Public-private partnerships in ICT for education

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INTRODUCTION

A recent World Bank report notes that across the world, per capita economic growth is driven by three information and communication technology (ICT)-related factors: investments in equipment and infrastructure, investments in human capital (i.e. in education and innovation), and efficient use of labour (human resource) and capital that increases productivity (Schware 2005). These three factors have a direct impact on the provisioning of education. For one, the demand to adopt ICT-supported education services, or e-education, is outweighing the capacity of governments to adequately support education reform and expansion.[2]

At the same time, these three factors are key areas of interest to the private sector, which includes local, national, and international private commercial enterprises, non-government organizations (NGOs), not-for-profit trusts, philanthropic organizations, and development agencies. This interest and support from the private sector can be leveraged to enable the sharing of resources to overcome such obstacles as limited funds and lack of technical expertise and project management capacities in ICT integration in education.

Public and private enterprises associated with e-education projects are driven by different agendas, which results in divergent targets and bottom lines. However, they may share common 'development' interests in having educated and healthy citizens, in putting in place the physical and social infrastructure that would improve the quality of learning, and in expanding markets for sustainable growth of e-education. A sharing of resources between public and private enterprises in e-education interventions make possible a shift away from collective, tax-based financing of educational infrastructure and services. Moreover, it is assumed that when public and private partners join forces to improve the provision of e-education services their complementary strengths can accelerate the pace of progress. Such partnerships draw in new ideas and capacities for problem-solving and leverage investments and professional expertise. Thus, the sum of the partnership wields greater influence, touches more people in need, and reaps benefits for all participants. The experience of Organisation for Economic Co-operation and Development (OECD) countries shows that public-private partnerships (PPP) can play a vital role in mobilizing the scale of resources required for financing and building ICT infrastructure, developing applications and locally relevant content, and developing the human capacity required for harnessing the full capacity of ICT productive tools (Ichiro and McNamara 2003).

NATURE AND SIGNIFICANCE OF PPP

PPP in the education sector is not a new concept. The private sector has been involved in different ways and at various levels in the provision of education services. Two definitions that capture the essence of PPP are as follows:

- 'risk sharing relationships based upon an agreed aspiration between the public and private sectors to bring about a desired public policy outcome' (Commission on UK Private Public Partnerships 2008).
- 'a cooperative venture between the public and private sectors, built on the expertise of each partner, that best meets clearly

defined public needs through an appropriate allocation of resources, risks and rewards' (Canadian Council for Public-Private Partnerships 2008).

The central tenet of PPP is shared ownership of the project, which means sharing of risks and rewards. Thus the importance of a mutually conducive partnership agreement cannot be over-emphasized. In general, most PPP frameworks may be shaped around the following concepts:

Effectiveness	• Success in meeting the PPP objectives • Effectively managing and monitoring the delivery of the program • Scalability/replicability
Efficiency	• Return on investment analysis • Affordability (public sector support) • Developing and implementing a regulatory mechanism
Equity and political considerations	• Equity (access for poor and rural populations) • Political/trade union resistance • Contingent on wider public sector reform
Sustainability	• Economic returns to the private sector (within the medium to long term) • Financing risk (within a long-term arrangement) • Private sector appetitive and capability • Local stakeholders buy-in

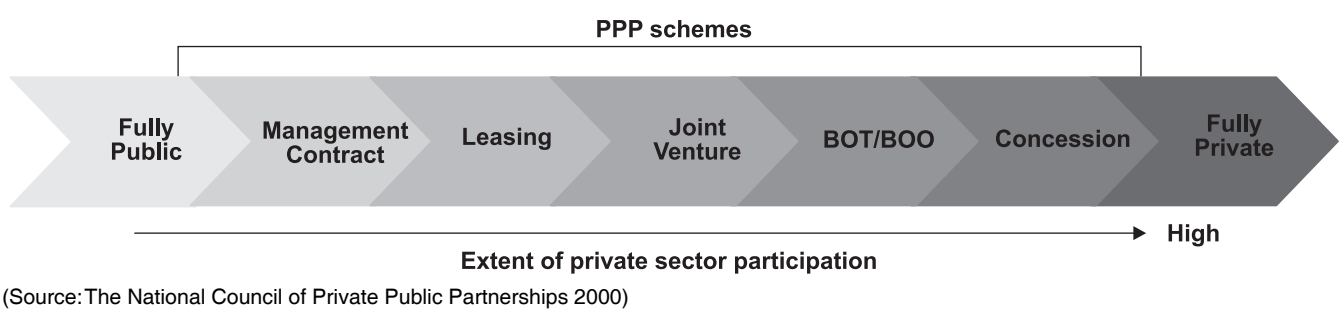
Between fully public sector enterprises and fully private enterprises, there is a continuum of PPPs (see Figure 8.1): managed contracts, lease agreements, joint ventures, build-operate-transfer schemes, build-operate-own schemes, and concession agreements. A totally privatized enterprise does not have any shared responsibility with the public sector; it is a case of full divestiture to the private sector and thus can no longer be considered a PPP.

The perceived commercial potential of providing public services is often associated with the significant market power of the public sector given that it may be the only provider of such services and the consumers do not have choices. The return on investment for the private sector partners may be achieved directly through fee for service, government concessions, or combinations of both. In the case of philanthropic private partners, the return could be non-monetary, such as ensuring a healthy, prosperous, and empowered community.

The different modalities, the number of partners and their roles, and the nature of service sought can affect the level of risk in the partnership. For instance, PPP enterprises in large countries like China, India, and Indonesia can be formed at the federal and state government levels with the federal government forging agreements with the state government, which in turn has agreements with private providers. These multi-layered PPPs seek enhanced outreach capacity through the NGO networks that are often more effective and efficient in delivering public services to the grassroots. It allows the public sector to utilize the strengths of different government entities and NGOs to become more responsive to local demand.

Being negotiated agreements, PPPs are not always straightforward. There must be careful consideration of the medium- to long-term impact of PPPs, as many of the issues may not be readily apparent at the time of negotiations. PPP arrangements can vary across a risk-reward spectrum in terms of planning and design, construction/development, implementation/performance, operating costs and capacity, variation in revenue and demand for service, technology obsolescence and limited expertise, and terminal and residual risks. The partners should separately undertake a risk assessment using a detailed 'risk allocation matrix' (see Appendix 8.1A). The risk assessment should be realistic and risks should be calculated for the medium- and long-term. Usually, the greater the risk, the more return the private sector partner will expect before signing up to a PPP agreement.

Figure 8.1
PPP modalities



(Source: The National Council of Private Public Partnerships 2000)

Risks tend to be greater when dealing with ICT in education due to the rapidly changing technology, continuous curriculum reforms, ever increasing competition, and intangible and uncertain returns on investment. Thus private partners are often very cautious in entering PPPs for ICT integration in education. For the public sector the important thing to consider is the level of risk transfer that can be achieved through the PPP.

USING PPP IN ICT-SUPPORTED EDUCATION AND TRAINING

The 2007 Global Knowledge Conference recognized the need to invest in human capacity development in many Asia Pacific countries to enable them to implement ICT initiatives in general and e-education initiatives in particular. Projections of demand for online learning by investment firms such as IDC, Merrill Lynch, and WR Hambrecth & Co., all indicate exponential growth in the future[3] (Varoglu and Wachholz 2001). This rapidly unfolding demand has emerged alongside an increased responsiveness from the private sector to engage in the development and delivery of education services and products. Traditional models of providing for education and training can no longer meet the demand, opening up opportunities for PPPs both at the national and transnational levels.

Partnerships with private providers of education services have had mixed reactions. Issues of national sovereignty and cultural values, equity and access, quality, and relevance of content to local needs, among others, have been raised and they need to be addressed via a good regulatory framework. Opening up the market to national and transnational providers also has implications for the survival of local providers, as the larger national and transnational providers have the advantage of economies of scale.

Despite these concerns, however, PPPs have become more significant, largely because of the huge capital costs and new types of expertise associated with e-education interventions. Given that e-education has cross-sector, national, and transnational implications, it is important to consider partnerships both within a local and broader framework. For transnational PPPs, the World Trade Organization (WTO) General Agreement on Trade in Services (GATS) could provide national authorities some guidance in the development of a regulatory framework for opening up and managing education markets to national and international private providers.

PPPs can be forged for various aspects of e-education provision as discussed here.

PPPs for Infrastructure and Equipment

E-Education is dependent on having good infrastructure and high-quality connectivity. Because these are often expensive to acquire and maintain, governments are increasingly turning to private partners for assistance in national infrastructure development. The following are examples of ways in which PPPs may be applied to infrastructure investments.

In a joint venture, the government jointly invests in developing information technology (IT) infrastructure with private sector partners and either jointly runs the project with the private sector or outsources the management of the infrastructure with caveats in place to ensure equity and quality of service provision. All partners share the risks and rewards on an agreed basis. To ensure that access to the IT infrastructure is available at fair market value, the government puts in place a sound regulatory and policy framework. For example, the Australian federal government has allocated AUD 4.7 billion to build a national broadband network based on joint public-private funding. The private partner is expected to provide access to its existing IT network, and technical and management capacity to expand the network coverage to include the rural areas and also invest financially. The initiative is intended to allow rural schools, farmers, and other regional communities to participate in global knowledge sharing.

In other types of joint ventures, notably private finance initiatives, capital investment is made by the private sector on the strength of a contract with government to provide agreed services. Government contributions in this case may be in kind only, for example providing a guarantee for the loan or assisting the private partner to leverage venture capital on the strength of the association with the government.

In seeding capital, governments provide capital for initial infrastructure development with an expectation that the private partners (both local and foreign) will further develop the infrastructure as the demand grows. Some Asia Pacific countries have opted for this type of partnership. Examples include the Malaysian Multimedia Supercorridor, the Hong Kong government's HKD 100 million venture capital, and the Bali Camp software development houses. These initiatives have had varied success due to differences in regulatory capacity and the availability of qualified human resources. The Malaysian initiatives have now been extended to the Smart School project, which intends to connect all schools through an education sub-network.

Governments also seek funds and technical expertise from international donor agencies to invest in innovative pilot projects

that, if successful, become PPP models for scaling up. But one of the risks in donor-led pilot projects is that one can easily become dependent on the propriety software, technology, and content provided by some of the private sector partners during the pilot stages. Such software, technology, and content may not be the best cost option or be the most relevant to local needs in the long term. Thus, as donor funding ends, pilot projects often fail as there are no agreed exit strategies to ensure continued resourcing.

In leasing and contracting arrangements, government and private enterprises enter into agreements for the use of ICT resources to implement public education policies. Typical lease agreements are for: *(i)* data hosting and storage spaces, where secure systems that can withstand natural disasters (such as hurricane force winds and floods) and have a backup power supply are key considerations; *(ii)* access to certain bandwidth on networks to ensure an optimum speed at all times; and *(iii)* supply of equipment such as computers and other digital equipment with minimum specifications. Many equipment lease agreements have a time-based (3–5 years) equipment upgrade requirement to keep pace with continuous technological and software innovations. One of the biggest risks in entering into a leasing agreement is not sufficiently considering the implications of regular maintenance of the equipment and the quality of service (e.g. factoring in network down times). This should be discussed during the negotiation stage.

Another common lease agreement can be seen in initial attempts to privatize public telecommunications assets. In these cases a private enterprise may lease the public infrastructure and manage the delivery of necessary public services for an agreed fee.

PPP for the Provision of Educational and Professional Training

The increasing demand for education in general and higher education and continuing education in particular cannot be met by the current model for delivering education and training systems. PPPs are an alternative model.

Online ICT skills training: An example of PPP in training is the Cisco Academy, which provides online training through partnerships with public and private institutions or universities that they designate as Learning Solutions Partners or Cisco Learning Partners. The public institutions either integrate the Cisco training within their programs to increase the relevance of their programs and increase student enrolments, or provide space, for a fee, to deliver the training. Online training is also provided by Indian company Aptech in partnership with the Indian Technical and Economic Co-operation (ITEC) as part of a Government of India initiative to provide software design and applications training to local and international participants from a range of sectors, including education. Aptech has also initiated the India Window Program where foreign students and corporate executives are trained in information technology and multimedia in India and participate in a mandatory internship at IT firms in Bangalore, the 'Silicon Valley of India'. These skills training partnerships provide courses that are driven by specific industry demands and have globally recognized credentials. They enjoy a high status, unlike regular distance and online education programs. But this cannot be said of all transnational online programs, and national and global online training partners have to

Intec Partnership to Promote ICT for Education

Intec is a private IT company in Mongolia providing direct services to private companies. It also serves as a project partner in many public sector projects financed by international donor agencies.

Intec has partnered with Atos Consulting of the United Kingdom (UK) to provide IT expertise to the Information and Communication Technology Authority (ICTA) of the Government of Mongolia (GoM). The partnership pooled the collective expertise of all of the partners to review the e-government strategy of the GoM and give the ICTA recommendations on how to pursue the e-government strategy to be implemented through a PPP model.

Intec has also partnered with Aptech WorldWide to set up a centre in Mongolia that will deliver a two-year software engineering course to fee-paying students and demand- and needs-based IT training courses to private commercial companies and government organizations. The Aptech WorldWide Mongolia Center (http://www.aptechmongolia.edu.mn/) is currently discussing with the GoM the possibility of providing custom-built training for ICTA staff. It has also partnered with the Ministry of Education, Culture and Science (MECS) of Mongolia to pilot the Aptech Plus — IT Training for Secondary School program. The pilot will provide the MECS feedback about whether to formally adopt Aptech Plus content in its secondary schools.

The Intec website is at http://www.itconsulting.mn/index.htm.

be carefully scrutinized for quality (see 'Intec Partnership to Promote ICT for Education').

Corporate online training: The flexibility and cost-efficiency of developing and delivering e-education and training, which traditionally has been the role of universities and IT vendors, has caught the interest of large multinational private organizations. These companies are forming 'concession' partnerships to jointly develop and deliver training on new equipment, software, and use of productive tools to public and private organizations. Hewlett-Packard has estimated that it saved USD 5.5 million on training 700 engineers (Hall 2000), and IBM saved USD 200 million in one year by delivering its management development program online (Horton 2000). The Ford Motor company, which operates in 125 countries and six continents, has adopted the e-education services provided by the Ford Learning Network for all training and staff development needs. Lessons from these private sector initiatives have also been adopted for the training of senior managers and technical staff in the public sector, mainly with private vendor companies.

In Asia Pacific countries, the base-level ICT capacity of senior managers, the turnover of staff with ICT capabilities within the public sector, and the peculiarities of individual government agencies can vary significantly. Thus, forging PPP agreements for customized training services on a long-term basis can be very attractive.

University partnership networks: As the significance of ICT is realized, more universities are teaming up with leading ICT companies, such as learning management system (LMS) developers, professional associations and corporate organizations, to jointly develop and deliver new e-education programs. Partnerships for the use of TV and radio for education already exist in countries like China, India, Pakistan, and Thailand. The challenge now for Asia Pacific universities is to use integrated IT platforms for the delivery of university courses. In the West, using IT platforms to jointly develop and deliver training can be seen in the US army forming a partnership with universities in creating a unique e-learning program called 'eArmyU'. The program allows soldiers to take classes from 32 US universities while working locally or overseas (Voth 2003).

There are also joint research and development (R&D) programs for complex learning management systems, multimedia tools for developing complex simulations and analysis, and course content development.

PPPs supporting university research particularly in the medical sciences, including pharmacy, IT and energy, are common and are likely to increase with the emergence of grid computing, which is largely driven by the private sector. The grid computing paradigm[4] provides access to high-quality video conferencing facilities, large-scale distributed meetings and collaboration, and synchronous interactive sessions from multiple locations for research seminars, lectures, tutorials, and training. High-performance computing capacity for digitization, visualization, animation, and mapping has revolutionized research and communication while nanotechnology innovations have increased efficiency in data processing and storage. These technological innovations have the potential to enable large-scale resource sharing and to bring people, computing systems, and information resources together through collaborative partnerships between private and public sector research and education enterprises. To enhance their global research and knowledge innovation capacities, universities can form partnerships not only with other universities through university consortiums but also with private sector partners.

The development of Open Access (www.openj-gate.com) as a means of disseminating findings from government-funded research is being supported by Informatics India, a private enterprise. Similar research databases serving the mutual purposes of universities and the private sector exist in the West. In addition, public sector initiatives like the Australian Research Council's industry linkage[5] scheme provide a facility through which university and private sector partners can engage in joint research, including in ICT innovations.

These research agreements are concession partnerships where limited public funds are provided by the public sector and the private sector partner matches the funding through a mix of cash and 'in-kind' contributions. The intellectual property produced or developed is often shared between the university(ies), the private sector partner(s), and the researchers. Indeed it is not uncommon for private companies to tap university professors and students, as well as university infrastructure, in product or applications development. When Microsoft first introduced its Tablet PC, it funded a research trial use of the machine. But in this case the partnership is closer to a contract and the intellectual property is owned by Microsoft.

PPP for e-Education and Social Development

The focus of e-education for social development is building social capital and improving the quality of life of disadvantaged communities by giving them access to information, empowering them to have a voice in how they live and work, encouraging them to participate in the knowledge economy, opening up opportunities for women to improve their social and economic status, and stimulating local business and marketing opportunities. Several international donor and philanthropic agencies have forged partnerships with governments, NGOs, and commercial enterprises to support e-education for social development.

Different partnership models, such as seeding funds, build-operate-transfer, and joint venture schemes, have been used for ICT service delivery to rural and remote telecentres, village information centres, community multimedia centres, information kiosks, and telecottages. The outcomes have been varied. One of the main concerns is the tenuous nature of the partnerships and the question of sustainability. International donors and philanthropic agencies often fund pilot projects but leave to the local partners the challenge of successfully transforming a pilot initiative into an institutionalized function within the community and attracting ongoing support. The transformation is often expected to happen within unrealistic timeframes. There is a need to adopt a long-term approach to seeking buy-in from local stakeholders and thereby ensure sustainability. Shifting to a sustainable model may be particularly difficult in countries that do not have a generous private sector to work with and where the average community incomes may be below poverty levels. Thus, the risks associated with community-based e-education partnerships need to be assessed at the outset.

Despite these difficulties, some PPPs supporting ICT interventions at the community level appear to have matured and have now moved beyond ICT learning centres. They are now seen as providing core information for the daily activities of a community such as local market opportunities or information on health epidemics, agricultural development, and weather forecast, and connecting people subjected to internal migration for economic reasons or due to natural disasters. Many of these community-based ICT centres are becoming consolidated social and information hubs. In many countries the success of some of these NGO-led interventions has been recognized and they have been mainstreamed into the national education system and are now supported through the national budget.

Partnerships between international donor agencies, private companies, and NGOs have also been supporting local content creation. For example, 'Finding a Voice' (http://www.findingavoice.org/) is a research partnership jointly funded by the Australian Research Council, UNESCO India, and UNDP Indonesia, and being implemented by researchers from the Queensland University of Technology and several NGOs from Nepal, India, and Sri Lanka. The project works with grassroots communities to develop ICT skills in generating local content. Aside from developing computer and multimedia skills, these kinds of projects deliver integrated education services for farmers, fishermen, and other community folk on topics that are relevant to them, such as public health, parenting, and nutrition (ADB and ESCAP — Economic and Social Commission for Asia and the Pacific — 2004).

Many governments in the Asia Pacific region have led initiatives for connecting rural and remote areas. For instance, the federal and state governments of India have entered into a multi-level partnership to include rural and remote communities in the digital economy. The Indian government has established partnerships with NGOs and not-for-profit trusts to deliver its ICT education programs to rural and remote areas. The partnership leverages the strength of NGOs in working with grassroots communities, which is critical for the success of this initiative. The Indian government plans to establish some 2,500 ICT community centres that will not only provide ICT learning opportunities but also act as the delivery point for government services.[6]

Some NGOs with support from public funding have forged partnerships with commercial private sector partners to provide ICT training to the underprivileged. Project Saraswati for IT Literacy and Project Srishti for Multimedia Training, for example, provide free training for underprivileged children at various Aptech, Arena, and SSi centres.

PPPs with telecommunication corporations with a strong commitment to social development can be pursued in advancing technological innovations, such as wireless broadband, 3G, and Fixed Mobile Convergence (FMC),[7] with the potential to significantly reduce user costs and increase access to information and knowledge. The Grameen Telecom Corporation in Bangladesh, for example, has the Village Phone Program, which provides universal access to telecommunications services in remote, rural areas. A partnership between the government's rural development programs and the Grameen Telecom Corporation provides subsidized connectivity to rural and remote villages using more cost-effective technologies such as 3G and wireless.

PPP in ICT for Basic Education

Preparing citizens for the knowledge society will be most effective if e-education is introduced at the basic education level. However, this sub-sector attracts limited interest from the private sector, particularly where the public sector aim is to provide access to education for poor and rural children as part of a policy of universal basic education. This is because the last mile of connectivity tends to be expensive, with little commercial return. Most ICT implementation partnerships in this sub-sector are government-led, such as those found in Australia, Malaysia, and Singapore. In some countries, the interventions are government-led, but in partnership with international donor agencies or vendor companies. These types of partnerships are not mutually exclusive and sometimes it may be an advantage to merge or combine them.

The most common type of agreement is 'seeding fund' partnerships with emphasis on front-end costs and mostly capital

costs. However, such an approach tends to underestimate the total cost of ownership (TCO) of computers and other ICT equipment, which includes recurrent costs such as ongoing hardware maintenance and upgrades of hardware and software in addition to initial capital outlays. Also, teachers have to devote additional time and effort to learning new skills in content development, approaches to teaching, and methods of assessment.

An important aspect of private sector participation involves contributions 'in-kind' of networking equipment, PCs, and concessional access to software licences for an initial period, as well as ICT skills training for teachers and students. For example, Microsoft has partnered with many states throughout India to provide free basic technology training to teachers of state-funded schools. This includes 'The Innovative Teachers Forums' that encourage innovative teachers to adopt ICT, award best practices in ICT integration, and support teachers in building global communities of practice (see 'Microsoft Innovative Schools Program').

International agencies such as the Asian Development Bank and the World Bank have also invested in providing ICT to the basic education sub-sector. Some of these initiatives have involved setting up computer labs in schools, computerizing education administration through Education Management Information Systems (EMIS), and developing an e-curriculum with appropriate learning materials. Other initiatives have set up 'schoolnets' and school-based telecentre projects where school children use the ICT facility during school hours and the community uses the facility for a fee after hours to generate an income that can help offset the centre's operating costs. Most of these are initially partnerships between the government and donor agencies but with the expectation that the community will take over the responsibility of ensuring sustainability once donor support ends. However, as mentioned, the transition has been difficult for many projects particularly in low-income communities.

NGOs also enter into partnerships with governments to promote ICT integration in basic education. For example, the US-based World Links for Development plans to work with state governments in India to bridge the digital divide by training secondary schoolteachers in 125 Indian schools in classroom applications of ICT. It will also provide school connectivity, basic computer literacy, and professional development training to teachers. Further support for PPP can be seen in the public–private alliance that is drawing together educational innovators and technology leaders to improve the quality of teaching, motivate children to complete school, and ensure that the skills of young people meet the needs of India's emerging economy. The Quality Education and Skills Training Alliance (QUEST), a partnership between Indian and American technology corporations with NGOs supported by public funds and working within the basic education system, is targeting the needs of marginalized children using ICT-supported non-formal education as the medium.

Technological innovations, which in turn facilitate the development of more advanced learning materials, have also triggered partnerships. The Singapore-based ICT company Litespeed

Microsoft Innovative Schools Program

The Innovative Schools project is part of the Microsoft Partners-in-Learning Initiative (PiL) launched in 2004.[8] Following four pilot projects in Singapore, Taiwan, the UK, and the US, this PPP scheme was extended to 12 locations, including three schools in Singapore and seven in Hong Kong. A local program manager, the Microsoft team, and a working group mentor work closely with the selected schools to formulate a blueprint employing the 6 'i' development processes — introspection, investigation, inclusion, innovation, implementation, and insight — developed in the School of the Future project.

The objectives are to partner with governments, schools, teachers, and technology partners to assist primary or secondary schools in strategic planning and furthering innovation in learning and knowledge discovery, and to equip students with the right skills to meet the demands of a knowledge-based economy. Microsoft provides not direct funding but access to technology solutions, human capital in terms of technology expertise, and knowledge in resources planning, curriculum development, and research findings from other projects such as School of the Future and BackPack.NET. The schools raise their own funding for building the infrastructure and acquiring the appropriate equipment, software, and technologies. After two years, evaluations at the school and program level are conducted by an independent third party research organization.

(Source: Microsoft 2009)

(http://www.litespeed.com.sg/) is a partnership between Ngee Ann Polytechnic, Hewlett-Packard, and SNP panpac that is developing a Diagnostics Tutorial Assessment System (DTAS) and Intelligent Content Assessment Marking (ICAM) system with the potential to revolutionize general education assessment practices. This partnership has also worked with schools and teachers to develop customized e-learning content. Litespeed has entered into partnerships with Education authorities in Hong Kong, Malaysia, and Singapore to provide an integrated e-education platform for schools.

CONCLUSION

In the past few years global initiatives such as the Digital Opportunity Task Force,[9] the Global Knowledge Partnership, the UN ICT Task Force,[10] and the World Summit on the Information Society have significantly increased awareness of the vital role that international cooperation can play in providing access for all to ICT as a tool for economic and social development. They have established multi-stakeholder partnerships, such as the Global Digital Opportunity Initiative (GDOI),[11] as a mechanism for developing creative PPPs and mobilizing private sector interest in supporting ICT for development and education.

There are challenges to confront. On one hand, the private sector is less interested in financial assistance to the education sector than in the profitability of the demand for its products and services in the long run. On the other hand, demand for the new access devices to the Web, new broadband networks, and new social networking applications such as blogs, wikis, and music and video sharing, and the increasing availability of educational content for online learning are becoming a part of global education and learning services. This demand and growth has the potential to generate more interest from the private sectors and provide alternative ways to mobilize community interest and action toward furthering PPP in the education sector.

From a national perspective, e-education is an important strategy for adapting the workforce to the technological revolution. It is also a tradable service with no boundaries. Education for all is a real possibility for the first time in human history and PPPs have the potential to make a significant contribution to delivering this reality.

Perhaps the most challenging task for governments in Asia Pacific countries will be the development of a sound understanding of what is entailed in PPPs and the creation of conducive environments for sustaining the interest of both public and private partners. Knowledge, skills, and expertise in developing, negotiating, implementing, and monitoring projects and programs with partners that may have competing agendas are crucial for the success of PPPs in ICT for education.

NOTES

1. The authors would like to acknowledge the contributions of Professor John Ure of Hong Kong University to earlier drafts of this chapter.
2. In many countries in the Asia Pacific region a substantial part (85–90 percent) of the education budget is spent on salaries alone and very little is left for capital investments such as those required for ICT interventions.
3. This demand is not just in the formal education sub-sector but also in non-formal education/community development and continuing professional development of employees.
4. The Grid Computing Information Centre (http://www.gridcomputing.com) 'enables the sharing, selection and aggregation of a wide variety of geographically distributed computational resources (such as supercomputers, computer clusters, storage systems, data sources, instruments, people) and presents them as a single, unified resource for solving large-scale data intensive computing applications. This idea is analogous to electric power network (grid) where power generators are distributed, but the users are able to access electric power without bothering about the source of energy and its location.'
5. This is an Australian Federal Government initiative to bring together industry and universities to undertake innovative research in Australia, including in the ICT software, hardware and service delivery areas.
6. See the chapters on China, India, and Pakistan in this volume for further information on government-led PPP for e-education.
7. In FMC a single handset can switch seamlessly between making calls over cellular and Wireless Fidelity (WiFi) networks.
8. Other initiatives under PiL include the Innovative Teachers program and Innovative Students program. The Innovative Teachers program consists of an Innovative Teachers Network which provides educators with access to teaching tools through a network of portals and Innovative Teachers Forums, which recognize teachers who demonstrate best teaching practices. The Innovative Students program offers software package at more affordable price than commercial rates.
9. The Digital Opportunity Task Force (www.dotforce.org) was set up and launched by the G8 member countries at the G8 Kyushu-Okinawa Summit in 2000.
10. The UN ICT Task Force (www.unicttaskforce.org) was created by the Secretary General in 2001 at the request of the UN Economic and Social Council.
11. The Global Digital Opportunity Initiative (www.gdoi.org) is a partnership of the UNDP and the Markle Foundation to engage public and private institutions and individuals to help developing countries formulate a comprehensive national approach, including resource allocation for specific ICT solutions.

APPENDIX

Appendix 8.1A

Indicative risk allocation matrix

No	*Nature of risk spectrum*	*Definition of risk type*	*Allocation*		
			Public sector	*Private sector*	*Shared*
1.	**Design risk**				
1.1	Failure to design to agreed brief	Failure to translate the required products and services into a viable project design with an agreed time frame		✓	
1.2	Amendments to meet requirements of the public sector	The public sector partner may require changes to the design, causing additional design and construction costs	✓		
1.3	Untenable design due to external influences	Need for a design change due to legislative and regulatory or technical and material unavailability etc.			✓
2.	**Construction and development risks**				✓
2.1	Unrealistic schedule and time estimate	Not considering all factors in estimating the time required to complete the construction may result in significant extensions that can incur additional costs			
2.2	Unforeseen site conditions	Accelerating the process, resulting in the private sector being unable to carry out necessary surveys prior to commencing work either because facilities are currently occupied or access to the site is not possible	✓		
2.3	Third party claims	Costs associated with third party claims, such as loss of amenity, livelihood, ground subsidence on adjacent properties	✓		
2.4	Force majeure	Additional costs are incurred; facilities may also be unavailable or parties may no longer be able to deliver as per the contract	✓		
2.5	Industrial action by contractor/ sub-contractor	Industrial action may cause construction and implementation activities to be delayed, as well as incur additional management costs		✓	
3.	**Performance risks**				
3.1	Change in specification initiated by the public sector	During the operating phase of the project, the public sector procuring the services could require changes to the specification	✓		
3.2	Performance of sub-contractors	Poor management of sub-contractors can lead to poor coordination and under-performance by the contractors. This may create additional costs in the provision of services		✓	
3.3	Default by contractor or sub-contractor	In the case of default by a contractor or sub-contractor, there may be a need to make emergency provisions. There may also be additional costs involved in finding a replacement		✓	
3.4	Termination due to force majeure	A force majeure could mean the parties will no longer be able to meet their contractual obligations	✓		

(*Appendix 8.1A continued*)

(*Appendix 8.1A continued*)

No	*Nature of risk spectrum*	*Definition of risk type*	*Allocation*		
			Public sector	*Private sector*	*Shared*
4.	**Operating cost risks**				
4.1	Incorrect cost estimates for providing services under the contract	The actual cost of providing these services may be different from the projected cost due to unexpected changes in the cost of equipment, labour, utilities, and other supplies		✓	
4.2	Legislative/regulatory changes having capital cost consequences	Changes to legislation/regulation may lead to additional construction costs, and higher building, maintenance, equipment, or labour costs			✓
4.3	Change in taxation	The scope and level of taxation will affect the cost of providing services	✓		
5.	**Variability of revenue risk**				
5.1	Non-performance risks	Payment will only be made by the public sector for services received		✓	
5.2	Poor performance of services	The operator will incur deductions from the performance payment for poor performance of services		✓	
5.3	Changes in the volume of demand for services	The volume of demand for the product and services may change during certain periods or due to demographic changes caused by internal migration	✓		
6.	**Termination risks**				
6.1	Termination due to default by the public sector	The public sector defaults on its non-financial commitments, leading to contract termination and no compensation for the private sector	✓		
6.2	Default by the operator causing financiers to step in	The operator or individual service providers default and financiers step in, leading to higher costs than agreed in the contract		✓	
7.	**Technology and obsolescence risks**				
7.1	Changes to technology; assets prematurely becoming obsolete	The building, plant, and/or equipment may become obsolete before the project is completed and commissioned		✓	
8.	**Residual risk**				
8.1	The public sector no longer requires the assets at the end of the contract	The procuring entity might wish to vacate the asset at the end of the contract period, and the operator may be faced with decommissioning costs	✓		

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