaCET – National Center for Education Technology (Armenia)

NCET – National Center for Educational Technology (China)

NECTEC – National Electronics and Computer Technology Center (Thailand)

NGO – Non-Governmental Organization

ODF – Omar Dengo Foundation (Costa Rica)

UNESCO – United Nations Educational, Scientific and Cultural Organization



Executive summary

National ICT/education agencies (and their functional equivalents) play important roles in the implementation and oversight of large scale initiatives related to the use of information and communication technologies in education in many countries. That said, little is known at a global level about the way these organizations operate, how they are structured, and how they typically evolve over time.

Through an examination of lessons from the development and history of a set of representative ICT/education agencies in East Asia, and, to better understand East Asian experiences, other countries around the world, this paper seeks to identify common challenges and issues and potential relevance to leaders of such institutions. Some areas of common interest across countries relate to legal frameworks and laws; oversight; autonomy and independence; links to policy; collaboration with key stakeholders; leadership; human resources; selling services; evolution; and decentralization.

Many, if not most, national ICT/education agencies were formed explicitly to help oversee and/or implement a large project in the education sector to help build out ICT infrastructure (connectivity, computer labs, laptop deployments) in schools. Over time, the responsibilities and functions of such institutions may change. A typical 'life cycle' of such organizations can be observed, characterized by different attributes and characteristics of, and different challenges faced by, such institutions depending on which of the five stages of development they typify.

National ICT/education agencies assume one of six common models or institutional structures, based on country contexts and needs. Over time, these models can -- and do -- change.

A set of twelve key common lessons can be identified from the experiences of national ICT/education agencies:

1. Leadership is important – critically important
2. Enabling legislation can make life much easier
3. Especially in the early years, 'getting the little things right' helps to build credibility
4. Funding and financial autonomy need to be ensured
5. Managing transitions successfully is key if ICT/education agencies are to remain relevant and useful
6. Tensions between building capacity versus creating dependence should not be underestimated
7. Remaining flexible and innovative becomes increasingly challenging over time
8. To ensure their relevance, agencies should evolve to become focal points for communication, consultation and cooperation
9. Where they are most successful, ICT/education agencies are one constituent part of a larger holistic vision related to education, technology – and the intersection of the two
10. Organizational structures may change, even if core functions do not
11. Focus on supporting and meeting the needs of teachers
12. Learning from experience is a vital ingredient for success



1. Introduction

Many developing countries have embarked upon – and others are seriously considering – large-scale roll-outs of information and communications technologies (ICTs) in their education sector. Similar processes began in most OECD countries 10-20 years ago, in many middle income countries more recently. Structurally, education systems organize themselves in various ways to fund, implement and oversee these sorts of initiatives, which are typically quite expensive – and complex – and the related organizations evolve, in ways incremental and radical, over time. Despite the highly varied local contexts, in most countries, **a single institution is core to the implementation of ICT/education initiatives.**

KERIS, the Korean Education & Research Information Service, is in many ways the prototypical model for this sort of institution: a semi-independent, quasi-governmental organization under the direction of the ministry of education that assumes lead responsibilities for helping to oversee and implement key elements of a country's activities related to the large scale use of ICTs in education. A number of countries have attempted to model themselves, in whole or in part, on KERIS – sometimes in active partnership with KERIS itself and/or with the help of KERIS staff or consultants. While KERIS is a prominent – and good – example of this sort of institution, it is certainly not the only one.

For the past six years, the World Bank and the Korean Ministry of Education, Science and Technology (MEST) have supported an annual global symposium on ICT use in education in Seoul to help policymakers learn more about the KERIS model and experience and to connect them with specific related expertise in Korea, in the hope that such connections might be of value to planning processes in other countries. Over 500 people from over 50 countries with related interests, including policymakers with responsibility for ICT and education issues and key stakeholders from other government ministries, civil society, academia and the private sector active on related topics, have to date participated in the international sharing of lessons, questions, concerns and experiences at the global symposium. During this period of time, many key figures from national ICT/education agencies have participated in the annual symposium, sharing information about how they have organized themselves to help implement and sustain large scale investments in technology use in education.

The November 2010 global symposium (“Building and Sustaining National ICT/Education Agencies”) was specifically focused on helping to share such experiences and to make connections between key actors within such organizations around the world, with a decided focus on experiences and questions relevant to middle and low income countries in East Asia and the Pacific. At this event, *policymakers from across Asia specifically asked for further documentation on key issues of relevance to the creation, oversight, evolution and activities of such organizations.* At that event, it was apparent that, while many countries had made, or were considering, a number of decisions related to how to organize and provide structure for their efforts related to large ICT/education initiatives, they had been doing so largely in isolation, not informed by or connected to similar experiences and lessons in other countries. In part, this was because little related publicly available documentation was thought to exist for a global audience (beyond, perhaps, PowerPoint slides occasionally made available on institutional and conference web sites) about how national ICT/education agencies were formed, how they were organized, and what functions they performed. Given the fast pace of activity in this regard -- most such institutions were formed since the mid-1990s – and the speed at which related decisions often had to be made (which made the typically laborious and time-consuming process of international outreach difficult), this lack of documentation is perhaps not surprising. Information circulated largely informally, incompletely, and sporadically, often as the result of chance meetings at international conferences, the work of

a small number of consultants and staff at international development agencies who moved from one country to another, sharing lessons from personal experiences of working with such institutions, or bilateral governmental efforts (such as those by KERIS as part of Korean overseas developmental assistance activities). Where documentation did exist, it was largely of experiences from OECD or 'developed' economies and/or not current.¹ *This short publication is a result of this request.*

Building and sustaining national ICT/education agencies: Lessons from international experiences takes a global view of the phenomenon of national ICT and education agencies. This work is informed by specific requests for related insight, information and guidance made by policymakers at the annual global symposium on ICT use in education in Korea, and as a result of lessons and experiences shared by policymakers at the event. It is also an attempt to distill some of the key lessons and findings from related advisory work (supported by the World Bank and other groups) in which the authors have been engaged over the past 15 years. It explicitly draws on a set of new case studies (to be published by the World Bank in a companion volume) profiling experiences from a set of countries which, taken together, are more or less representative of the different contexts, approaches and histories of national ICT/education agencies from different parts of the world:

- Armenia: NaCET (authors: Edmond Gaible & Anush Shahverdyan)
- Australia: EdNA (Gerry White & Lesley Parker)
- Chile: Enlaces (Eugenio Severin)
- Costa Rica: The Omar Dengo Foundation (Carla Jimenez)
- England: Becta (Gavin Dykes)
- Indonesia: PUSTEKKOM (Neil Butcher & Petra Bodrogini)
- Korea: KERIS (Youngsan Kwon & Sanghyun Jang)
- Malaysia: Smart Schools (Molly N.N. Lee & Soon Seng Thah)
- Philippines (Benjamin Vergel De Dios)
- Thailand: NECTEC/Schoolnet Thailand (Saowaraj Rattanakhafu)
- Uruguay: Plan Ceibal (Eugenio Severin)

Through an examination of some of the common backgrounds and contexts that inform the creation of such institutions and the environment in which they often operate, this report attempts to identify some of the common functions performed by such institutions, and the common organizational models that such institutions typically assume. It examines issues related to the governance of such institutions, and identifies some common stages of development that many such institutions exhibit over time. A number of general observations about such institutions are discussed, as well as related key lessons that have emerged over the past two decades about what has worked, and what hasn't.

The specific country experiences considered are the result of specific requests from policymakers in East Asia who wished to learn more about experiences in these countries, and represent experience both from with East Asia itself, as well as global experience considered to be of relevance to policymakers in the region. The observations, analyses and conclusions contained in this paper were first shared at the 2002 Global Symposium on ICT Use in Education in Seoul. This report represents both the culmination of an effort of engagement with policymakers across East Asia and the Pacific on these topics, and benefits from feedback and insights gained as a result of this engagement. Any errors of fact are those of the authors.

¹ *The informal knowledge exchange of the Global Exchange of Networks in Education, or GENIE, in the first decade of the 21st century was one notable and important effort to share information of this sort among like-minded groups and their leaders in developed countries. The useful set of 'Schoolnet Toolkits' sponsored by UNESCO Bangkok (in Asia) and the Commonwealth of Learning and IDRC (in Africa) date from roughly the same period of time.*

The views and opinions expressed here are those of the authors as well and do not necessarily reflect the opinions of the World Bank, the government of Korea, or any affiliated institutions.

It is hoped that this paper may help to catalyze interest in documenting and exploring the experiences of such national ICT/education agencies, which play increasingly key roles in activities that are growing in strategic importance -- and cost -- in many countries, but which have to date only been the subject of minimal critical and academic interest.

This paper is part of a larger initiative sponsored by the World Bank: Systems Assessment for Better Education Results – The Use of ICT (more commonly referred to as 'SABER-ICT'). Through SABER-ICT², the World Bank is supporting activities to help policymakers make informed decisions about how best to use information and communication technologies (ICTs) in pursuit of core developmental objectives in the education sector. Notably, it is:

- developing a framework to assist policymakers as they attempt to assess and benchmark their own *policies on ICT use in education* against those of comparator countries around the world, identifying key themes and characteristics and building a global database of policy documents on ICT use to serve as a foundation for the framework;

and, as part of a larger international consortium,

- supporting the collection of *key data related to the use of ICTs in education*, as part of a larger international, multi-stakeholder initiative to improve the availability and quality of ICT data and indicators, particularly in the education sector in developing countries.

SABER-ICT's policy-related work focuses on intentions (as expressed through related government policies), while activities supported under SABER-ICT related to data collection are meant to help provide insight into and what has actually happened 'on-the-ground'. By highlighting practices and approaches at a key level of implementation and oversight, Building and sustaining national ICT/education agencies seeks to document and analyze key lessons from a wide set of experiences, in East Asia and around the world. By doing so, it is meant to serve as a sort of bridge between the high level policy analysis and efforts to collect school level data under SABER-ICT.

² For more the most recent information on SABER-ICT, please see the related web site, <http://go.worldbank.org/BKW0E2VTX0>.



2. Background and Context

Why should we care about national ICT/education agencies?

Given their critical, integral, and in many ways outsized importance in the implementation of national policies and initiatives related to the use of ICTs in education in many countries, especially at large scale, there has been surprisingly little international attention paid to how national ICT/education agencies are organized, what they do, how they have changed over time, and what lessons have emerged from such experiences. ICT-related investments in the education sector around the world are becoming increasingly large, strategic and complex, and yet little is thought to be known at a global level about how such investments are implemented and managed, especially where related responsibilities are shouldered by a single institution established for this purpose.

In reality, *a lot* actually *is known* about these topics, but this knowledge has largely remained *within the country in which such an institution exists*, known primarily only to policymakers, practitioners and partner organizations there. Related lessons and institutional practices have, for the most part, not been documented, disseminated and made accessible to key decision makers responsible for the management and oversight of such institutions in other places – especially in middle and low income countries in the early stages of planning for, or evolving, their own national ICT/education agencies. This knowledge gap can greatly complicate efforts to inform key decisions and planning about the nature and role of such institutions going forward. Given the amounts of money being invested in educational technology products, services and activities around the world today, and the strategic importance that ICTs are assuming in the official education policies and practices in many countries, this knowledge gap could have very practical – and expensive! – consequences.

Whether it is in (1) low or middle income countries that are currently considering or embarking on large scale ICT/education initiatives and considering how to organize themselves to translate the often lofty rhetoric of related policy documents into implementable action 'on the ground'; or (2) countries that are transitioning away from a hardware-centric, approach to ICT-related investments in the education sector focused primarily on infrastructure to more varied and holistic considerations of how the use of various information and communication technologies can make the achievement of a variety of education sector goals more likely; the 'success' or 'failure' of national ICT/education agencies is often critical to the success of such efforts.

A caveat: This paper is deliberately **not** concerned with issues related to whether technology should be used in the education sector, how it should be used, and/or what the impact of such use might or might not be. These larger, and more fundamental, sorts of questions are beyond the scope of this particular study. (Those looking for discussions of those topics can benefit from a rich related literature available from the World Bank and other sources.³) Instead, this publication attempts, in a modest way, to begin to help fill in a small but critical gap in our collective knowledgebase about how countries organize themselves, deliberately or organically, in response to however it is that they seek to answer such questions. (A cynic might re-phrase this last sentence to read, "about how countries organize themselves to do

³ For a list of World Bank publications on the topic, please visit the World Bank's web site devoted to ICT/education issues, www.worldbank.org/education/ict.

things instead of attempting to answer such questions" – but that is perhaps the topic for another paper.) However one feels about large investments in ICTs in the education sector, there is no denying that they are occurring with increasing frequency and at increasingly large scale, in rich and poor countries alike, in East Asia and beyond. A national ICT/education agency often plays a critical role in this process. Generally speaking, this study on national ICT/education agencies seeks to provide some insights that may help answer two lead questions:

1. What do we know about the form, functions and characteristics of such organizations?
2. What are some key considerations and lessons related to their establishment, operation, and oversight?

It is hoped that, by attempting to document and highlight various ways some such institutions have acted, been organized, and evolved over time, policymakers may gain some insight into useful, practical approaches to implement their country's vision for the use of ICTs in education.

What exactly is a national ICT/education agency?

Despite often highly varied local contexts, in most countries a *single institution is core to the implementation of ICT/education initiatives*. For the purposes of this study, this institution is labeled a 'national ICT/education agency' as a matter of convenience. It is acknowledged that such a designation in some cases may not be technically accurate: In most cases this institution is not actually an 'agency' (and even where it is, it may not include the word 'agency' in its official title). In some cases, the institution is not national, but rather regional (or even municipal) in focus or activity and in others, a combination of two or three institutions may effectively, and collectively, perform the function(s) of an 'agency' of this sort. 'National ICT/education agency' is therefore deployed here as convenient shorthand to designate groups or institutions around the world that perform similar functions, but which may take many different legal and organizational forms in practice.



3. Key Themes

Around the world, the use of the ICTs is often seen to play an increasingly important and strategic role in the way that education services are delivered, and to be more integral to daily teaching and learning processes and activities. Structurally, education systems organize themselves in various ways to fund, implement and oversee ICT/education initiatives, which are typically quite expensive – and complex. Despite highly varied local contexts, in most countries, a single institution is core to the implementation of ICT/education initiatives. Experiences from around the world reveal that such institutions typically evolve, in ways incremental and radical, over time according to a common ‘life cycle’.

What do we know about how such ‘national ICT/education agencies’ function, and what insights and lessons might exist for governments creating such institutions for the first time, supporting these sorts of agencies over time, and/or restructuring such organizations to meet future challenges?

Some key questions and themes related to the development of ICT/education agencies (and their functional equivalents, within the public, private and non-governmental sectors) are worth considering:

- How should an education system structure itself to meet new challenges and realize new opportunities that arise through the increased availability and utilization of ICTs, and what related roles and responsibilities could/should a dedicated ICT/education agency play?
- What do the experiences of national ICT/education agencies from around the world tell us?
- How have such organizations evolved over time, and what implications might there be for the future?

National ICT/education institutions take *various forms*. Most prominent in the global consciousness are probably the quasi-autonomous ICT/education agencies under the general direction or guidance of the ministry of education (prominent examples include KERIS in Korea, Becta in the UK, PUSTEKKOM in Indonesia, NCET in China). In other countries, foundations or NGOs serve some similar functions, in coordination with units at the ministry of education (examples include the Omar Dengo Foundation in Costa Rica and the Pilipinas School at FIT-ED in the Philippines). In yet other places, related responsibilities are assumed almost entirely by a special department or division of the MOE (as is currently the case in Malaysia); in still others, universities (as in the early days of Chile’s Enlaces program) assume such roles.

A study of such institutional arrangements over time is complicated by the fact that formal place of such institutions can *change* within the structure of a country’s education system. Examples of this mutability can be found in Thailand, where the MOE assumed the schoolnet-related functions originally performed by NECTEC, which operated under the general direction of the MoIT ; in Chile, where the Enlaces program began as a university-centric initiative and was later folded into the MOE; in Uganda, where the staff of the independent Schoolnet Uganda were absorbed into the MOE; and in Jordan, where the Jordan Education Initiative was spun out of its home in the MoIT to become a separate NGO.

In addition to taking various forms, such institutions can assume different formal and informal *functions* and responsibilities integral and vital to the success of ICT use in education. Most commonly, such institutions oversee the roll-out and maintenance of the technical infrastructure (hardware, software, networking) upon which ICT use in schools depends. *Most national agencies of this sort are created to deal oversee the roll-out of computer hardware and connectivity within a country’s education system*; the National Center for Education Technology (NaCET) in Armenia is one notable example of a relatively new institution of this

sort. Schoolnet Thailand performed similar roles a decade earlier, as part of an initiative led by an institution under the loose direction of the national IT ministry.

In addition to fundamental initial responsibilities around technical infrastructure (including procurement of equipment, installation, tech support, development of technical specifications, and maintenance of educational networks and portals, to name just a few) many institutions *slowly assume additional responsibilities over time* – sometimes by design, often by default. These responsibilities can include delivery of (or oversight of) the *training* of technical staff; technical training for students, administrators and/or teachers; the development of education content (digital learning resources); pedagogical training for teachers; research and development, including *piloting* of new approaches and practices; the management of *community* ICT resources and outreach; educational and/or ICT strategy or *policy* development; and monitoring and evaluation. In some cases, institutions are able to adapt and change successfully over time in response to new responsibilities assigned to them (KERIS in Korea is one good example of this), while in other cases organizations are not able to survive the new mandates and responsibilities thrust upon them (see, for example, the notable case of Becta in England).

Independent or quasi-independent institutions can have *complicated relationships with government* departments, which act (variously) as their key clients, overseers and/or, in some cases, even their 'competitors'. The *staffing* of such institutions can be challenging, especially as they may be populated by a mix of employees, civil servants, seconded staff from other organizations and (especially in very technical areas) private contractors. In some instances, organizations are established independent of existing government structures expressly to be able to employ people with certain skills not typically found within government agencies – and to pay these people salaries out of sync with existing government civil service guidelines. *Leaders* of such organizations can be drawn from various specialties, possessing a variety of skill sets.

Institutions can draw on a variety of *funding and financing* mechanisms, such as dedicated or discretionary government budgets or earmarks; contracts; user fees; special revolving funds (sometimes made possible by dedicated monies from universal service provisions); philanthropic donations; revenue-sharing arrangements with private companies; and subsidies from sponsoring or partner organizations.

Managing relationships with vendors can be an important – and difficult role – for such institutions. In some cases, such institutions are deliberately set up at arm's-length from existing government units or agencies to allow for a greater flexibility in dealing with the private sector (as in the case of NaCET in Armenia or Plan Ceibal in Uruguay); in others they are expressly established as a special public-private partnership (as in the case of EdNA in Australia), or to help enable such partnerships (as in the case of Malaysia).

Set up outside (but linked to) formal government ministries, national ICT/education agencies can explicitly serve as *mechanisms for experimentation and innovation*, introducing new processes and approaches (supported by the introduction of new ICT tools) into an education system that may have trouble innovating from within. Plan Ceibal in Uruguay, which was set up under the auspices of that country's national research laboratory is a good example in this regard; the Jordan Education Initiative is another.

The enabling legislation and governing regulations for the activities of such institutions vary by country, as do models for institutional oversight. Over time, such institutions typically evolve, sometimes quite dramatically, in form, function, size and legal identity. *A common challenge for many institutions occurs when their responsibilities shift from providing mainly technical support services related to ICT infrastructure to assume additional responsibilities related to pedagogical training, content development, R&D and impact evaluation.*

Not all countries where large scale initiatives utilizing ICTs in the education sector have a dedicated single agency or institution that leads or supports such activities. The Philippines provides an interesting case how the model for organizing the prominent activities and actors implementing ICT-related initiatives in the education sector is, essentially, to have 'no model' . Examining the various functions and responsibilities common to national ICT/education agencies in the context of a country where no such institution exists can help highlight the potential utility – and limitations – of such institutions.

The organizational structures – and the staff and leadership who populate them – at the core of such institutions in the early years may be challenged to deliver, manage or plan for a broader range of such activities as the organizations grow over time. Institutions set up for other purposes (as in the case of PUSTEKKOM in Indonesia, which originally developed learning content for correspondence courses) can be reformed and restructured to help oversee an implement national ICT/education initiatives, but this process can be difficult. In addition, by slowly accreting a variety of new responsibilities over time (whether desired or not), such organizations can experience *existential challenges* when political leaders question the suitability of the institution to deliver on an expanded set of responsibilities (the public outcry in the UK in late 2009 about the role and fate of Becta – considered one of the model global agencies of this sort – is one such example of this phenomenon).



4. Origins: Why Establish a National ICT/Education Agency?

Why, and how, might a country decide to establish a single organization dedicated to the use of ICTs in education? It is worth noting up front that many countries don't do this, of course. Some simply assign tasks to a special department or division within the ministry of education (or, in some cases, the telecom regulator or ministry of communications, IT or ICT). For others, related responsibilities are diffused throughout the education system as a result of a series of strategic decisions (as in the highly decentralized circumstance of the United States) or as the result of inattention or an inability to make related decisions (as in the case of the Philippines). In some countries, there simply hasn't been a need (yet), as few substantial investments have been made related to the use of ICTs in education. That said, where dedicated agencies exist, they are typically born as a result of one or more of the following factors:

1. A big investment in educational technologies is coming

Many national agencies were formed explicitly to help oversee and/or implement a large project in the education sector to help build out ICT infrastructure (connectivity, computer labs, laptop deployments) in schools. This is perhaps the 'classic' example of why an institution of this sort is created, from Korea to Thailand, from Malaysia to Armenia to Uruguay. In some cases, many investments may have been made already, but, as such investments grow in size, scope and complexity, value is seen in having a single institution with primary responsibility for such activities to serve as a mechanism for taking stock of what has occurred and to help better coordinate activities going forward. Indonesia's PUSTEKKOM and England's Becta are examples of this.

2. A new policy has been developed -- or needs to be

It is not uncommon for the creation of an agency to be an important part of a country's ICT/education policy – especially where such a policy outlines a vision or imperative for large investments in educational technologies. As groups involved with the implementation of large scale ICT/education initiatives grow in competence and importance over time, they may come to assume a key role in helping to formulate a new policy (as was the case with EdNA in Australia).

3. Existing institutions are not well placed to assume different or new risks and/or to promote innovative practices and approaches

In many countries, ministries of education are considered to be quite conservative, bureaucratic institutions, strongly invested in the status quo. As such, they can be seen as ill-equipped to introduce new innovations within the system quickly and efficiently – and across the world, technology use in education is almost always seen as something that is by its very nature to be 'innovative'. While government ministries, and especially the ministry of education, may be seen to be (if not explicitly designed to be) risk-averse, new institutions set up to help guide the roll out of new technologies in the sector can be explicitly conceived in order to take on such risk (as was the case with Plan Ceibal in Uruguay), as can new programs within existing institutions outside government (like what occurred with the creation of Schoolnet Thailand within NECTEC). These can be especially true, or important, related to the potential use of so-called **public-private partnerships** to help enable and guide a country's ICT/education-related investments and activities (the Jordan Education Initiative has been a prominent example in this regard). Existing procurement guidelines can complicate attempts

for the government to learn from what is happening in the market, and to communicate with companies active in this area. An agency can help coordinate and direct activities of vendors and private groups at an arm's length from the formal activities of government in ways that may not be possible, or appropriate, where the government itself to attempt to perform such a coordination function – one of the many ways that KERIS is useful to the Ministry of Education, Science and Technology in Korea.

Related to this:

4. The necessary technical and business skills don't exist within existing organizations (especially within government)

In many places, a number of the technical and business skills required by an ICT/education agency are not commonly found within existing government ministries. For a variety of reasons, it is thought that attracting people with such skills to work in government may be quite difficult. At a basic level, they may command higher salaries, and disrupt existing pay scales. Issues of 'cultural fit' can also arise. In addition, there may be caps on the hiring of civil servants that prevent the hiring of additional staff, even where the salary needs of technical staff can be accommodated. NaCET in Armenia, which initially included staff from other organizations with strong technical skills and ICT-related competencies, is one of many examples in this regard; KERIS in Korea is another.

5. A desire exists to ensure continuity over time

Large scale investments in technology use in education often serve very clear political purposes. Indeed, the unveiling of shiny new computer labs in schools, or the handing over of the latest laptops to students, can serve as strategic photo opportunities for politicians wishing to demonstrate that they both care about young people and are actively investing in their future. Is there a more potent symbol of the future, and of the fact that a politician is forward-looking, than investing in computers for schools? While the parties and individual politicians in power may come and go, investments in ICTs in education are typically seen to be long-term, and so assigning key related responsibilities to a dedicated organization that is not officially part of a government ministry (although it may well be linked to one or more ministries, closely or loosely) can be one way to ensure that such investments can be made and sustained over time. When a new party comes to power, it can then call on existing expertise and experience, and not have to start over from scratch. The Omar Dengo Foundation in Costa Rica is a good example of how an institution has served for a focal point for activity related to ICT use in education during periods of governmental change and transition.

6. There is a need for a focal point of, or hub for, activity related to ICT use in education

Where a lot of activity related to ICT use in education has already been underway for some time as a result of the activities of many different groups, both inside and outside of government, a dedicated agency can serve as a mechanism to help better coordinate the activities of these groups. In such cases, the agency can assume certain important roles to convene multiple actors, to amplify the individual voices of such groups when speaking with government, and to channel messages from government to stakeholder groups more efficiently. The Smart School program in Malaysia, Plan Ceibal in Uruguay and Becta in England are prominent international examples of how an institution – or an organization within a larger institution – can play this role.

7. A country wishes to share its national experiences and expertise related to technology use in education with countries and institutions abroad

A national ICT/education agency can serve as an important mechanism to showcase what a country has accomplished. By sponsoring research and outreach activities, an agency can

be an important tool for a government to burnish its global 'brand' as an innovator in the use of technology and education, and to help guide a country's overseas development assistance in related areas. Plan Ceibal in Uruguay, for example, has served not only as the mechanism to provide free laptops to students in government schools, but has also organized workshops, conferences and study tours as a way to expose policymakers and practitioners in other countries to the innovative practices and programs that are being explored and implemented in that small South American country. The global symposium on ICT use in education, which KERIS hosts every year on behalf of the Korean Ministry of Education, Science and Technology, in partnership with the World Bank, is another notable example of how a national ICT/education agency can play this role.



5. Functions: Common Responsibilities of National ICT/Education Agencies

While national ICT/education agencies may come in various shapes and sizes, there are core sets of responsibilities and functions that they often assume. ***Indeed, it is the fact that a single institution performs many or all of these functions that has led us to label it an 'ICT/education agency' for our purposes here, even if it is not technically an 'agency'.***

The reason(s) that informed the initial creation of a national ICT/education agency often help determine both the initial *functions* (or roles) that institution serves, as well as the *form* (or organizational model) it takes. Whatever the reasons that informed the establishment of such an institution, it is perhaps worth noting that *the rationale(s) that influenced the initial creation of a national ICT/education agency typically continue to define the roles and organizational structure of such an institution quite fundamentally over time, even when circumstances change.* How such an institution evolves in response to these external changes and pressures – and indeed, whether it can in fact evolve in the face of such change – presents a critical (and in some cases, existential question) to such agencies as time passes.

An analysis of national policy documents⁴ related to the use of ICTs in education reveals a set of common thematic areas of policy guidance in most countries around the world:

- Vision and Planning
- ICT Infrastructure
- Teachers
- ICT Skills and competencies
- Digital learning resources
- Education management information systems (EMIS)
- Monitoring and evaluation, assessment, research and innovation
- Equity, inclusion and safety

Generally speaking, government ministries are typically responsible for formulating national educational technology policies, while national ICT/education agencies are charged with implementing (or coordinating the implementation of) these policies. In some circumstances, where the agency is officially part of a ministry, it may help lead related policy development. More commonly, it may serve as a convenor of related policy discussions and outreach, helping bring together diverse sets of stakeholder groups and outside expertise to help inform the development of ICT-related educational policies.

Depending on the extent of ICT use across a country's education system, and the capabilities of related institutions, other common *functions* that national ICT/education agencies typically assume include:

1. Infrastructure

The prototypical, indeed the 'classic', reason a national ICT/education agency is created, and which therefore determines its fundamental role or function in its first years of operation, is to help implement a large scale roll-out of ICT-related hardware (computers, Internet connectivity) into schools. To make this happen, such agencies are often staffed with many people who have strong computer-related technical backgrounds to (a) to do the actual roll-out of hardware; (b) to perform related software installation and technical support, and the training of technical staff; (c) to manage or support external groups who perform these roles;

⁴ See *A Conceptual Framework for Understanding ICT/Education Policies* (World Bank, forthcoming).

(d) to draft the technical specifications for such hardware; and/or (e) to oversee related procurement activities. KERIS in Korea, Schoolnet Thailand, NaCET in Armenia, Smart Schools in Malaysia are just a few of the many examples of how national organizations can play key roles related to infrastructure.

2. Training

Where an agency has primary responsibilities for rolling out and/or maintaining technical infrastructure, much of its early responsibilities related to training are often technical in nature. For example, it may offer or oversee ICT literacy courses for teachers and school administrators (as happened with NaCET in Armenia, Enlaces in Chile, and Schoolnet Thailand). It may conduct technical training or support ongoing professional development for technical staff on topics like networking and computer repair and maintenance. Because it has been involved in training and teacher professional development for teachers using technology, such organizations can over time assume responsibility for professional development activities for teachers where the use of technology is integral, but where the training itself is primarily pedagogical in nature. This shift in responsibilities can be gradual and subtle, but it often occurs. Where a single institution does not exist with explicit, government-mandated responsibilities in this area – as in the Philippines with FIT-ED – groups may spring up and evolve to help with this function.

3. Digital content

Many ICT/education agencies are responsible for the building and maintenance of online educational portals which serve as central hubs through which teachers and students can access educational materials, get the latest news about the education system, find official government directives and communiques, etc. In addition to the back-end support of the servers and content management tools that make the portals possible, agencies may also have responsibilities related to the content and services offered through the portal itself. This can include the development of educational content as well as the vetting of content developed by others but made available through the portal. PUSTEKKOM in Indonesia is one example of this, as was EdNA in Australia. In some cases (as with the Kenya Institute of Education, which is responsible for curriculum development), an existing institution can assume this responsibility in a similar way where a dedicated national ICT/education agency does not exist.

4. Advocacy

A national ICT/education agency sometimes assumes advocacy roles within and across government, with key stakeholder communities or broader society, related to the use of technology in education. It can also serve as a convener of advocacy and stakeholder groups. Such advocacy work is often informed by the results of research (item #6) and pilot projects (#7) in which the agency itself has taken a lead role. It can also build off on-going, regular working relationships with a variety of stakeholders and stakeholder groups. Plan Ceibal in Uruguay, Smart Schools in Malaysia and KERIS in Korea are examples in this regard.

5. Vendor relations

Where it is organized outside existing governmental structures (for example, as a free-standing agency, or as an NGO), an ICT/education agency can serve an important role vis-à-vis vendors and private sector partners. Where an agency exists at arm's-length from standard government processes and procedures, it may have greater freedom to interact and partner with private groups without running afoul of procurement regulations and guidelines that apply to civil servants. The Omar Dengo Foundation in Costa, and the JEI in Jordan, are two good examples of this.

6. Research

An ICT/education agency can serve important roles by supporting forward looking research that can inform upcoming government policies and by evaluating the impact of government, private sector, civil society and academic programs related to technology use. As part of this process, it can support linkages with academic research communities and universities, connecting researchers with practitioners. EdNA in Australia, Enlaces in Chile, Becta in England and KERIS in Korea are prominent examples in this regard.

7. Risk

An ICT/education agency can assume responsibilities for new initiatives, piloting new, innovative practices and approaches in ways that may be difficult to do within existing government structures. In this regard, an agency can assume risks that government itself is unwilling or unable to take on itself. Where such initiatives are deemed to be successful, ongoing responsibility over time can be assumed by (e.g) a government ministry. When pilots 'fail', responsibility for that failure can remain with the agency itself, with the ministry of education insulated to some extent from potential fall-out. Plan Ceibal in Uruguay is an oft-cited example of an institution serving this function in this way.

8. International outreach

A national ICT/education agency can perform specific functions on behalf of a government, showcasing a country's experiences internationally via various means: through hosting and supporting study tours from other countries, through publications about projects and research meant for international audiences by organizing conferences and workshops, and/or by providing technical assistance on behalf of the country to similar organizations around the world. KERIS in Korea, Becta in England and Uruguay's Plan Ceibal are all examples in this regard. PUSTEKKOM has also served to help bring international exposure and attention to the ways that ICTs are being used in education in Indonesia.

9. Special initiatives

An ICT/education agency can assume responsibility for 'special' initiatives utilizing ICTs in some way outside of the scope of what is offered through traditional channels and educational programs. Examples include programs to support students with special educational needs through technology; extra-curricular activities and competitions related to things like robotics and programming; as well as targeted outreach to specific population groups related to technology use (girls, low income communities, linguistic or ethnic minority groups). Special programs of the Enlaces program in Chile reaching out to linguistic minorities; the Omar Dengo Foundation in Costa promoting the use of educational robotics; KERIS's support for open educational resources; and the efforts of Uruguay's Plan Ceibal in piloting English language training at a distance using ICTs; are examples of this sort.

10. Sustaining and expanding new programs

An ICT/education agency can assume critical responsibilities for sustaining pilot programs begun by other groups, expanding them to a level where they might be able to be absorbed into ongoing government programs. By recruiting people with different profiles and skill sets, especially younger people, it can also serve as a way to introduce cultural changes into an education system more quickly than is possible through formal government bureaucracies, as well as to and energize (or re-energize) longstanding existing initiatives. The example of KERIS in Korea is notable here, especially in its ability to attract and retain staff with technical competencies and academic backgrounds in educational technology use.



Functions without form in the Philippines

What happens in a country without a dedicated national ICT/education agency but which is the site for many initiatives and experiments related to the use of ICTs in education?

The situation in the Philippines provides insight into how (very loosely organized groups of) institutions with complementary (and sometimes even competing) activities can help provide many of these ten functions, even in the absence of explicit direction from the ministry of education. That said, such a situation may not be ideal, as complications can arise related to planning, with individual groups acting largely in their own interests, and because there are not clear channels of collective communication between the private sector and civil society with related governmental bodies.



6. Forms: Common Models for National ICT/Education Agencies

Most national ICT/education agencies fall into one of six basic models. These models are typically an outgrowth of existing governmental, legal, cultural and academic contexts. In other words, they are typically evolutionary, based on what is considered possible and practical within a system, and do not stand in opposition to existing circumstances or institutions. In a number of notable cases, agencies have adopted different models over time, usually in response to new mandates and/or government policies.

1. Quasi-governmental agency

Perhaps the most well-known general model is that of, for lack of a better term, a quasi-governmental agency. Agencies of this organizational type often have strong links with an existing governmental body, and may be covered by a specific governing law or regulation. Staff of such agencies are typically *not* civil servants, although civil servants can be – and often are, particular in the early stages of the life of this sort of institution -- loaned or 'seconded' to such groups via a formal secondment process. Prominent examples of this model include KERIS in Korea, Becta in the UK, and NaCET in Armenia.

2. Government department or unit

In some cases, the functions and responsibilities of a national ICT/education are assumed by a dedicated group within the Ministry of Education. This is the case, for example in Malaysia. In some cases, as in Chile (with the Enlaces program), Uganda (with Schoolnet Uganda), and Schoolnet Thailand, programs that began elsewhere were incorporated into and absorbed by groups within the ministry of education, bringing functions and responsibilities that had previously been assumed and performed by outside groups into ministries of education.

3. Small foundation or NGO

Another option is to set up a small foundation or NGO to assume some of the key functions that are in other countries assumed by a national ICT/education agency. In this model, a group may take on a limited number of targeted responsibilities. The Jordan Education Initiative, which was originally a project housed within the Ministry of IT in Jordan, was reconstituted as an NGO under the patronage of the Queen, concentrating on testing and piloting new approaches and tools for using ICTs in education. The Foundation for Mobile Communications in Portugal is supported by telecom providers, and coordinates industry support of ICT/education programs under the direction of the ministries of education and IT. The Maine International Center for Digital learning (MICDL) is housed at the University of Southern Maine (USA) and performs research and outreach activities in support of the official governmental program to support the use of educational technologies in schools in that U.S. state, the Maine Learning Technology Initiative (MLTI).

4. Larger foundation

Another model is that of a large foundation, whose size can enable it to perform a wider variety of functions than a small NGO and foundation, and which is designed to last for a longer (or indeterminate) amount of time. The Omar Dengo Foundation in Costa Rica is an example of this model.

5. No institution

In some countries, there is not one 'model' at hand. The Philippines is an example of the



model being, essentially, 'no model'. In such a case, it is possible for a diverse set of loosely coordinated stakeholders to evolve in a semi-organized way over time to assume responsibilities which are performed in other countries by a single ICT/education agency. Such a circumstance typically takes place out of necessity and rarely occurs by design. It could be seen as an organic response to the lack of such an agency in the face of sets of compelling needs for implementation, organization, advocacy, implementation and oversight that are not being handled via systematic, 'official' means. Whether this is a desirable circumstance or not, or whether this 'model' is a pre-cursor to the establishment of a formal agency, depends on the local circumstance.

6. Other models: A company, a university

The final model observed is that of a group outside government housed within another existing institution, such as a university, or even as a private company. The early years of the Enlaces program in Chile, when the initiative existed as a research program within the Universidad de la Frontera, is one example of this arrangement. In some countries, a private company serves (some of) the functions of a national ICT/education agency (facilitated by a multi-year contract with a ministry of education). EdNA in Australia is an example of this sort of structural model.

Regional ICT/education bodies

In Europe and in Africa, regional organizations have existed to support the sharing of information between national ICT/education agencies and institutions.

The **European Schoolnet** is a network of ministries of education from across the continent. On behalf of its members, it provides support for policy development, research and innovation activities; facilitates the exchange of inter-operable digital learning resources across the continent; and provides targeted services to select groups of schools related to ICT use.

The **Schoolnet Africa** NGO has encouraged the use of the internet in African schools through linking together national schoolnets across the continent and by hosting a pan-African portal of digital education materials.



7. Stages: The Development and Evolution of National ICT/Education Agencies Over Time

National ICT/education agencies have been observed to pass through a general ‘life-cycle’ over the course of their existence, with five semi-distinct stages of development. Each stage may bring with it a new set of functional responsibilities and mandates, different staffing (including leadership) and budgeting requirements, and entail varied levels of oversight and relationships with other groups, causing organizational structures to adapt, and be adapted, over time.

Stage 1. Starting (‘birth’)

When initially conceived, ICT/education agencies often have a narrow set of responsibilities, typically related to the roll-out of computers and/or Internet connectivity to schools.

Alternatively, they may be set up to perform a specific function (e.g. research, overseeing pilot activities) for which an existing (typically governmental) structure is poorly positioned.

Some related *key considerations for policy makers to consider* during the first stage of life of a national ICT/education agency may include:

- What sort of key enabling legislation or policy may need to be enacted to give a national ICT/education agency its mandate – and to communicate this mandate with a larger community of stakeholder organizations active in the sector?
- How should such an organization be funded – and staffed? (a more complete set of considerations and questions can be found in an annex to this report)

Stage 2. Expanding (‘childhood’)

As an agency gets better at its work, and as its activities roll out at greater scale, it may increase both its budget and staff. It still does what it did before – it just does more of it.

Some related *key considerations for policy makers to consider* during this third stage of life of a national ICT/education agency may include:

- How can the processes and procedures introduced during the early activities of the agency be formalized, so that the institution can become increasingly cost-effective and impactful as it grows?
- How can an agency find – and retain – key personnel once the start-up phase of the institution has largely ended?

Stage 3. Evolving (‘adolescence’)

Over time, an ICT/education agency often assumes additional responsibilities beyond its original mandate. This occurs because its ‘success’ in achieving its original mandate naturally surfaces new needs (e.g. once all schools have computers, some group needs to make sure that there is educational content to run on them), because new opportunities arise and/or because existing responsibilities are absorbed into formal government programs and structures and, as a functioning existing institution, it is considered well placed to pursue other objectives.

Some related *key considerations for policy makers to consider* during this third stage of life of a national ICT/education agency may include:

- As an agency enters a new phase of its life, might new leadership be necessary to help



direct its evolution?

- If an organization is outside of government, does it make sense to bring many of its key responsibilities and functions within government, now that an initial period of trial and error has largely ended? *Conversely*: If a program is housed within government, does it make sense that it be 'spun out' to another institution – or to be constituted as its own separate institution?
- If initial special funding sources and mechanisms have run out, how should such an agency be funded going forward?

Stage 4. Sustaining ('adulthood' and 'middle age')

Where an ICT/education agency becomes 'embedded' into the system and is seen as 'core' to the delivery of certain essential activities or services over time, with a (reasonably) secure medium- to long-term budget horizon, much of its activities and processes can become more bureaucratized and serve largely to sustain existing programs. Given the pace of technological change, it will continue to assume new responsibilities and mandates, but its structure and defining characteristics remain largely un-changed. KERIS in Korea is a very prominent example of an institution that is seen to have 'grown up' in this way; the Omar Dengo Foundation in Costa Rica is another.

Some related *key considerations for policy makers to consider* during this fourth stage of life of a national ICT/education agency may include:

- How can a national ICT/education agency remain a locus for innovation and experimentation, given that it is responsibility for a rather set of on-going, legacy activities?
- How can a national ICT/education agency develop deeper links with key stakeholder groups – and incubate new initiatives and processes that might one day be spun-out as separate programs or organizations on their own?
- To what extent can – or should – a national ICT/education agency play a more proactive role in helping to inform and influence policy decisions related to ICT use in education across the country?

Stage 5. Ending ('death')

Where the goals of an ICT/education agency have been thought to have been met, and/or where other organizations are thought to be able to more effectively and efficiently absorb an agency's responsibilities, it may be disbanded or shut down. Becta in the UK and EdNA in Australia are perhaps the two best known global examples of this occurring. Whether this is the result of a conscious process ('mission accomplished'), the 'failure' of an agency to accomplish its mandate, or simply changing circumstances, the end result is the same.

Some related *key considerations for policy makers to consider* may include:

- What are the agency's key assets, and how can they live on past the closing of a national ICT/education agency?
- What institutions can assume the key roles previously performed by a national ICT/education agency that are still deemed important?
- What are the key messages that they government wishes to convey related to the closing of the agency?



8. Observations: Key Issues for Policymakers Concerning National ICT/Education Agencies

National ICT/education agencies can vary greatly in their forms and functions, depending on a number of factors. In some cases, form and function may be unique to a particular country context or circumstance. That said, when the histories of many such agencies around the world are viewed collectively, it is possible to make a number of common observations about key issues that typically confront such institutions over the course of their institutional life, as well as some potentially important related questions for policy makers to consider, related to:

1. Legal frameworks and laws
2. Oversight
3. Autonomy and independence
4. Links to policy
5. Collaboration with key stakeholders
6. Leadership
7. Human resources
8. Selling services
9. Evolution
10. Decentralization

Each of these observations, and a short set of related questions for potential consideration by policymakers, will be examined briefly.

Observation #1: Legal frameworks and laws

In some countries, an ICT/education agency takes its mandate from a specific law passed to bring it into existence, to secure budgets, define related oversight and articulate core responsibilities and areas of activity. In such circumstances (as with the case of KERIS in Korea), the establishment of such an organization through a dedicated law can help to ensure long term funding for such an organization (especially when there is a change in government) and can be an important signal to other stakeholder groups about the importance and mandate of such an organization. In the UK, Becta received its annual mandates through a series of official letters from the department of education which, while not laws, had many of the same consequences in practice.

What role can specific laws or regulations play in establishing the mandate and legitimacy of an ICT/education agency? Some key related questions for policymakers to consider:

- To what extent might new legal mechanisms or frameworks be useful or necessary for an ICT/education agency to be created, funded and governed?
- Are there laws or regulations governing other institutions in the country, or from other countries, that may serve as useful models for a 'national ICT/education agency' law?

Observation #2: Oversight

As a new institution operating in an area where a government may not have much prior experience, government may have limited internal expertise to evaluate the effectiveness of such an institution. People and organizations with relevant skills and experience in this area may well have professional (and potentially even contracting) links to the agency.



How should the effectiveness and impact of the work of an ICT/education agency be measured? Some key related questions for policymakers to consider:

- Who articulates the vision and mission for a national ICT/education agency?
- Who will be responsibility for setting performance targets for an ICT/education agency – and for checking to see if these targets are met?
- How can the independence of the oversight (including the auditing function) of a national ICT/agency be ensured?

Observation #3: Autonomy and independence

A key rationale for establishing a dedicated national ICT/education agency *outside* existing governmental institutions is to help insulate it from daily political and bureaucratic pressures that may may impact the normal working of a government agency ministry. The extent to which an agency is autonomous or independent of current political leaders may help to ensure continuity when governments change. It can also enable more flexible human resources practices than those possible within government and allow more room for innovative and market-relevant procurement practices. To the extent that an ICT/education agency evaluates the impact of government initiatives related to ICT use in education, it may benefit from the extent to which it is independent of or autonomous from the ministry or agency whose work it may be evaluating.

How autonomous should an ICT/education agency be? Some key related questions for policymakers to consider:

- To what extent will an ICT/education agency need to recruit staff who do not fit the profiles of government employees and civil servants?
- Will an ICT/education agency be expected to assess or comment on the impact of government programs and initiatives?
- If/when government leaders change, how closely aligned might an agency be with a prior administration – and might its funding or existence be endangered as a result?

Observation #4: Links to policy

ICT/education agencies often play a key role in the implementation of policies related to ICT use in education, on behalf of the ministry of education, the ministry of IT (or equivalent) and other key government ministries. They may also be effectively utilized by governments to explore activities where no governing policies exist, in the hope that lessons from such activities may contribute to the formulation of future policies. Agencies can also serve an important convening role as part of policy formulation and dissemination processes, by bringing together key stakeholder groups to explore areas of common concern and communicating such concerns and related recommendations to government, and by communicating government policy decisions on to key stakeholder groups.

To what extent do ICT/education agencies serve to implement current policies, to contribute to the formulation of related policies, and/or to potentially to go beyond them? Some key related questions for policymakers to consider:

- Where an agency is meant to implement existing policies, are these largely the policies of one ministry, or of multiple institutions across government?
- Is the ICT/education agency meant to simply implement existing policies, or does it have a role in the process of policy formulation as well?

Observation #5: Collaboration with key stakeholders

Because its activities often cut across areas for which multiple government ministries (education, IT/communication, etc.) may have responsibility, a national ICT/education agency may operate in an environment where regular collaboration with multiple groups across government may be necessary. In addition, an agency may be called on to play key roles in coordinating with the private sector and civil society in the course of its operations – and as part of its mandate.

What is the role of an ICT/education agency vis-à-vis other stakeholders and key actors? Some key related questions for policymakers to consider:

- Who are the key stakeholder groups active in, or responsible for, ICT/education activities in the country, and what role should an ICT/education play in coordination with and between such groups?
- In the course of its activities, to what extent should an ICT/education present itself as acting independently, and to what extent should it be representing the interests of multiple stakeholder groups?
- What guidelines should be developed related to conflicts of interest, especially with regard to dealings and communication with vendors with whom the agency might be in close and regular contact, but who also may be selling goods and services to the agency itself and/or to other key stakeholder groups, including government ministries who have oversight of the ICT/education agency?

Observation #6: Leadership

ICT/education agencies often exist as hybrid institutions, attempting to confront challenges that cut across both the education and ICT sectors. Generally speaking, the heads of such agencies tend more often to come from IT, rather than education, backgrounds. As ICT/agencies evolve over time, the profile of the leader of an institution may need to change as new responsibilities are assumed and legacy activities are completed. Where such groups take on responsibilities beyond the management and support of technical infrastructure for schools, leaders of such institutions who feel technically competent in assessing the work of the institution they lead may be challenged to provide leadership and oversight of activities that are more typical of those assumed by ministries of education, as opposed to ministries of IT. In addition, where ICT/education agencies are called on to play increasingly central roles in the coordination of activities of many new stakeholder groups, especially groups outside the IT sector, and where agencies are expected not only to implement related government policies, but also to help inform the creation of such policies, different sets of skills, expertise and sensibilities may be required of the heads of such organizations.

Who should lead a national ICT/education agency? Some key questions for policymakers to consider:

- What is the required skill set and background for the head of an ICT/education agency?
- From what types of organizations can such leaders be recruited?
- Where the responsibilities and mandates of an ICT/education agency have changed, is a different sort of leader required?

Observation #7: Human resources

In some cases, ICT/education agencies explicitly are meant to serve as outsourced expertise, so that government ministries can benefit from skills, competencies and expertise that do not exist within government. Such expertise can include things related to computer networking and

connectivity; computer hardware installation, maintenance and technical support; software development; digital content development; training in specific software applications; and IT project management. In some small, low income countries, an international NGO may serve many of the functions of a national ICT/education agency, especially where local expertise or skills are not available.

What are some of the key competencies of staff at an ICT/education agency? Some key related questions for policymakers to consider:

- What are the standard profiles of agency staff, and how are these consistent with the activities and responsibilities of the agency?
- To what extent should technical expertise be found within an agency, and to what extent should it be outsourced?
- To what extent should civil servants be placed within an ICT/education agency?
- If a group from outside the country (e.g. an international NGO) or international expats (e.g. funded by international donors) perform key functions within an ICT/education agency, is there a plan for transferring knowledge and expertise from to local groups and people?

Observation #8: Selling services

Over time, as it develops and demonstrates specific expertise and competencies, an ICT/education agency may decide to set up a what is essentially a 'consulting' arm, offering services outside of its original mandate to other groups within a country (include parts of the formal education system, especially at a sub-national level), to international bodies, or to ICT/education agencies in other countries.

Once it has demonstrated functional expertise, to what extent should an ICT/education agency market and sell this expertise to other potential clients? Some key related questions for policymakers to consider:

- To what extent should an agency be seeking alternative funding sources, and what rules or guidelines should govern its pursuit of additional funding opportunities?
- Should a national ICT/education agency be allowed to market and sell its services on the open market to third parties?
- Where it is allowed to do market its products and services to third parties, what are the key rationales for allowing an ICT/education to do this, and what related guidelines and processes, checks and balances may need to be put into place?

Observation #9: Evolution

As it grows over time and as new technologies and political imperatives emerge, an ICT/education agency can be assigned many new responsibilities beyond the scope of their original mandate. In some cases, such new responsibilities may be internally generated, in response to perceived new opportunities or as a result of the successful completion of earlier mandates. In other cases, changes in technologies may compel such institutions to explore new areas of activities. Political and governmental leaders may be tempted by the flexibility of an external ICT/education agency – especially where it is free from many of the bureaucratic, legal and human resource constraints that limit or proscribe the activities of government ministries – and allocate new mandates to a national/ICT agency which is unprepared for them, and which may lose at least some focus on its core mission as a result. As an institution evolves, it might be worthwhile to consider whether or not its legal status may need to change to help it better meet new responsibilities or respond to new market or political circumstances.

How do ICT/education agencies assume new responsibilities over time – and does this usually happen by design or by default? Some key questions for policymakers to consider:

- Is there a vision or expectation for how an ICT/education may evolve over time?
- To what extent will it be useful to insulate an ICT/education from being assigned new tasks and responsibilities not relevant to its core mission, or for which it is inadequately staff or funded?
- Is there a mechanism to periodically evaluate the responsibilities and mandates of an ICT/education agency – and, where possible or relevant, to benchmark its activities and performance against similar institutions, both within the country and abroad?
- Is there a specific point at which an ICT/education is expected to have fulfilled its mandate, and if so, what are the plans for the dissolution of the agency and the apportioning of its responsibilities to other groups (as necessary/appropriate)?

Observation #10: Decentralization

While this short paper has focused on ‘national’ ICT/education agencies, most of the lessons and experiences from such institutions apply to sub-national agencies at various levels. In some cases (as is the case with NCET in China) a national ICT/education agency sits atop a hierarchy of regional and sub-regional ICT/education institutions. In other cases, no national agency may exist, and so the form and functions of a national agency are assumed at a smaller scale at a more local level. As a practical matter, this may mean that a regional institution is just like a national one, only a bit smaller. Where regional institutions of this sort exist, the roles of a national agency may change, and focus more on coordination with local groups, communication of policy decisions, oversight of funding, and research activities which may be of general benefit across the system. Where no national agency exists, a provincial or state equivalent (especially in a large state or province) may function, and indeed appear, much like a national agency does.

How might the nature and role of an ICT/education agency change if it is part of a decentralized educational system? Some key related questions for policymakers to consider:

- What is the role of a national agency in a largely decentralized system?
- What are the forms and functions of local (provincial, municipal, district) ICT/education agencies or organizations, and how to these relate and connect to those of a national agency?



9. Key Lessons from Experiences of National ICT/Education Agencies

An analysis of commonly observed successes, failures and challenges experienced by national ICT/education agencies around the world yields a set of twelve key lessons of potential interest to policymakers and leaders with oversight and management responsibility for such institutions. While these lessons were developed with particular attention to the contexts and needs of national organizations in middle and low income countries in East Asia and the Pacific, it is hoped (and expected) that they may be of wider applicability and relevance. While they may not apply in every circumstance – and where they do apply they might have varying degrees of importance or relevance – these lessons highlight areas of strategic interest and importance across multiple countries:

1. Leadership is important – critically important
2. Enabling legislation can make life much easier
3. Especially in the early years, ‘getting the little things right’ helps to build credibility
4. Funding and financial autonomy need to be ensured
5. Managing transitions successfully is key if ICT/education agencies are to remain relevant and useful
6. Tensions between building capacity versus creating dependence should not be underestimated
7. Remaining flexible and innovative becomes increasingly challenging over time
8. To ensure their relevance, agencies should evolve to become focal points for communication, consultation and cooperation
9. Where they are most successful, ICT/education agencies are one constituent part of a larger holistic vision related to education, technology – and the intersection of the two
10. Organizational structures may change, even if core functions do not
11. Focus on supporting and meeting the needs of teachers
12. Learning from experience is a vital ingredient for success

Each of these lessons will be considered briefly in turn.

Lesson #1: Leadership is important – critically important

A key theme that emerges from an examination of the development of national ICT/education agencies relates to the central importance of **leadership**. Operating at the place where the education and ICT sectors meet, national ICT/education agencies have to navigate between two different worlds. Education ministries are often viewed as very traditional, quite bureaucratic institutions that have evolved very slowly over time. The IT sector, in contrast, is seen as dynamic, fast-changing and innovative. The leader of a national ICT/education agency needs to have feet in both worlds, and often has an important role in serving as a ‘translator’ of sorts between them. At the same time, s/he presides over an institution that is often quite new, and growing or evolving quite quickly. Links to universities can be important, especially where the mandate of an ICT/education includes research responsibilities. In addition, the leader of a national ICT/education agency may serve as a convener or stakeholder across the public, private and civil society sectors, and as a key advisor to government on upcoming policies related to ICT, education, and the combination of the two. Not many people have backgrounds and expertise in all of these areas – especially in many middle and low income countries.



Lesson #2: Enabling legislation can make life much easier

Many national ICT/education agencies have benefitted greatly from the existence of **enabling legislation** and official government directives. Where such institutions have been around for a long time (such as in the case of KERIS in Korea and the Omar Dengo Foundation in Costa Rica), the fact that their existence has been enshrined in law has been cited by their leaders as critical to their institutional identity, ability to attract sufficient funding, and longevity. In addition, the existence of related laws provides powerful signals to other groups and actors – within government, in the private sector and in civil society – about the mandate of the institution, its centrality with regard to various ICT/education initiatives, and the fact that it has official government support.

Lesson #3: Especially in the early years, ‘getting the little things right’ helps to build credibility

National ICT/education agencies often operate in environments characterized by much uncertainty and change. Where they are engaged in activities that are new, and thus for which they have no demonstrated track record of success, they may encounter skepticism from both partner organizations and beneficiary groups (schools, teachers, principals, students) about their ability to successfully, efficiently and expediently do whatever it is they aim to do. This is especially true when the activities of ICT/education agencies are disruptive to traditional ways of doing things. Taking the time to ‘get the little things right’ especially in the early years, can help to build credibility and support for their activities among key stakeholder groups. Quickly responding to and solving problems related to technical support is often a way for an ICT/education agency to demonstrate both competence and reliability. Establishing competence and reliability early – even for seemingly minor things – can serve as an important foundation on which an ICT/education agency can pursue more complicated projects and objectives.

Lesson #4: Funding and financial autonomy need to be ensured

Not surprisingly, issues related to **funding and financial autonomy** emerge as key to both the day-to-day operations of national ICT/education agencies, as well as to how such organizations develop and evolve over time. The ability to ensure budget allocations beyond the traditional, and sometimes highly variable, annual budgeting cycle of government is seen as important – especially where an ICT/education agency is involved in large scale, multi-year roll outs of infrastructure and activities. Where multi-year budget commitments are not possible, uncertainty can negatively impact contracting of certain vital services from third parties (the case of PUSTEKKOM in Indonesia may be instructive here, where needs to procure Internet connectivity on a yearly basis, coinciding with annual budget allocations from government, can greatly complicate long term planning). In some countries, ICT/education agencies and schools benefit from the regular and predictable allocation of monies from *Universal Service Funds*, in which telecom countries are required to dedicate a portion of their revenues to benefit various social objectives (including the provision of connectivity to communities that can not afford it). Some of the national ICT/education agencies that have existed for many years have been able to tap multiple funding streams as a way to diversify their funding risks; grants from foundations and international donors, as well as the selling of services, are two mechanisms that ICT/education agencies have utilized to this end.

Lesson #5: Managing transitions successfully is key if ICT/education agencies are to remain relevant and useful

While the contexts and functions of individual ICT/education agencies may be different in different places, one common theme that emerges from an examination of the histories of such institutions is that ‘change is inevitable – and so it needs to be anticipated and planned for’. Success in **managing transitions** of various sorts – including the political changes that

accompany changes in government to the impact of new technologies, from the emergence of new actors and stakeholder groups to changes in funding mechanisms and institutional structures – can be of critical importance in ensuring the effectiveness and relevance of national ICT/education agencies. Where such transitions are poorly navigated, the existence of the institution itself may be called into question.

Lesson #6: Tensions between *building capacity* versus *creating dependence* should not be underestimated

A tension common to the activities and priorities of many ICT/education agencies relates to the need to build internal capacity within the institution and the desire not to create undue dependencies by other groups on the capabilities of the ICT/education agency. How to resolve this ***tension between building capacity and creating dependence*** may differ according to a country's specific individual context, and/or by the stage of an ICT/education agency according to the general life cycle of national ICT/education agencies. Given the increasingly important and various ways that ICTs are being used in, and are relevant to, education systems, few national ICT/education agencies have the resources and capabilities to 'go it alone' – even where they have a clear mandate from government that would enable them to do so. Building and maintaining partnerships with key stakeholder groups, whether within or across government, as well as with the private companies whose activities and knowledge are typically key to the activities and functions of such agencies.

Lesson #7: Remaining flexible and innovative becomes increasingly challenging over time

Another key tension experienced by many national ICT/education agencies over time relates to trade-offs between desires for an institution to ***remain flexible and innovative***, while at the same time institutionalizing the role of the institution vis-à-vis government and other key stakeholders. It is out of a need for an organization that can be flexible, and operate in innovative ways or in areas being quickly disrupted as a result of various (typically technology-enabled) innovations that many national ICT/education agencies are born, or survive after their initial mandates have been met. As an ICT/education agency ages, the need for support for legacy activities in which it has been involved can inhibit its ability to identify and respond to new opportunities and challenges in ways that are quick and efficient. Over time such institutions may have to resist forces that may conspire to make them more risk averse – especially where they have been conceived in part as a way to accept and embrace risks that other existing institutions were not equipped or able to handle.

Lesson #8: To ensure their relevance, agencies should evolve to become focal points for communication, consultation and cooperation

In their early years of operation, national ICT/education agencies may largely be concerned with implementing existing government policy related to the large scale roll out of computing infrastructure in a country's schools. As it develops internal competencies and expertise in this regard, and interacts with a variety of important stakeholder groups, it can serve important roles related to ***communication, consultation and cooperation*** between these groups, both as it aims to help realize governmental policies and vision related to technology use in education, as well as serving as a mechanism for surfacing and aggregating information, knowledge and opinions from these stakeholder groups, which can then be used to help inform the development of government policies going forward. In this way it can play an important role in promoting and sustaining *public-private partnerships* of various sorts.

Lesson #9: Where they are most successful, ICT/education agencies are one constituent part of a larger holistic vision related to education, technology – and the intersection of the two



Where national ICT/education agencies primarily serve as an implementation mechanism for existing policies related to ICT use in education, they may benefit from the strength and relevance of such policies. The existence of good policies strengthens the ability of a national ICT/education agency to implement such policy. ‘Good’ policies are often a consequence not only of a narrow vision for technology use in education, but rather are part of a larger **holistic vision** for education, for ICT, *and* for ICT use in education that is fundamentally cross-sectoral in nature. That said, it is perhaps worth noting that it is sometimes the absence of related government policies in this area that actually enables the growth of such agencies. (The emergence of Schoolnet Thailand has been attributed in part to this phenomenon.)

Lesson #10: Organizational structures may change, even if core functions do not

Organizational structures are a means to an end – they may need to change, even where/if core functions do not. Where core functions *do* change, a change in organizational structure may be required. Whether a national ICT/education agency is part of the ministry of education (or another government ministry), a quasi-governmental agency, an NGO, or assumes some other form, it is the core functions and roles that it serves, and not the particular legal form that it embodies, that is most important. As agencies age, they would do well not to lose sight of this distinction.

Lesson #11: Focus on supporting and meeting the needs of teachers

Teachers are fundamental to the learning process. Introducing and sustaining technology use in schools is not easy – and teachers play a central role in this effort. **Focusing on supporting and meeting the needs of teachers** – related to technical training needs and equipment support, opportunities for peer networking, support for introducing new pedagogical approaches – will increase the likelihood that the activities of national ICT/education agencies may be successful. ICT/education agencies should be while cognizant of the fact that a variety of factors may conspire to restrict the ability of teachers to act as an agent of technology-enabled change at the point of learning in classrooms. Where agencies can help to ensure that new technology initiatives are not a further burden in the lives of teachers, but rather help and support them in ways that are practical and tangible, they should do so. Where teachers are seen as part of the ‘problem’, a ‘barrier’ to introducing technology successfully in education, they may turn out to be so. Whether they are considered part of the ‘solution’, teachers can be critical allies for ICT/education agencies, serving as agents of change within schools.

Lesson #12: Learning from experience is a vital ingredient for success

The history of the introduction and use of new technologies in education is littered with mistakes, and indeed includes more than a few spectacular failures. As a key institution integral to the implementation and oversight of large scale ICT/education initiatives, a national ICT/education agency typically experiences its fair share of setbacks and challenges. Given that it is often leading new initiatives and piloting new approaches and technologies in an environment characterized by change and complexity, a national ICT/education is in part often ‘learning-by-doing’. An **ability, commitment, and willingness to learn** – and learn quickly, recognizing mistakes when they occur and changing course as a result, *piloting* and iterating its approaches and procedures until it finds one that ‘works’ – is seen by many leaders of such agencies as key to success, not matter what stage of the typical life cycle of national ICT/education agencies an institution may find itself. When and where possible, opportunities to learn from the failures and successes of similar organizations in other countries, can be an important part of this process.



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Annex 1: Ten discussion questions for policymakers seeking to create or restructure a national ICT/education agency

Based on interviews and discussions with government policymakers around the world, a set of ten short, general 'discussion questions' has been developed to help catalyze targeted discussions during the initial stages of high level planning exercises related to the activities and responsibilities of national ICT/education agencies. These questions are meant to highlight areas of potential critical importance, based on the experiences of national ICT/education agencies in many places, and can serve as entry points into deeper, more fundamental discussions, linking recognition of specific needs related to the implementation of ICT/education activities in a particular country with practical experiences of institutions in other countries which exist to help meet similar needs.

1. **Goals:** Why are you doing this? What is the purpose, and why can't you do it through existing structures, organizations or mechanisms?
2. **Needs:** Is the desire to create a national ICT/education agency a response to a short term need ... or part of a long term vision?
3. **Change:** Is this about reinforcing or extending existing educational practices, or changing/reforming them? How does this fit in with existing policies, strategies and visions?
4. **Partners:** What are the key stakeholder groups whose support will be critical if the agency is to meet its responsibilities? Are you seeking to extend control from the top, or to engage a stakeholder community from below?
5. **Models:** Do you want to do this inside or outside of government? Is there a particular organizational model you wish to adopt, based on the experiences of a similar type of institution?
6. **Learning from the past:** Has something similar been tried before in your country, and if so, what lessons were learned from this experience?
7. **Evaluation:** What would success look like (over five years, over ten years) and how will you know if you have 'succeeded' or not?
8. **Funding:** How are you going to pay for this?
9. **Legal:** What legal measures or environment is required?
10. **Opportunities:** What new opportunities do you see arising in coming years related to the potential for ICT use in education, and how can you plan for them?

Annex 2: A partial list of national ICT/education agencies around the world

Those who wish to learn more about the specific circumstances of individual national ICT/education agencies (and their functional equivalents) may be interested in the following list of some notable institutions of this sort. Some of these institutions may not technically meet some of the criteria to qualify as an ‘ICT/education agency’, but they serve some of the functions commonly attributed to such organizations. Some of the institutions are no longer in existence – some have folded, others have been restructured, merged with or absorbed by other organizations in ways that may obscure their histories as separate or independent institutions. There are still important lessons that can be learned from the histories of such organizations, however, and so they are listed here as well. A number of these institutions are profiled in specific World Bank case studies.

Armenia: NaCET +	Korea: KERIS +
Australia: EdNA *+	Malaysia: Smart Schools +
Canada: Schoolnet Canada *	Portugal: FCM
Chile: Enlaces +	Romania: TEHNE
China: NCET	Solomon Islands: Solomon Islands Schoolnet
Costa Rica: Omar Dengo Foundation +	South Africa: SchoolNet South Africa
India: Schoolnet India	Uganda: Schoolnet Uganda
India (Kerala): IT@School	Thailand: Schoolnet Thailand +
India (Rajasthan): Rajasthan Education Initiative	UK (England): Becta *+
Indonesia: PUSTEKKOM +	UK (Scotland): LT Scotland *
Ireland: NCTE	Uruguay: Plan Ceibal +
Jamaica: e-Learning Jamaica	USA: CoSN
Japan: NIME *	USA: Digital Promise
Jordan: Jordan Education Initiative	USA (Maine): MICDL
Kenya: KICD (successor to KIE)	Zimbabwe: Worldlinks Zimbabwe

* no longer in existence (disbanded, reconstituted, or merged with / absorbed by another group)

+ World Bank case study



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- [1] *SABER-ICT Framework Paper for Policy Analysis: Documenting national educational technology policies around the world and their evolution over time* (Michael Trucano)
- [2] *Building and sustaining national ICT/education agencies: Lessons from international experiences* (Michael Trucano & Gavin Dykes)
- [3] *Building and sustaining national ICT/education agencies: Lessons from Korea (KERIS)* (Youngsun Kwon & Sanghyun Jang)
- [4] *Building and sustaining national ICT/education agencies: Lessons from Malaysia (Smart Schools)* (Molly N.N. Lee & Soon Seng Thah)
- [5] *The Role and Status of National Research and Education Networks (NRENS) in Africa* (Michael Foley)
- [6] *Building and sustaining national ICT/education agencies: Lessons from England (Becta)* (Gavin Dykes)
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- [11] *Evoke -- Developing Skills in Youth to Solve the World's Most Complex Problems: The Social Innovators' Framework* (Barbara Freeman & Robert Hawkins)
- [12] *Technologies in education across the Americas: The promise and the peril – and some potential ways forward* (Michael Trucano)
- [13] *Building and sustaining national ICT/education agencies: Lessons from Costa Rica* (The Omar Dengo Foundation) (Carla Jimenez)
- [14] *Building and sustaining national ICT/education agencies: Lessons from Thailand (NECTEC/Schoolnet Thailand)* (Saowaruj Rattanakhamfu)
- [15] *Building and sustaining national ICT/education agencies: Lessons from the Philippines* (Benjamin Vergel De Dios)
- [16] *Building and sustaining national ICT/education agencies: Lessons from Australia (EdNA)* (Gerald White & Lesley Parker)
- [17] *ICT and the Education of Refugees: A Stocktaking of Innovative Approaches in the MENA Region. Lessons of Experience and Guiding Principles* (Kent Lewis with Simon Thacker)
- [18] *Digital teaching and learning materials: Opportunities, options and issues* (Michael Trucano)
- [19] *Developing Skills in Youth to Solve the World's Most Complex Problems: Contextualization, Implementation, and Experimental Research. Lessons from Evoke* (Barbara Freeman & Robert Hawkins)
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