

# **An ICT Professional Development Strategy for Teachers in Guyana**

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# 1 Acronyms

BEAMS	Basic Education Access and Management Support Project
CARICOM	Caribbean Community and Common Market
CC	Creative Commons
CIA	Central Intelligence Agency
CIDA	Canadian International Development Agency
CFT	Competency Framework for Teachers
COL	Commonwealth of Learning
CPCE	Cyril Potter College of Education
CPD	Continuing Professional Development
CSEC	Caribbean Secondary Education Certificate
CST	Competency Standards for Teachers
CXC	Caribbean Examination Council
EMIS	Education Management and Information System
GBETT	Guyana Basic Education Teacher Training Project
GCE	General Certificate of Education
GDP	Gross Domestic Product
GINA	Government Information Agency
GIS	Geographic Information System
GOG	Government of Guyana
HIV	Human Immunodeficiency Virus
HE	Human Resources
IDB	Inter-American Development Bank
ICT	Information and Communication Technology
ICT4D	Information and Communication Technology for Development
IT	Information Technology
M&E	Monitoring and Evaluation
MoE	Ministry of Education
NCERD	National Centre for Educational Resource Development
NCN	National Communications Network
OER	Open Educational Resources
PEIP	Primary Education Improvement Project
SA	South Africa
SIS	School Information System
SSE	Secondary Schools Entrance
SSITT	Secondary School Information Technology Teaching
SSRP	Secondary School Reform Project
TORs	Terms of Reference
UG	University of Guyana
UNESCO	United Nations Educational Scientific and Cultural Organization
UNICEF	United Nations Children’s Fund
VLE	Virtual Learning Environment

## 2 Summary

### 2.1 The Strategy Described

There is a strong rationale to establish an ICT Professional Development Strategy for Teachers in Guyana. There is strong government commitment to rollout of ICT in education combined with growing allocations of financial resources – both through government budgets and funded projects – to finance this rollout. The rationale for such investments is already well established, both globally and in Guyanese policy proclamations. However, international experience highlights that, without accompanying investment in professional development of the users of this infrastructure, the funds used to procure ICT can lead to significant wastage and high levels of systemic disappointment caused by apparent lack of positive impact of ICT on education outputs. Consequently, there is a need to provide a structured framework, and accompanying professional development offerings, to systematize professional development in use of ICT for teaching and learning in Guyana.

Thus, it is proposed to invest in establishing an ICT Professional Development Strategy for Teachers in Guyana. This Strategy shares the broader vision of the Guyana Ministry of Education's ICT Operational Plan that:

*ICT and other assistive technologies for educational delivery will be supporting a quality and accessible teaching and learning environment at all levels of the education system in Guyana. Further, most graduates of the Secondary level will have attained core competencies in ICT Literacy.*

The long-term outcomes of this strategy will be to ensure that all Ministry of Education officials, teacher development management and staff, school principals, and teachers are competent to harness ICT effectively to support high quality teaching and learning in Guyanese schools, with:

- Most able to integrate the use of basic ICT tools into the standard school curriculum, pedagogy, and classroom structures, knowing how, where, and when (as well as when not) to use technology for classroom activities and presentations, for management tasks, and to acquire additional subject matter and pedagogical knowledge in support of their own professional development; and
- A critical mass able to use more sophisticated methodologies and technologies with changes in the curriculum that emphasize depth of understanding and application of school knowledge to real world problems and pedagogy in which the teacher serves as a guide and manager of the learning environment and students are engaged in extended, collaborative project-based learning activities that can go beyond the classroom and may involve local or global collaborations.<sup>1</sup>

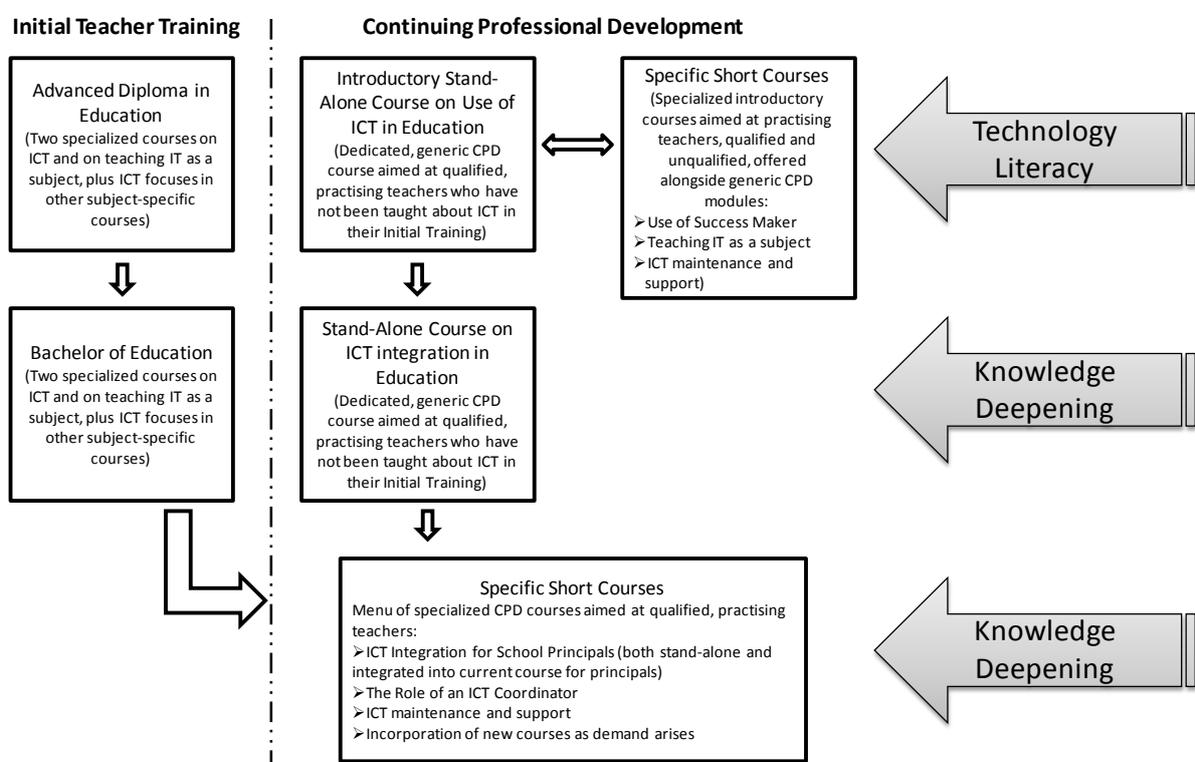
### 2.2 Description of the Strategy

The ICT Professional Development Strategy for Teachers in Guyana will provide a comprehensive framework and learning pathway for Ministry of Education officials, school

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<sup>1</sup> These statements are adapted from: UNESCO. 2008a. *ICT Competency Standards for Teachers: Policy Framework*.

principals, administrators, and teachers to become competent to harness ICT effectively to support high quality teaching and learning. This learning pathway will use the UNESCO ICT CFT as its guiding framework. It will seek to develop core competences for the key intended audiences for a suite of professional development initiatives, as mapped out below.



Thus, the Guyana ICT Professional Development Framework for Teachers will incorporate the following initial professional development options.

- ICT components in the revised CPCE programme (which, according to current plans, will be a two-year programme leading to a two-year Associate Degree in Education):
  - Two compulsory courses to introduce teachers to technology – electronic and otherwise – and then in more detail to ICT in education, equivalent to six semester credits (these courses are anticipated to focus on the level of ‘Technology Literacy’, in terms of the UNESCO ICT CFT);
  - A dedicated focus in secondary subject options to enable teachers to specialise in teaching IT as a subject;
  - Subject-specific ICT integration specializations (incorporated into subject-specific courses, not delivered as separate modules).
- ICT components in the revised UG programme (a further two years of study, which will lead to a Bachelor of Education Degree):
  - Two further compulsory courses on ICT integration in education, again equivalent to six semester credits (anticipated to focus on the level of ‘Knowledge Deepening’, in terms of the UNESCO ICT CFT)
  - A dedicated focus in secondary subject options to enable teachers to specialize in teaching IT as a subject;
  - Subject-specific ICT integration specializations (again incorporated into existing modules, not delivered as separate modules).

- A suite of courses to be offered by NCERD (with the possibility that some may, through a licensing agreement, be delivered by one or more suitable third-party suppliers and quality assured by NCERD). In the next five years, the objective will be to:
  - Create a dedicated module on ICT Integration for school principals, to be integrated into the 18-month course for school principals. In addition, it will be important to offer this module as a stand-alone course for people who have already successfully completed the course without the ICT Integration module. This module will include a specific focus on ‘Using ICT in school administration’.
  - Re-package the four ICT Integration modules being designed for the new CPCE and UG ADE and B. Ed. programmes as into two stand-alone courses for qualified teachers, as well as designing a stand-alone course for qualified teachers who are teaching IT as a subject, but are not formally qualified to do so.
  - Develop a stand-alone course on using Success Maker in schools. This short course will require two versions, one for teachers who are already ICT literate and one for those who are not.
  - Design of a course for ICT Coordinators at schools.
  - Design of a course for ICT maintenance and support personnel.

## 2.3 Key Principles and Assumptions

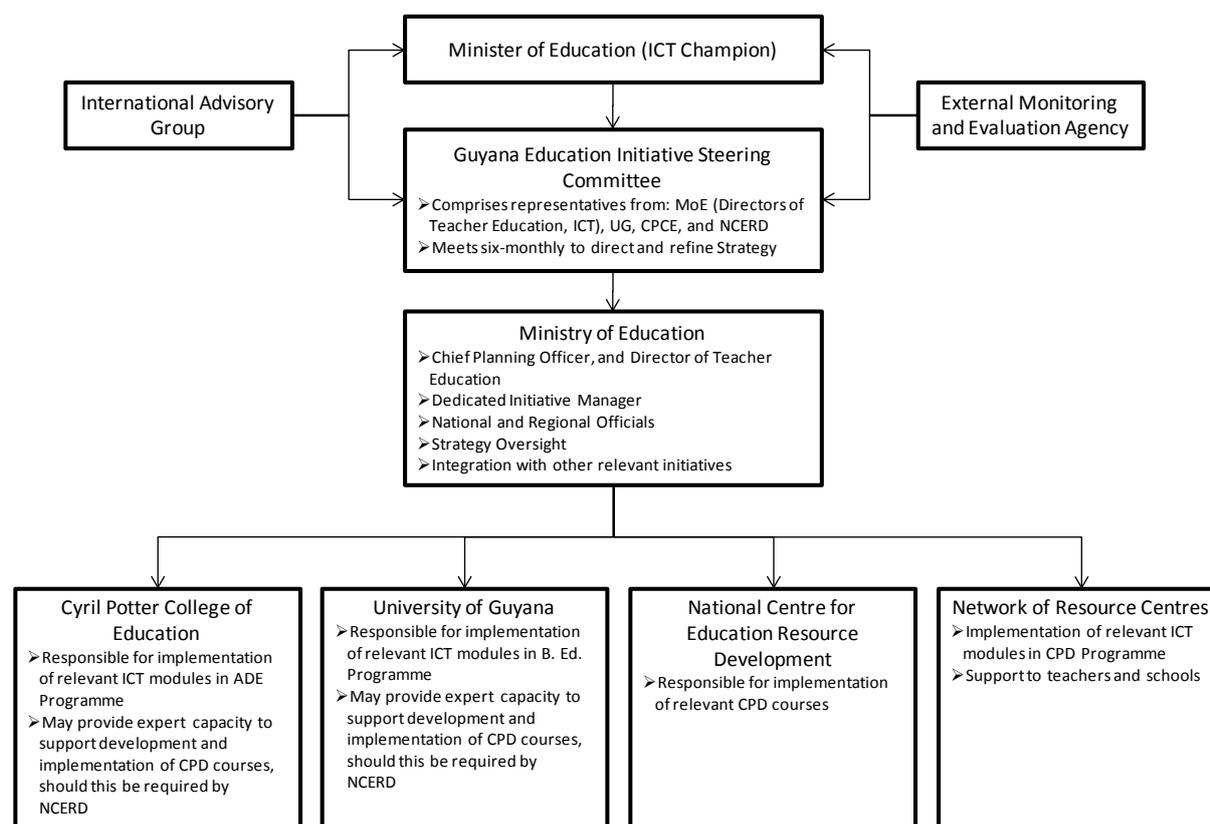
Design of the ICT Professional Development Strategy for Teachers in Guyana has been based on the following key principles and assumptions:

- 1) The design process will ensure that:
  - a) All courses will be competency-based;
  - b) The courses will include appropriate blends of face-to-face learning and use of e-learning.
- 2) The Strategy will integrate the United Nations Educational Scientific and Cultural Organization (UNESCO) ICT Competency Standards for Teachers (CST) into the curriculum design of all courses.
- 3) The CPCE, UG, and NCERD will seek to submit relevant courses and modules that it designs to UNESCO for formal approval as and when the necessary structures are established within UNESCO.
- 4) The ICT Professional Development Strategy for Teachers will seek to construct clear learning pathways for Guyanese teachers to move progressively from technology literacy to knowledge deepening through the initial teacher training and continuing professional development.
- 5) Courses and modules produced through the Strategy will seek to build on and adapt existing national and international courses and modules wherever possible.
- 6) The Strategy will facilitate sharing of all courses/modules and associated educational materials by releasing them as Open Educational Resources (OER) under an appropriate Creative Commons (CC) licence.
- 7) Professional development opportunities will be timed to coincide with rollout of ICT infrastructure.
- 8) Completion of all CPD modules will, as per the policy on Continuing Professional Development, count as credits towards salary increases and promotions.

- 9) The ICT Professional Development Strategy for Teachers will not incorporate any focus on delivery of ICT infrastructure to support professional development of teachers.

## 2.4 A Management Structure for the Strategy

The management structure for the Strategy can be represented diagrammatically as follows:



## 2.5 Three-Year Results

The following results have been identified for the first three years of the ICT Professional Development Strategy for Teachers in Guyana:

- 1) ICT in Education policies and plans are reviewed in order to ensure that results are integrated clearly to take account of necessary dependencies and prerequisites, deadlines are realistic, ICT infrastructure models are suitable for all schools, and full implementation plans are developed.
- 2) An ICT Professional Development Framework for Teachers in Guyana and accompanying implementation guidelines is developed, accepted by all key players in the country, and underpins all ICT-related professional development in the Guyanese schooling system.
- 3) Capacity of all relevant staff at the MoE, UG, CPCE, and NCERD in ICT integration is developed sufficiently to enable successful implementation of the ICT Professional Development Strategy for Teachers in Guyana.
- 4) Completed review and improvement of IT curriculum for secondary students (in support of current plans), taking into account ICT operational plan targets and new opportunities

arising and defining clearly professional development requirements for teachers teaching IT as a subject.

- 5) Development of all ICT Integration courses and associated materials as per requirements of Guyana ICT Professional Development Framework for Teachers, adhering to the UNESCO ICT CFT and formally approved by UNESCO for purposes of international certification as soon as UNESCO has established necessary processes to process such approvals.
- 6) Connected Classrooms portal expanded to include repository of all curricula and content for above courses and modules to be openly accessible.
- 7) Monitoring system established to track implementation of the strategy against key, defined metrics.

## 3 Introduction

### 3.1 Background

Guyana plans to move beyond Technological Literacy into a stage known as ‘Knowledge Deepening’, characterized by an education system where the following is found:

- Knowledge application in complex problem solving;
- The use of ICT tools in knowledge dissemination and sharing;
- The improvement of teachers’ capacity to guide and facilitate learning.

The Guyana Ministry of Education’s ICT Operational Plan sets out the vision that:

*ICT and other assistive technologies for educational delivery will be supporting a quality and accessible teaching and learning environment at all levels of the education system in Guyana. Further, most graduates of the Secondary level will have attained core competencies in ICT Literacy.*

The Commonwealth Secretariat has already worked with a number of key Ministers from the Ministries of Finance and Education to look to conceptualize an ICT Professional Development Strategy for Teachers in Guyana. The Commonwealth Secretariat asked Microsoft and the Commonwealth of Learning to partner in this project. All key stakeholders from the Ministries, as well as the Government of Guyana (GOG), Microsoft, the Commonwealth Secretariat and Commonwealth of Learning fully support this initiative and believe it is consistent with the strategic direction of the Ministry of Education (MoE).

Consequently, Education Impact was approached by Microsoft to support the MoE in Guyana in implementing the ICT component of its 2009-2013 Strategic Plan which has at the centre of its Operational Plan UNESCO’s ICT Competency Framework for Teachers (CFT). To assist the MoE in implementation of the ICT Operational Plan, this Strategy will focus on building capacity of MoE officials, school principals, and teachers in the use of ICT, and specifically integration of ICT into teaching and learning.

Education Impact is a Fellowship of some of the world’s leading experts in all aspects of the use of ICT in education. The Fellows are based in all regions around the world. To complete this work, Education Impact has engaged the services of one its Fellows, Neil Butcher, a South African citizen who runs a consulting firm out of Johannesburg. He has been supported by another Education Impact Fellow, Pedro Hepp, a Chilean national, who understands the Latin American context.

### 3.2 Terms of Reference

This report presents the results of the Consultancy completed by Education Impact. The purpose of this activity has been to develop an ICT Professional Development Strategy for Teachers in Guyana. Education Impact was tasked to:

- Review the Ministry of Education’s Strategic Plan (2008-2013) and relevant documentation;

- Conduct interviews with key staff, which was undertaken during a visit to Guyana by Neil Butcher between 18<sup>th</sup> and 24<sup>th</sup> April, 2010 (for a full list of people consulted during the visit, consult Appendix Two);
- Assess the current education environment (skills, capabilities, processes, frameworks, structures, and infrastructure);
- Compare the current education environment with other countries that have implemented similar strategies to obtain best practices and lessons learnt (presented in detail in Appendices Two and Three, as well as being threaded through the main report);
- Compile a roadmap to migrate from the current state to the new state that is congruent with the overall Strategy for Ministry of Education;
- Develop a migration path and possible scenarios on the CFT-Guyana implementation regarding the possible projects to be implemented;
- Develop a high level plan (scope, high level schedule, resource requirements, risks, and assumptions);
- Develop a funding proposal that could be used to obtain funding for the different projects in the Strategy.

For the purposes of this document, the focus has been on K-12 school education.

## 4 ICT in Education in Guyana

### 4.1 Introduction: Education Context

With a population of about 780,000 (GINA, 2010), Guyana has an urban population of approximately 28%, with much of its population living in the hinterland. Life expectancy is over 62 years for males and over 70 years for females. HIV prevalence is very low at 2.5% in 2008. Education expenditure in 2006 was 8.3% of GDP. In 2008, about 27% (205,000) of the Guyanese population were internet users (CIA, 2010). The distribution of the population, with many people living outside urban areas in geographically hard to reach places, the high prevalence of a healthy population with a high expectancy rate, the education expenditure, and the low internet penetration all have implications for education, particularly education and information and communication technologies (ICT).

### 4.2 The Education System

Guyana's pre-tertiary education system comprises preschool/nursery; primary, and secondary school education. The Ministry of Education (MoE) administers and manages these levels of education under the guidance of a Minister of Education, with 10 regional administrative offices (Wikipedia). Although not compulsory, preschool/nursery education is a two-year early childhood programme open to children who have turned three years and one month. Primary education, for children who are five years and nine months old, is a six-year programme leading to secondary education. Primary school is compulsory and an exit examination, the Secondary Schools Entrance (SSE) examination, is written at the end of primary school to gain entrance into secondary school. Secondary education is dependent on the scores of the SSE examination and offers the following three systems of education:

- Community high school, which is a four-year programme of high school based on imparting practical skills to students, but includes two years of secondary school subjects and two years of vocational education. The vocational aspect of the training involves work placement.
- Multilateral high school is a general high school programme with an emphasis on practical application. At the end of this programme students can take the Caribbean Examination Council (CXC) examinations, leading to the Caribbean Secondary Education Certificate (CSEC).
- The general secondary school programme has a more academic orientation and prepares students for two examinations, the CSEC after five years of the programme, and the London General Certificate of Education (GCE), Advanced Level after another two years (Guyana.org; Wikipedia).

Entrance to any of these systems is dependent on scores obtained in the SSE examinations.

The Ministry of Education also has dedicated special schools, where students with disabilities or special needs are educated following the national curriculum, which can be adapted where necessary to accommodate the needs of the students (Wikipedia).

### 4.2.1 Education Statistics

In 2006-7, according to the Guyana 2009-2013 MoE Strategic Plan, there were 1,217 institutions offering education from pre-school to secondary education. These institutions enrolled 202,551 students, who were taught by a total of 9,303 teachers. The teacher: student ratio at the different levels of schooling ranged from 1:15 to 1:26. Table 1 gives a breakdown of the state of education in Guyana in 2006-2007, the most recent year for which statistics were available.

Table 1 Guyana Education Statistics: 2006-7

Level and Type of Schooling	Number of Institutions	Enrolment	Number of Teachers	Students per teacher
Nursery	426	27 835	1,876	15
Primary	442	106,720	4,058	26
Secondary Department of Primary Schools	243	10,649	500	21
Community High Schools	24	9,533	434	22
General secondary Schools	82	47,814	2,435	20
<b>Total</b>	<b>1,217</b>	<b>202,551</b>	<b>9,303</b>	<b>22</b>

*Adapted from the MoE 2008-2013 Strategic Plan*

The quality of both primary and secondary school education has been questioned, and conclusions have been made that, in the past, it has failed to equip graduates with functional literacy, and it is only at tertiary level that this functional literacy is acquired (MoE, 2004). Most children start school at the appropriate age, enrolment levels at primary school are high and the completion rate is nearly 100 percent, but poor mastery of literacy and numeracy is widespread and student performance in national and regional examinations is low. An Early Grade Reading Assessment<sup>2</sup> (EGRA) piloted in Guyana during the 2008-09 school year (targeting students in grades 2 to 4) revealed that students know almost all of their letters, but not the sounds the letters make, an essential step in learning how to read. In the full sample of 2,700 children, over 60 percent could not read a single word in the first line of a simple paragraph. At the secondary school level, student learning outcomes are also low. In 2008 only 28 percent of the students that presented for the Caribbean Secondary Education Certificate (CSEC) obtained pass rates in English<sup>3</sup> and 31 percent did so in mathematics (World Bank, 2010). Current MoE plans reflect a structured attempt to resolve these problems.

There is low retention of teachers in the Guyanese education system, with a significant number of teachers leaving teaching before retirement age. This has contributed to the employment of untrained and under-qualified teachers, which in turn affects the quality of education made available to the students. In 2007, there were 9,303 teachers across the system, 42% of whom teachers were untrained. Table 2 summarizes the number of teachers at each level, and specifies those who were trained and those who were not trained.

<sup>2</sup> EGRA is a diagnostic instrument used to rapidly assess pupils' literacy acquisition that was developed by Research Triangle Institute (RTI) of Washington, DC and customized for use in Guyana.

<sup>3</sup> This indicator is for English A General Proficiency Exam from the May-June 2008 sitting.

Table 2 Teachers in Guyanese Schools in 2007

School/Level	Trained Graduates	Untrained Graduates	Trained Teachers	Untrained Teachers	Total
Nursery	118	3	882	873	1 876
Primary	194	2	2,134	1,728	4,058
Secondary Department of Primary	11	1	201	287	500
Community high school	39	13	181	201	434
General high school	317	162	1,125	831	2,435
<b>Total</b>	<b>679</b>	<b>181</b>	<b>4,523</b>	<b>3,920</b>	<b>9,303</b>

Source: MoE Strategic Plan 2009-2013

The Ministry of Education has, as one of its priorities, improvement in the number and quality of trained teachers. There is currently a high absenteeism rate among teachers that also needs to be addressed as it is believed to be affecting student performance (MoE, 2008a).

In addition, many teachers enter and remain in the profession without the necessary academic qualifications and/or professional training. In 2008, out of 8964 teachers nationwide at all levels of education, 40 percent remained untrained, (i.e., had no formal certification as educators)<sup>4</sup>. Furthermore, many trained teachers continue to use teacher-centered methodologies to deliver the curriculum which prevent students from meaningful learning and developing higher cognitive, problem-solving skills. These problems have been identified as a primary contributor to low student achievement in the country. Therefore, teacher education and training has been placed squarely at the forefront for addressing ineffective teaching and low quality of learning in the classroom (World Bank, 2010).

#### 4.2.2 Teacher Education

Two institutions offer initial teacher education in Guyana, the Cyril Potter College of Education (CPCE) and the University of Guyana (UG). The College offers a three year certificate programme in Early Childhood Education, Primary and Secondary, and successful graduates earn a Teacher Certification which qualifies them as trained. The CPCE has its main campus at Turkeyen and it operates 14 other regional centres that provide in-service training via a distance mode for untrained teachers who are already teaching in the system. Initial teacher training with the College for post-secondary students, at all levels of schooling is three years full-time, and for practising teachers is three years part-time (World Bank, 2010). This training includes three compulsory courses on ICT for both full- and part-time students, an Introduction to Computers, Introduction to Computers Part 2, and a Course on Advanced Office Skills. These courses are offered both on main campus and through the Regional Centres (adjusted as appropriate to take account of ICT infrastructure constraints at the different Regional Centres).

<sup>4</sup> From the 2006-07 academic year to the 2007-08 academic year, the teaching force decreased in size by 3.4 percent, but the majority of teachers leaving were in the category of untrained teachers with a decrease of 9.1 percent.

Teacher training at the University of Guyana is offered in the School of Humanities and Education, and requires more stringent entry qualifications than those at the CPCE. The University requires more CXC subjects with Mathematics and English as compulsory subjects. UG offers a four-year Bachelor's Degree in Education (B.Ed.) which theoretically accommodates entrants directly from high school, but this has been defunct for many years. Consequently, CPCE is the feeder institution for the School of Education and Humanities (World Bank, 2010).

It takes the average teacher seven years of schooling to earn a degree: three at the college and four at the university. A person must first complete the certificate programme and then acquire two years of teaching experience before applying for the B. Ed. programme. Although there is some overlap in the Certificate and Bachelors programmes, and although the same instructors are often teaching both in the College and at the University, those wishing to pursue a B. Ed. must start from scratch and take the entire four-year programme. The perception by the University that the quality of graduates from the College is low has perpetuated this requirement. As a result, it takes nine years to obtain a B. Ed. in Guyana, which is four to five years longer than in most countries (World Bank, 2010).

This and other related problems associated with quality of initial teacher education are being tackled in a new project currently being designed by the World Bank (hereafter referred to as the Guyana-World Bank Project on Improving Teacher Education), which will seek to:

- 1) Support collaboration between the CPCE and the University of Guyana to produce a well articulated, highly competitive teacher education and training programme, equal in scope and quality to any within the region;
- 2) Build human resource capacity at CPCE and UG to improve the quality of education provided for and by teachers in the education system;
- 3) Improve Science and Technology Education;
- 4) Increasing CPCE and UG's capacity in relation to ICT to strengthen their abilities to become true dual mode institutions and integrate ICT into the teaching and learning process;
- 5) Expand library services and improving research capacity (World Bank, 2010).

The challenge of unqualified teachers is felt more in the hinterland, as most teachers from coastal areas do not want to take up teaching positions in the hinterland. As a result, most teaching in the hinterland falls in the hands of local women, who themselves have not completed secondary education and with no access to mentors to guide them. The Guyana Basic Education Teacher Training (GBETT) project, funded by the Canadian International Development Agency (CIDA) focused on getting teachers to achieve their secondary school qualification equivalency before enrolling for a distance education teacher training qualification (CIDA, 2001). GBETT is a 15-credit course offered through distance education and supported by monthly tutorials supported by Master Trainers across the country (MoE, 2009).

In-service teacher training is the responsibility of the National Centre for Educational Resource Development (NCERD) and other accredited providers (for example, the Guyana Human Rights Association, the Book Foundation, and various church bodies). A policy proposal to make continuing teacher development the basis of promotion and salary

increments has been proposed in the *Policy on Continuous Professional Development*. NCERD proposes that teachers should be required to complete courses with a credit value of at least 12 credits during their first five years of teaching. Subsequently, six credits should be acquired within every five years of teaching for teachers to receive two salary increments.

Currently, NCERD has developed several courses for in-service training, and uses a cascade model to train teachers in face-to-face training, through distance learning, and through a blended format which combines face-to-face learning with e-learning. Four of these courses are relevant for preparing teachers to integrate ICT into teaching and learning:

- Basic Information Technology Skills (delivered to an estimated 783 teachers to date);
- Audio Visual/Multimedia in Classroom Instruction;
- Maintenance of Multimedia Equipment; and
- Use of Multimedia in Classroom Teaching.

Courses offered at NCERD are both short (one or two credits) or longer (between six and 15 credits). Courses are free of charge. The aforementioned ICT courses are worth either one or two credits (MoE, 2009). What is not clear in the policy and perhaps something that deserves attention is careful thinking about how various courses could be aligned or combined to form a whole qualification. For example, if a teacher completes all of the aforementioned ICT related courses, he or she will get six credits. If a national certificate is worth 15 credits, it would be useful to chart pathways for attainment of a certificate in an ICT-related qualification, either by pointing out which other courses can be combined with the four already existing ones or developing other ICT relevant courses to combine with these four to form a whole qualification.

Examples of courses offered by NCERD include that, by the end of 2009, 200 primary school teachers had received a one-week basic computer training course. About 700 teachers have expressed interest, through application, in receiving this training (MoE, no date). In addition, workshops on how to teach reading were conducted for second-year nursery teachers and Grade 1 to 3 teachers in five regions. The number of teachers who were trained in these workshops is not specified but follow-up visits revealed that the trained teachers were making use of the methodologies they had learned during the training (MoE, no date)

As a final example, a one-week workshop on preparing teachers to teach Information Technology and Electronic Document Preparation and Management as subjects, facilitated by two presenters from Trinidad, was attended by 86 teachers. At this workshop, all the content for the syllabus was covered and peer collaboration was established for teachers who indicated they were having difficulty in delivering the content (MoE, no date).

NCERD also offers an 18-month course to school principals, delivered using a blended mode (including some recent use of online support). This course used materials from the Commonwealth of Learning (COL), and was initially implemented in pilot form through the GBETT Project, before being scaled up and offered regularly through NCERD. The course comprises nine modules, and leads to a Certificate and credits for promotion. Over 800 people have taken this course to date. However, the course currently includes no specific focus on ICT integration in the curriculum.

In courses given by NCERD, monitoring and evaluation are an integral part. Teachers enrolled on a course are encouraged to perform self evaluation, while a senior education official observes the teacher's classroom practice to evaluate change in practice as a result of the training (MoE, 2009). While this method is useful, it is not clear if there is other long-term evaluation to evaluate sustainability of retention and application of skills and change in practice beyond the training. It may be easy for teachers to model new skills during the training but long term impact is what leads to sustained improvement of student results. As such, impact evaluation would be useful to evaluate the degree to which training may be washed out over time.

### **4.3 ICT in Education Policy and Implementation Strategy**

The broad vision of the role of ICT for national development is encapsulated in the ICT4D Guyana National Strategy of 2006, aiming to contribute to economic growth and social transformation, where 'all citizens, businesses and public institutions in Guyana will have an opportunity to participate in the information and knowledge society'. This strategy emphasizes that ICT is a key component for national development in the 21<sup>st</sup> century, and acknowledges that the digital divide in Guyana provides challenges of access to and use of ICT. The strategy suggests that a useful way to bridge this divide is to have a coordinated plan for ICT development in the country, guided by the five focus areas of:

- Capacity building;
- Development of content and applications;
- Infrastructure and connectivity;
- Legislation and regulations; and
- IT enterprise development.

The central role of education is through the capacity building focus, where ICT skills can be developed through integration of ICT into the education and training system (Government of Guyana, 2006). As part of this, Information Technology (IT) is available as a secondary school subject in Guyana for all grades in secondary school. The curriculum adopts an incremental approach to the teaching of IT, which begins with basic understanding of the rules and safety of the laboratory to understanding the computer before engaging in application activities and tasks like word processing, using the spreadsheet, using the internet, desktop publishing, and advanced word usage. The premise of the curriculum is that only those with access to computers should partake in this curriculum, hence, schools with no computer facilities are discouraged from making use of this curriculum. The MoE is intending to review and revise the IT Curriculum in 2010.

The role of education in developing an ICT-enabled workforce is endorsed in the MoE Strategic Plan 2008-2013, which recognizes the importance of ICT in enhancing educational experiences of students. The importance of ICT in national development and how this articulates with the education agenda is reflected twice in the MoE Strategic Plan. In Section 3.3.4 of the Plan, it is suggested that technology can be used to support classroom instruction and for delivering distance education programmes to mitigate the shortage of skilled teachers. In Section 3.8, it is mentioned that ICT can be used for administration and to support delivery of quality education, as well as producing graduates who are ICT literate (MoE Strategic Plan 2008-2013, 2008a). These two focuses reflect the role of ICT in bringing

about efficiencies of delivery and developing an ICT literate workforce, factors that are inextricably tied with national development goals.

### 4.3.1 MoE 2008-2013 Strategic Plan: Focus on IT

The MoE 2008-2013 Strategic Plan has an IT component, which emphasizes that achieving full potential to human development can be facilitated by a relevant educational curriculum which includes, amongst other skills, learning of foreign languages and exposure to computer training. The MoE believes that use of ICT in education will improve the quality of educational experience and students' results (MoE IT Component of Strategic Plan 2008-2013, 2008b).

There are three national goals whose achievement can be supported by ICT and education. These are stipulated in the IT Component of the MoE Strategic Plan 2008-2013.

*Table 3 How ICT in Education can Support National Development Goals*

National Goal	Strategic Implication for MOE
Improve competitiveness of industries	<ul style="list-style-type: none"> <li>• Produce IT Literate graduates.</li> <li>• Produce lifelong learners.</li> <li>• Produce students who excel in IT and can move on to higher learning.</li> <li>• Produce IT competent graduates at the technical level using the Tech-Voc intuitions.</li> </ul>
Improving the delivery of health and education services	<ul style="list-style-type: none"> <li>• Accelerate the use of ICT in the teaching learning process.</li> <li>• Expand the use of IT in remedial education.</li> <li>• Use the Internet to deliver distance programs (for students and teachers).</li> <li>• Encourage collaboration between students and teachers.</li> <li>• Use ICT to support student learning beyond the classroom (homework, discussion, etc).</li> <li>• Implement a system for the development of local content for student learning.</li> </ul>
Developing human resources in ICT	<ul style="list-style-type: none"> <li>• Make greater use of the work-study programme for exposing students to ICT work experience.</li> <li>• Train all teachers in the capacity to use ICT for curriculum delivery.</li> <li>• Collaborate with the University of Guyana to prepare students for entry to the Computer Science programme.</li> </ul>

*Source: IT Component of the MoE Strategic Plan 2008 -2013*

As Table 3 shows, there is a relationship between use of ICT for teaching and learning and the production of an IT literate citizenship that will provide an IT literate workforce for a competitive industry and development of the country. The MoE recognizes that effective use of ICT for teaching and learning and the resultant benefit of an ICT literate workforce hinge on good preparation of teachers to use the ICT effectively for teaching and learning. Linked to this, a Foresight Programme is currently being undertaken as a five-year scoping exercise in Guyana, which envisages learners who will be able to: identify and solve problems and make decisions using critical and creative thinking strategies; work effectively with others as a member of a team, group, organization and community; access, analyse, organize, critically evaluate, integrate, present and communicate information; create knowledge and new

information by adapting, applying, designing, inventing, and authoring; communicate effectively using visual, symbolic and language skills in various modes; and function effectively in a knowledge society using appropriate ICT and mastering communication and collaborative skills.

The following goals are set for this five-year plan:

- 1) To develop in 50% of primary students the capacity to use the computer for learning;
  - 2) To have by 2012 at least 20% of all secondary students passing CXC IT;
  - 3) By 2012 to have all secondary graduates ICT literate based on criteria to be established;
  - 4) To improve the success rate of students taking introductory IT courses at the University of Guyana to greater than 75%;
  - 5) To double the technical ICT graduates from the Tech-Voc institutions and to increase the areas of specializations;
  - 6) To reach all secondary students with quality web based content delivered over the Internet for core subject areas;
  - 7) To upgrade the capacity of all teachers to use ICT for teaching and learning;
  - 8) To help reduce the number of primary students entering secondary schools falling below a minimum standard in Mathematics and Language by 50%;
  - 9) To provide information and learning services to the general public;
  - 10) To create greater partnerships with community and industries for sustainability.
- (MoE IT Component of Strategic Plan 2008-2013, 2008b).

#### **4.3.2 The ICT in Education Operational Plan**

The Ministry of Education Guyana has an ICT Operational Plan for enhancing teaching and learning in the education sector 2009-2013, which was developed in 2008 as a deliverable of the Strategic Plan 2009-2013 (specifically Activity 1.10: *Develop an ICT strategic plan aligned to the MoE Strategic Plan*). The vision set out in the operational plan is that

*ICT and other assistive technologies for educational delivery will be supporting a quality and accessible teaching and learning environment at all levels of the education system in Guyana. Further, most graduates of the Secondary level will have attained core competencies in ICT Literacy (MoE ICT Operational Plan 2009-2013).*

The operational plan recognizes that integration of ICT into education is based on addressing issues of content, access, competency, and the actual integration of ICT into teaching and learning, which is intricately tied with teacher and student competencies in the available technologies. This operational plan has the following targets:

1. To improve students access to technology and tools for learning:
  - 1.1. 100% secondary schools with computer labs;
  - 1.2. 50% primary schools with computer labs;
  - 1.3. All Tech-Voc with adequate ICT resources;
  - 1.4. All CPCE and Support centres resourced;
  - 1.5. All sites with broadband Internet access;
  - 1.6. TV time increased from 4hrs/day to 6hrs/day;
  - 1.7. TV expanded to major population centres;
  - 1.8. DVDs of TV modules available at all schools.
2. To expand the use of Success Maker / ICT to improve student performance:
  - 2.1. 50% of primary school using Success Maker;

- 2.2. Subjects delivered with Success Maker increased;
- 2.3. Interactive whiteboard piloted in 20 schools.
3. To create content for effective student/teacher learning:
  - 3.1. A multimedia centre set up and resourced;
  - 3.2. Math and English TV modules revised;
  - 3.3. Science and ICT modules developed;
  - 3.4. A content repository established;
  - 3.5. Teacher training materials via eLearning;
  - 3.6. School manager training converted for eLearning;
  - 3.7. Teachers trained in developing Learning Objects;
  - 3.8. Selected courses at UG developed and offered online through support from CKLN (lecturers encouraged to provide electronic content for all courses);
  - 3.9. Teachers trained in accessing and using Internet;
  - 3.10. Tec-Voc Skills Training modules for selected subjects created for TV.
4. To improve the competencies of students and teachers to use ICT and be prepared for work:
  - 4.1. ICT based learning incorporated into curriculum;
  - 4.2. Teachers trained in use of ICT for teaching;
  - 4.3. Students exposed to essential ICT tools;
  - 4.4. ICT modules to become required part of programs at Tec-Voc and Tertiary levels.
5. To utilize ICT to address the needs of learners in the 21<sup>st</sup> century:
  - 5.1. Develop policy for open and distance education;
  - 5.2. Establish body to oversee open and distance education.

(MoE ICT Operational Plan 2009-2013).

## **4.4 ICT in Education Initiatives**

Generally, levels of access to computers and internet connectivity have been relatively low in Guyanese schools and communities, although this is now improving. Fewer than 10% of all primary schools have computer laboratories and access to the Internet, and fewer than 25% of all secondary schools have adequate computer laboratories, with fewer than 20% having access to the Internet and television time on National Communications Network (NCN) for revision modules (MoE, 2008b). There are several projects that have aimed to contribute to equipping schools with computer laboratories and computers, as well as providing other kinds of ICT input. These are outlined briefly below.

### **4.4.1 Computers for Schools Project**

The Computers for Schools project was funded through the Canadian Global Partners in Literacy project and brings together SchoolNet Guyana and the Ministry of Education in a project to integrate ICT into Guyanese communities and schools (Strabroek, 2010). Currently, five secondary schools have been given a laboratory which was equipped with 30 computers (MoE, no date).

#### **4.4.2 Secondary School Reform Project**

The primary objective of the Secondary School Reform Project (SSRP), which concluded in 2004, was to initiate a long-term, multi-phased education reform programme to improve quality, relevance, equity and efficiency of secondary education in Guyana. More specifically, the project aimed to:

- Develop measures to improve the quality and efficiency of lower secondary education and test them at a limited number of schools in order to gain acceptance before extending the reform to the rest of the system;
- Improve the school environment by supporting rehabilitation and repair of schools; and
- Enhance the ability of national and regional institutions to design, plan for, and implement sustainable education reforms.

As part of this process, the Project financed the establishment of the School Information System (SIS), which would be a permanent mechanism to compile, process and store information on: (a) individual students (b) student learning outcomes assessed on a sample or census basis; (c) teachers and staff; (d) teaching methods and curricula; (e) textbooks, other instructional materials, equipment, and furniture; (f) school sites and buildings; and (g) communities and school catchment areas. However, this activity was only partially successful, so work is ongoing in Guyana to take this forward since the project concluded.

As part of the effort to expand access to information technology, the project procured computers for a laboratory for the CPCE (16 computers) and a computer laboratory was installed in each of the 12 pilot schools. Each pilot school laboratory consisted of a network with one server, four computers and a printer. In addition, a set of educational software CDs was provided to the schools. The laboratories proved very popular, being intensively used by the schools. Most schools assigned an IT teacher who was responsible for providing IT classes as part of the curriculum. Many schools took advantage of the newly built computer laboratories and have installed more computers (many are donations or second-hand) so that more students and teachers can use the laboratories and be exposed to information technology. To allow for proper laboratory set up, the SSRP installed air conditioners in each laboratory and procured office-type computer tables (World Bank, 2004).

#### **4.4.3 Primary Education Improvement Project (PEIP)**

In Primary Education Improvement Project (PEIP), four computer laboratories were installed in primary schools (MoE IT Component of the Strategic Plan 2008-2013, 2008b).

#### **4.4.4 Basic Education Access and Management Support (BEAMS) project**

The Basic Education Access and Management Support (BEAMS) Project responds to a history of poor literacy and numeracy levels at high school graduation that poorly prepares students for higher education. The project is aimed at providing intervention at nursery and primary levels. At nursery level, the programme focuses on the relationship between the word and phonics, and at primary level the programme emphasizes the role of the teacher as facilitator rather than repository of knowledge in the teaching of maths, using an activity

oriented approach through interactive radio instruction (MoE, 2004). As highlighted above, the SSE has been the exit-level examination from primary to secondary school. This is considered a weakness and BEAMS piloted a continuous assessment programme at Grades two, four and six which enabled teachers to assess weaknesses and areas of intervention as students progressed through their primary school education, allowing for early intervention, and consequently, better results in the primary school exit examination (MoE, 2004).

As part of implementation of the BEAMS project, 14 schools have been equipped with computers, using a three-model framework for allocation of computers, that is:

- Model 1 schools were equipped with 15 computers and one server
- Model 2 schools were equipped with five computers and one server
- Model 3 schools, mostly in the hinterland, were equipped with one laptop each (MoE, 2008c).

In addition, by June 2009, jolly phonics kits and scholastic libraries had been distributed to 200 schools in all regions (MoE, no date).

Residual funds from the BEAMS Project were used to widen this impact to a further 60 schools, starting in August, 2009. In parallel, The MoE has invested in school/classroom infrastructure to house these additional computers, with training support being provided by NCERD. The MoE estimates that approximately 200 primary schools have received one computer and peripherals for administrative use, while another 79 received, or will receive, computers for teaching and learning purposes through BEAMS. A limited number of additional schools have also purchased their own ICT infrastructure.

As part of the BEAMS Project, students work through 15-30 minute numeracy and literacy exercises, based on the computer's self diagnosis of a student's level of competence. The programme has a result management system that allows the teacher to view the students' results and identify potential remediation areas that he/she can then address in his/her teaching (MoE, 2008c). A weakness of the programme may be that students in Models 2 and 3 schools do not get as many chances as Model 1 school students to practice their numeracy and literacy exercises because of the limited availability of computers.

Because of its focus on curriculum and teaching methodology change, BEAMS has also focused on teacher training. BEAMS methodologies are included in the Cyril Potter College of Education teacher training curriculum and the revision of main textbooks (MoE, 2004).

#### **4.4.5 Improvement of ICT Equipment for Teacher Education**

By the end of 2009, a training and experimental laboratory had been completed at NCERD. The laboratory will be used as an IT training centre by the MoE and new technology that can be used in schools, while the information management system will be tested and verified there. The laboratory will be used for IT training of teachers, including basic computer literacy, troubleshooting, and technical aspects, including repair of computers.

According to the Proposal for the Improvement of ICT at CPCE, lecturers have to be trained in use of ICT for teaching and learning so that they can use technologies for their courses, and some of them can teach students ICT courses on a two-year associate degree. To

accomplish the integration of ICT for lecturing, the Information Technology Department needs a computer laboratory with some of the following equipment: 120 desktop computers, two servers, 40 laptops, digital cameras, educational software, wireless routers, and virus protection. The cost of setting up this laboratory is estimated to be US\$905,000.

#### **4.4.6 Success Maker**

A remedial teaching programme, Success Maker, was originally rolled out for use by 40 teachers in 20 schools, by 1,084 Grade 1 to 3 learners (MoE, 2008d). This project is based on mathematics and English remedial teaching. The results seem to be that Success Maker raises numeracy and literacy levels among underperforming students (MoE, 2008a). It is reported that teachers have also reported a positive behavioural change in the classroom among the students using Success Maker (MoE, 2008b).

By the end of 2009, teachers in 25 schools were retrained on the use of Success Maker. The trained teachers gave positive feedback about the training, particularly that it was aligned to the curriculum. Because of the envisaged improvement of literacy and numeracy results among students due to Success Maker, an additional 2,000 licences of the programme have been procured so that the programme can be rolled out to 50 schools (MoE, no date). It should be noted that teachers require ICT literacy training before they can use Success Maker. It is estimated that 250 teachers have received such training to date.

#### **4.4.7 Connecting Classrooms**

The United Nations Children's Fund (UNICEF) sponsors the 'connecting classrooms initiative,' a project that makes use of the internet to virtually connect multiple students and classrooms. An aim of the project is to get students and teachers to source information, engage critically with issues, demonstrate critical thinking and problem solving, and collaborate with peers. Another aim of the project is to enhance 'participation, performance, coaching and mentoring for students, teachers, parents and interested public which can enable young people to develop the skills and create opportunities to act as agents of positive social change' (Stabroek, 2009). Currently, only 12 schools are participating in the Connecting Classrooms project (MoE, no date). A two-day information session on the project has been held, which was attended by 86 teachers (MoE, no date).

#### **4.4.8 Current Financing of Projects**

There are several budgets for funding of ICT in education related projects in Guyana. There is a budget allocation of G\$21.4 billion for equipment and learning materials, which includes ICT, in the MoE Strategic Plan. The strategic plan 2009 -2013 also allocates G\$419,000 annually for five years for education for ICT-driven development. The estimated budget for implementation of the ICT operational plan for 2009 and 2010 is US\$3,415,219.

The IT component of the MoE 2009-2013 Strategic Plan specifies an implementation budget of US\$10,357,500 for explicitly specified budget line items, of which the Government of

Guyana (GOG) is supposed to bear the lesser component of the cost, with other funders specified bearing the bulk of costs of implementation over five years.

*Table 4: MoE funding projections for ICT implementation in Guyana*

Action		Cost (US\$)	Funding Sources
1.1	GIS/EMIS Implementation	5,000	IDB/BEAMS
1.2	School lab space	200,000	GOG
1.3	Computer Equipment	7,220,000	Partners + GOG
1.4	Internet Access	262,500	Corporate Sponsors
1.5	Software	700,000	GOG
1.6	Support Centres	100,000	GOG
1.7	School IT Coordinators	630,000	GOG
2.1 + 2.2	IT at grades 7-11	100,000	GOG
2.3	Teacher guides	100,000	GOG
2.4	Self learning	20,000	GOG
2.5	Application of ICT	10,000	GOG
2.6	Tech-Voc ICT Curriculum	10,000	GOG
2.7	ICT in remedial education	100,000	GOG
2.8	On-line courses	100,000	GOG
2.9	School portal	20,000	GOG
2.10	Teacher training in ICT	330,000	GOG
2.11	Linkages with academia/industry	10,000	GOG
3.1	Complete EMIS	100,000	IDB/BEAMS
3.2	MOE Web	20,000	IDB/BEAMS
3.3	MOE Intranet	20,000	IDB/BEAMS
3.4	IT Organization	300,000	GOG
TOTAL		10,357,500	

*Source: IT Component of the MoE Strategic Plan 2008-2013*

The Government of Guyana's contribution to the above costs is US\$4,950,000 over five years. The number of institutions targeted for the five-year period for equipment is 200 primary schools, 120 secondary schools, eight vocational training centres, five support centres, and a laboratory at NCERD. Considering the current context of 791 primary and secondary schools, if these projections of equipping primary and secondary schools with ICT equipment are achieved, this will account for almost 40% of primary and secondary schools equipped. The plans are also that 6,816 teachers be trained in the use of ICTs for teaching and learning. Considering the current number of 9,303 teachers in the education system, training the specified number of teachers will account for training of 73% of the teaching workforce. Both the projections for equipping schools and training of teachers look very ambitious, given that current projects with very large budgets (that is BEAMS, PEIP and the Computers for School Project) have only managed to install a limited number of computers in only schools and trained relatively few teachers at quite basic levels. Perhaps with dedicated project management and adequate budgets and human resources, the set targets will be realizable. As the main centre for IT training for the MoE, the NCERD laboratories seems to be very small for the number of teachers that need training, unless the plans are that school laboratories will be used as centres of training, which will be an efficient way to

train teachers and may be more effective as they will be receiving the training in familiar contexts.

The output budget for the MoE ICT Operational Plan is only for two years, yet the operational plan and the IT Strategic Plan are for five years. This raises questions of sustainability, about what will happen after the two years funding budgeted for is exhausted. Further, the budget does not present quantitative data. For example, there is a lump sum of US\$600,000 in 2009 and US\$900,000 in 2010 for computer laboratories in primary and secondary schools, as well as vocational institutions and the CPCE. However, it is not clear what the per-sector allocation is, how many laboratories specifically are to be equipped, and whether the costs include buildings or just computers and other equipment (and how much equipment will be supplied in each laboratory). Further, the budget does not take into consideration fixed and recurrent costs, for example equipment costs are recurrent. In the first year, the price of computer purchases is typically high but, in subsequent years, there are maintenance costs which vary according to the number of problems that may occur. Connectivity costs are fixed costs which also vary according to usage, and it is not clear how connectivity will be sustained. It may be useful to make a distinction between types of costs.

There are separate budgets for Success Maker project over the next five years. The NCERD has its own budget, as does the CPCE. Although it is useful for each project to have its own budget, it is important that the budgets articulate with each other, and that it is clear that resources available are being used efficiently and effectively. Further, it is useful for each budget to reflect on how it will draw from the MoE ICT related budget. It would be useful to have a detailed budget template that identifies quantity specifically and escalates costs each year to factor in inflation and resultant changes in prices of goods and services. As such, as the country embarks on its ICT in education development journey, it may be useful to have an overall ICT in education development project manager who analyses the different budgets and rationalises them so that a broad overview of where the funds allocated are going and how they are being spent emerges. This project financial tracker would also be useful for informing future spending on ICT in education development projects.

## **4.5 Implications for an ICT Professional Development Strategy for Teachers in Guyana**

As the above analysis demonstrates, there are already several initiatives underway in Guyana designed to ensure more effective and widespread use of ICT in education. This provides an excellent framework for development of an ICT Professional Development Strategy for Teachers for the country. However, it is also clear that there are significant challenges contained in the above review, which have important implications for this Strategy. These can be summarized as follows:

### *1) Integration Between Initiatives*

The above analysis notwithstanding, it has been difficult to secure systematic and rigorous documentation of the design, implementation, and impact of ICT-related projects, or how they articulate with each other. Communication between different key

players in Guyana did not always seem to be either regular or coordinated, which will be essential for success of an ICT Professional Development Strategy for Teachers if it is not to become simply another project that is implemented in parallel with, and potentially duplicating, other similar initiatives. Thus, it will be essential that the ICT Professional Development Strategy for Teachers in Guyana seeks to bring together and consolidate existing activities, rather than seeking to replace them or operate in parallel with them. Of particular importance will be to ensure that the Strategy is integrated, and becomes part of, the Guyana-World Bank Project on Improving Teacher Education. From this perspective, a key to success of the ICT Professional Development Strategy for Teachers will be to ensure that there are structured, ongoing channels of communication between the MoE, NCERD, CPCE, UG, and all other key players focusing on aspects of school ICT integration, which aggregate all current project plans into a single, integrated reporting and monitoring framework and ensure that all key role players are complementing the work of the others.

## 2) *Ambitious ICT Targets*

The MoE's operational plans include several ICT targets that seem quite ambitious on the face of it. For example, plans to provide 100% of secondary schools and 50% of primary schools with computer laboratories by 2013 may be harder to achieve than anticipated, as may the objective to ensure that all schools have Internet access by that time (notwithstanding current government plans to put in place a National Government Network to supply this connectivity). Experience in other parts of the world indicates clearly that ambitious targets such as these are typically not met within the expected timeframes. This should not be interpreted to suggest that the targets should be revised, but strategies focusing on professional development of teachers to use ICT need to remain sufficiently flexible to take account of potential delays in infrastructure rollout. There is no point, for example, in developing the capacity of school principals to develop ICT Integration Plans for their schools until such time as rollout of ICT is imminent. Likewise, there is little point in teaching practising teachers to use ICT if their school is unlikely to receive ICT infrastructure for another 12 months. Such capacity building activities will generally have no impact (or potentially even a negative impact, as they may serve to mystify technology and thereby disincline teachers from engaging with it).

In addition, global experience suggests strongly that it is unwise to base plans on any expectation about the speed and scale of connectivity rollout. Although it undoubtedly true that Guyana's overall extent and penetration will expand over the next five years, the speed of rollout into schools, and the quality of bandwidth that will be supplied, will be very hard to predict. Consequently, plans to provide professional development to teachers should be sufficiently flexible to accommodate this uncertainty, rather than assuming that this rollout process will, for example, enable all teachers to study online on broadband Internet connections within three years.

Finally, the target of upgrading 'the capacity of all teachers to use ICT for teaching and learning' by 2013 also seems optimistic, although it is unclear how much capacity development is expected. Nevertheless, delivering effective professional development to thousands of teachers in four years, many of whom have no access to ICT and are located in geographically remote areas, using institutions that are already stretched to

capacity seems unattainable. This plan will seek to propose a series of more attainable targets.

3) *Current Parameters of ICT Rollout*

It is equally important to note the parameters of current ICT rollout targets in Guyana. Clear priorities have already been defined, within which the ICT Professional Development Strategy for Teachers in Guyana should be clearly located and which should serve to guide it. For example, the focus through until at least 2013 will be to provide schools with a single computer laboratory. Consequently, expectations regarding the amount of time that teachers and learners will be able to spend using computers should be kept reasonably modest and take into account these constraints. It will be important not to generate unrealistic expectations about the number and variety of problems that will be solvable using this relatively limited infrastructure, as this will generate an unjustified sense of failure in the investment, undermining its potential effectiveness. Similarly, there is no point in pushing very sophisticated models of ICT classroom integration, where these assume regular sustained access to ICT by both teachers and learners, because ICT infrastructure rollout plans for the next few years (already potentially ambitious logistically) will place a relatively limited ICT infrastructure into schools. Rather, the ICT Professional Development Strategy for Teachers in Guyana should seek to provide 'just-in-time' training to teachers, to help them use what they have effectively and immediately, with a corresponding focus on harnessing ICT to reduce workload, while laying a platform for future growth and development pathways.

4) *Defined Curriculum Priorities*

Linked to the previous observation, there are some clear curriculum priorities already defined, which should be actively supported by the ICT Professional Development Strategy for Teachers in Guyana. Most notably, there is, at primary (and increasingly, secondary) level, a strong policy commitment by the MoE in Guyana to use Success Maker as a key remedial software application. Although it would be unwise to focus teacher professional development exclusively on this software application, it would be equally imprudent not to provide direct, and immediate, support for its rollout through the ICT Professional Development Strategy for Teachers in Guyana (at least for as long as it is government policy to procure and use Success Maker). Likewise, the MoE targets to have, by 2012, 'at least 20% of all secondary students passing CXC IT and 'all secondary graduates ICT literate based on criteria to be established' will need active support in terms of the professional development focus for teachers. As an aside, though, the latter objective seems unlikely to be attainable given that the MoE's plan is only to have rolled out laboratories to all secondary schools by the end of 2013. This, combined with observations above, suggest there would be merit in a comprehensive review of current ICT targets in order to determine their viability and to consider prerequisites for achievement.

5) *Levels of ICT Proficiency of Teachers and Principals*

Although there is no quantitative data on ICT competence levels of teachers, anecdotal evidence, combined with data on the extent of delivery of some or other form of professional development to teachers in the past five years, suggests strongly that the vast majority of teachers in Guyana will either be at introductory levels of proficiency in

use of ICT or will not yet have had any exposure to ICT. While there are no doubt some teachers who have embraced technology and/or had exposure to relatively advanced professional development opportunities, these will be in the minority, and thus should not be the primary focus in the ICT Professional Development Strategy for Teachers in Guyana. Rather, the pressing need will be for professional development at the Technology Literacy level (see UNESCO ICT Competence Framework for Teachers), with clear pathways for some to move to levels of Knowledge Deepening in the medium term. However, the short-term priority will be for extensive introductory capacity-building activities to create a strong solid platform of teacher competence in use of ICT for teaching and learning. This should contribute explicitly, amongst other objectives, to ensuring successful achievement of targets regarding use of Success Maker at primary level and delivery of IT as a subject at secondary level.

Linked to this, current policies and plans place relatively limited emphasis on school principals and Ministry officials as a professional development target, despite overwhelming evidence that success of ICT integration at schools is highly dependent on the extent to which these stakeholders engage with the process. Likewise, NCERD's professional development course for school principals currently includes no focus on ICT in its 18-month curriculum. Consequently, it will be important for the ICT Professional Development Strategy for Teachers in Guyana to focus on professional development opportunities for school principals and Ministry officials.

6) *Capacity Within Key Teacher Education Institutions*

Linked to the previous observation is the reality that those institutions that will be the vehicles for delivery of an ICT Professional Development Strategy for Teachers in Guyana – most notably, CPCE, UG, and NCERD – face two key capacity constraints that will need to be tackled. First, there are limited human resources within the institutions themselves. Consequently, care should be taken not to proliferate new courses and programmes unless these are accompanied either by new appointments and/or re-deployment and re-training of existing personnel to cope with the additional workload that this will generate. There is, for example, already clear evidence of overload at NCERD, due to the requirement for a small team of people to run multiple parallel projects and training courses. In the long run, this is both counter-productive and likely to have negative consequences for quality. Second, many of the personnel at these institutions are novices in use of ICT for teaching and learning. Consequently, a parallel objective of the ICT Professional Development Strategy for Teachers in Guyana will need to be to develop capacity in ICT integration amongst the teacher educators themselves over time.

7) *The Need for Baseline Data*

It has been difficult in researching the context of implementation of an ICT Professional Development Strategy for Teachers in Guyana to get reliable, up-to-date information on many aspects of the system, such as progress in ICT rollout to schools, ICT connectivity levels, teacher professional development and capacity in ICT integration, and so on. Although this baseline data would not form part of the ICT Professional Development Strategy for Teachers, it will be a key requirement for its successful implementation, as well as for effective ongoing monitoring and evaluation (M&E). Consequently, this is a

gap that will need to be plugged if the ICT Professional Development Strategy for Teachers is to be successful.

#### 8) *Improving Documentation and Conducting Monitoring and Evaluation*

The MoE in Guyana seems to have several ICT in education projects being implemented. However, it appears there is no systematic and rigorous documentation of the design, implementation and impact of these projects, or how they articulate with each other. This is a weakness, as important lessons that could impact on future implementation will be missed if project design and implementation are not documented. Where reports are available, for example for Success Maker, they do not seem to be informed by systematically presented rigorous empirical data but rather by perception of what the impact of the project is. Further, review of the project does not have a section where spending is reviewed in relation to project roll out, lessons learned about implementation, and what can be done better in the implementation going forward. It would be useful to have a generic template for reporting on projects so that comparable data can be extracted from this reporting, across projects.

The lack of importance attached to documenting project data could be deduced from some of the project the budgets, particularly the budget for the ICT operational Plan outputs, which does not include a monitoring and evaluation (M&E) component. Including an M&E budget line item is significant as all project implementation could then have a formative and summative evaluation component that can feed into current and future planning. Formative evaluation would help improve implementation as the project rolls out and summative evaluation would help evaluate impact of the project and provide useful lessons for future implementation of similar projects.

## 4.6 Conclusion

The above context provides a backdrop for consideration of an effective, supporting ICT Professional Development Strategy for Teachers in Guyana. In addition, though, the analysis presented above does highlight that there will also be merit in completing a short, intensive evaluative review of the current ICT policies and plans of the Guyana MoE in order to:

- Ensure alignment of all elements of different plans pertaining to deployment of ICT in education, so that current initiatives and projects are all clearly located under a single policy framework;
- Review proposed ICT infrastructure models to ensure that they link to current school physical infrastructure constraints and support the educational objectives of the ICT Operational Plan;
- Identify dependencies and prerequisites within the targets and activities, in order to ensure that targets that are mutually inter-dependent can be achieved within defined timeframes; and
- Refine defined targets in the context of detailed implementation planning in order to ensure that defined achievements are realistic.

This evaluative review should precede implementation of implementation of the ICT Professional Development Strategy for Teachers in Guyana, as it will have a material impact on the content of courses and the timing of rollout of the different elements of the Strategy.

Consequently, such an evaluative review has been built into the Strategy plan presented below.

## **5 An ICT Professional Development Strategy for Teachers in Guyana**

### **5.1 Rationale for, and Viability of, the Strategy**

Given the context and current status of ICT in education mapped out above, it is clear that there is a strong rationale to establish an ICT Professional Development Strategy for Teachers in Guyana. There is strong government commitment to rollout of ICT in education combined with growing allocations of financial resources – both through government budgets and funded projects – to finance this rollout. The objective is to ensure that all students are able to use ICT appropriately and effectively and to function in a knowledge society, while some specialize in ICT for technical and vocational purpose, in order to learn how to apply ICT effectively in the workplace, and some graduates specialize in ICT, knowledge creation, and development of ICT applications.

The rationale for such investments is already well established, both globally and in Guyanese policy proclamations. However, international experience (presented throughout this report) highlights that, without accompanying investment in professional development of the users of this infrastructure, the funds used to procure ICT can lead to significant wastage and high levels of systemic disappointment caused by apparent lack of positive impact of ICT on education outputs. Consequently, there is a need to provide a structured framework, and accompanying professional development offerings, to systematize professional development in use of ICT for teaching and learning in Guyana.

The historical landscape of ICT in education in Guyana is characterized by a high degree of fragmentation of initiatives, where communication and integration of parallel activities between different key players in the field is not as strong as it should be. Consequently, there is value in investing now in creating an overarching ICT Professional Development Framework for Teachers to guide the activities of these players in professional development of teachers, school principals, and ministry officials in use of ICT.

Linked to this, as has been noted, the World Bank is currently leading a project to improve initial teacher education programmes in Guyana. While this project has a much broader focus than just ICT, it provides an ideal opportunity to ensure that the entire system of teacher education, from initial training through to the most advanced levels of continuing professional development (CPD), incorporates clear and effective learning pathways that enable effective integration of ICT into teaching and learning environments, thus unlocking the true potential of the country's educational investments in ICT. In parallel with this, the MoE – via the NCERD – has plans to review and improve the IT subject curriculum for secondary students. Given these two processes, the timing is ideal to put in place and operationalize an overarching ICT Professional Development Framework for Teachers in Guyana.

An ICT Professional Development Strategy for Teachers in Guyana is clearly viable given the operational environment into which it would be introduced. There are policy commitments

to support and sustain the Strategy, accompanied by growing allocations of financial resources to facilitate rollout of ICT into the Guyanese education system. Further, there is an existing institutional infrastructure (CPCE, UG, and NCERD) that can be used as a base to operationalize and sustain the Strategy, provided there are investments in capacity development and expansion of the staff contingent for these activities. Importantly, the Guyana-World Bank Project on Improving Teacher Education can be harnessed to ensure that ICT professional development is integrated into the programmes that will be designed through those projects, rather than requiring new projects. Likewise NCERD, already has a programme of action for teacher CPD in use of ICT, which – with judicious investment – can be carefully re-defined, structured, adapted and developed as required, and sustained.

## 5.2 Key Goals and Long-Term Outcomes of the Strategy

Given the above, it is proposed to invest in establishing an ICT Professional Development Strategy for Teachers in Guyana. This Strategy shares the broader vision of the Guyana Ministry of Education's ICT Operational Plan that:

*ICT and other assistive technologies for educational delivery will be supporting a quality and accessible teaching and learning environment at all levels of the education system in Guyana. Further, most graduates of the Secondary level will have attained core competencies in ICT Literacy.*

The long-term outcomes of this strategy will be to ensure that all Ministry of Education officials, teacher development management and staff, school principals, and teachers are competent to harness ICT effectively to support high quality teaching and learning in Guyanese schools, with:

- Most able to integrate the use of basic ICT tools into the standard school curriculum, pedagogy, and classroom structures, knowing how, where, and when (as well as when not) to use technology for classroom activities and presentations, for management tasks, and to acquire additional subject matter and pedagogical knowledge in support of their own professional development; and
- A critical mass are able to use more sophisticated methodologies and technologies with changes in the curriculum that emphasize depth of understanding and application of school knowledge to real world problems and pedagogy in which the teacher serves as a guide and manager of the learning environment and students are engaged in extended, collaborative project-based learning activities that can go beyond the classroom and may involve local or global collaborations.<sup>5</sup>

## 5.3 Description of the Strategy

The ICT Professional Development Strategy for Teachers in Guyana will provide a comprehensive framework and learning pathway for Ministry of Education officials, school principals, administrators, and teachers to become competent to harness ICT effectively to support high quality teaching and learning. This learning pathway will use the UNESCO ICT CFT as its guiding framework. It will seek to develop core competences for the key intended audiences for a suite of professional development initiatives, as mapped out below.

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<sup>5</sup> These three statements are adapted from: UNESCO. 2008a. *ICT Competency Standards for Teachers: Policy Framework*.

### 5.3.1 Overview of Professional Development Needs

It is possible to analyse the specific requirements of each of the target groups as defined in the groups of occupational categories presented above:

- 1) School principals;
- 2) Teachers in schools; and
- 3) Ministry of Education officials.

There are two important additional categories for consideration: ICT coordinators or champions and ICT technicians and support personnel. The former are individuals identified at a school, who champion the adoption and integration of ICT into the local environment. They are the logistical focal point for communication, and are likely to play a key role developing and administering School ICT Integration Plans. The latter are the people responsible for maintenance and support of ICT networks at school level. While there may be an overlap between ICT coordinators and ICT maintenance and support people, coordinators play a leadership role and technicians have a technical role, so these may not be the same person. While there should be an ICT coordinator at each school, ICT technical maintenance and support may be a distributed function operating across schools (based, say, in school clusters or at regional level). Consequently, the professional development needs of ICT coordinators and technical support people will be discussed separately from the above target groups.

#### School Principals

The growing consensus is that, for instructional technologies to be implemented successfully, leadership and administrative support are critical. This means that it is important that school principals – who make policy and financial decisions – are trained in educational technology and have the resources they require to make informed decisions.<sup>6</sup>

Recent studies in the United States of America have noted the importance of technology leadership in school districts, with a 2004 study finding that school districts with strong district leadership in technology invested far more heavily in technologies than those districts with poor or no ICT leadership. Districts that had strong district ICT leadership also reported greater involvement of the school board, educators, and parents in ICT-related decisions.<sup>7</sup>

To ensure effective use of ICT at school, it is imperative that leadership in schools is supported in the role of ICT leadership for the school. The principal need not be the ICT champion, but he/she does need to be aware of debates surrounding use of ICT in education and of the important role that leaders play in ensuring successful use. Leaders need to be aware of the consequences of working with and maintaining ICT facilities, as well as the financial implications thereof. It is imperative that, after initial training, leaders become part of a broader community of practice, attending ICT conferences, receiving quarterly circulars, e-mail newsletters, participating in online discussion forums, and sharing expertise and experiences.

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<sup>6</sup> SchoolNet Africa. 2004. Towards a Strategy on Developing African Teacher Capabilities in the Use of ICT. Draft report.

<sup>7</sup> SchoolNet Africa. 2004. Towards a Strategy on Developing African Teacher Capabilities in the Use of ICT. Draft report.

In addition, there may also be requirements to include specific focuses on use of specialized platforms, including:

- 1) Human resource management systems;
- 2) Education management information systems;
- 3) Communication platforms;
- 4) Portals to access government and systems information and education content;
- 5) Administration and management systems;
- 6) Financial and accounting systems;
- 7) Security software;
- 8) Timetabling systems; and
- 9) Office productivity tools.

### **Teachers**

Teachers are at the heart of delivery of the curriculum. Teacher professional development in use of ICT is best introduced in a context of broader educational reform, which embraces a shift away from teacher-centred, lecture-based instruction toward student-centred, interactive, constructivist learning. Teacher professional development is essential if ICT in schools is to be used effectively. Thus, ongoing teacher training and professional development offerings are vital for successful use of ICT in education. Teachers play a pivotal role in the adaptation and integration of ICT in education as they are a key element in curriculum implementation and innovation. Studies show that insufficient understanding of the scope of an ICT resource leads to inappropriate or superficial uses in the curriculum.<sup>8</sup> However, designing and implementing successful teacher professional development programmes in the application of technology is neither easy nor inexpensive.<sup>9</sup>

Various authors note that the question is no longer whether students/learners will use technology, but rather whether educators will have a role in directing learners' use of technology.<sup>10</sup> To harness ICT effectively in support of curriculum delivery, teaching and lecturing staff require substantial support and stimulation to change entrenched practices. This support includes general approaches to integration of ICT within teaching and learning, support within specific areas of a subject specialization, and training and support on effective use of specific ICT applications and digital education content offerings.

UNESCO's ICT Competency Standards for Teachers are located within a broader policy context of educational reform and sustainable development which views education as a cultural relay which inculcates societal values including the role of the citizen in economic development. The ICT-CST project views ICT as 'engines for growth and tools for empowerment [which] have profound implications for education change and improvement' (UNESCO, 2008a: 7). For UNESCO, educational change through ICTs encompasses three approaches: technology literacy, knowledge deepening and knowledge creation, and these approaches have different implications for pedagogy, teacher practice and professional development, curriculum and assessment, and school organization and administration. In

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<sup>8</sup> Cox, M and Abbott; C (ed). (2004). A review of the research literature relating to ICT and attainment. Retrieved November 9, 2006 from Becta ICT Research website: [http://www.becta.org.uk/page\\_documents/research/ict\\_attainment04.pdf](http://www.becta.org.uk/page_documents/research/ict_attainment04.pdf)

<sup>9</sup> Carlson, S. and Gadio, C.T. (2002). Teacher Professional Development in the Use of ICT. Retrieved November 9, 2006 from SchoolNet website:

[http://www.schoolnet africa.net/fileadmin/resources/Teacher\\_Professional\\_Development\\_In\\_the\\_use\\_of\\_Technology.pdf](http://www.schoolnet africa.net/fileadmin/resources/Teacher_Professional_Development_In_the_use_of_Technology.pdf)

<sup>10</sup> Costello (1997).

relation to pedagogy, the use of ICTs requires teachers to develop skills to develop 'innovative ways of using technology to enhance the learning environment, and to encourage technology literacy, knowledge deepening and knowledge creation,' (UNESCO, 2008a: 9). As such, teacher professional development has to focus on developing teachers' knowledge and skills to develop technology literacy, knowledge deepening, and knowledge creation in relation to components of the educational system, that is, policy, curriculum and assessment, pedagogy, the use of technology, school organization and administration, and teacher professional development.

According to UNESCO, the three approaches to educational reform have different demands for teacher education, with the technology literacy approach being the most basic and requiring the most basic policy changes as the aim of this approach is to encourage and facilitate student uptake of new technologies to support social and economic development. Professional development aimed at supporting the technology literacy approach focuses on developing teachers' technological literacy to integrate basic ICT tools into the curriculum. This technology literacy approach requires a focus on equitable distribution of technological resources to enable access by as wide a population as possible to lessen the digital divide. The outlay of technological tools at this stage is a precursor for possible success of all three approaches to educational development.

Knowledge deepening educational changes are deeper and they are likely to have greater impact on learning. Knowledge deepening requires students as citizens to apply school knowledge for complex problem solving in the workplace to add value to national development, for example through innovation that provides solutions to national challenges. To achieve this approach to educational reform, teacher professional development should focus on providing teachers with the knowledge and skills to use more complex methodologies and technologies. Change in the curriculum should include establishing a complex relationship between school knowledge and real world problems and can involve collaboration between students at local and global levels with the teacher managing the learning environment (UNESCO, 2008a).

The knowledge creation approach to educational improvement is the most complex as it aims to create a citizenry that engages in and benefits from knowledge creation, innovation, and participation in lifelong learning. Curriculum changes to achieve the aims of this approach are inculcating skills in collaboration, communication, creative thinking and innovation and critical thinking. Teachers can model these skills to their students through their own professional development where they develop more sophisticated skills on using technology and collaborate with peers to design projects that challenge students to exercise the aforementioned skills (UNESCO, 2008a).

UNESCO proposes a matrix combining the technology literacy, knowledge deepening and knowledge creating approaches with the six components of policy, curriculum and assessment, pedagogy, the use of technology, school organization and administration, and teacher professional development (UNESCO, 2008b). Each of the cells of the matrix below constitutes a module in the ICT-CST framework (UNESCO, 2008c).

Table 4 UNESCO ICT CST framework

Policy and Vision	Technology Literacy	Knowledge Deepening	Knowledge Creation
Curriculum and Assessment	Basic knowledge	Knowledge application	21 <sup>st</sup> century skills
Pedagogy	Integrate technology	Complex problem solving	Self management
ICT	Basic tools	Complex tools	Pervasive tools
Organization and Administration	Standard classroom	Collaborative groups	Learning organizations
Teacher Professional Development	Digital literacy	Manage and guide	Teachers as model learners

Source: UNESCO ICT –CST Implementation Guidelines

This matrix, and the accompanying model syllabus (UNESCO, 2008b) and module suggestions (UNESCO, 2008c), can be used as a framework for revision of professional development programmes and allows flexibility that suits the providers although adaptations are subject to review by the ICT-CST Endorsement Board (UNESCO, 2008b). It should be noted, though, that this Board does not yet exist, so engagement with UNESCO will be necessary to assess the timeframes and roadmap for its implementation.

### Ministry of Education Personnel (National and regional)

The leadership role of Ministry of Education personnel at the national and regional levels in changing their own practice and supporting schools in their uptake of ICT is pivotal to the success of Guyanese plans to roll out ICT in education. This observation is recognized internationally:

*There is a growing consensus that administrative support and leadership are crucial to successful implementation of instructional technologies, and that the importance of this administrative support is often understated.*<sup>11</sup>

This quotation uses the American definition of the term ‘administrative support’, where the government is referred to as the administration. Ministerial personnel are key change agents in adoption and use of ICT in schools.

One of the most comprehensive undertakings in bringing meaning to the area of leadership for ICT in education is the work of the Technology Standards for School Administrators (TSSA) Collaborative in its Educational Technology Standards for Administrators. The TSSA Collaborative facilitated the development of a national consensus on what K-12 administrators should both know and be able to implement in order to optimize technology use in schools. Broad standards areas were established as core performance indicators, following which each standard area was further refined to highlight role-specific technology leadership tasks for each of the three leadership roles. A focus in this collaborative endeavour was the recognition that:

- Implementing technology involves large-scale systemic reform; and
- Leadership plays a key role is successful reform within education.

<sup>11</sup> Yee, D, (2000). ‘Images of School Principals’ Information and Communications Technology Leadership.’ In Journal of Information Technology for Teacher Education, 9(3), 287-302.

The standards for administrators were also defined across six categories within the TSSA document, as listed below:

- 1) Leadership and vision;
- 2) Learning and teaching;
- 3) Productivity and professional practice;
- 4) Support, management and operations;
- 5) Assessment and evaluation; and
- 6) Social, legal and ethical issues.

A key approach to professional development is to provide access to information, encourage communities of practice, and provide mentoring support to national and regional MoE personnel to manage their change in practice and support the schools for which they are responsible.

### **ICT Coordinators**

The term 'ICT coordinator' refers to the individual staff member at a school who is assigned overall responsibility for developing and overseeing/driving implementation of a school's ICT Integration Plan.

This staff member could be drawn from any of the job functions at a school. So, he/she may, for example, be a primary school principal, head of department, or senior teacher responsible for IT in secondary school. Some education systems, for example in Japan and Hong Kong, have recognized the special role of ICT coordinators in schools, and therefore provide training to those occupying such positions. In other systems, there are not formal appointments of ICT coordinators in schools, and usually the more competent ICT teachers will assume such roles in their schools.<sup>12</sup>

One of the ICT coordinator's roles will be to act as the school point of contact on all ICT-related matters. Another is to promote creative use of computers in the development of educationally meaningful projects. There are also administrative requirements, where the ICT coordinator needs to work closely with school leaders to, for example:

- Develop a School ICT Integration Plan.
- Develop and ensure compliance with a code of conduct for computer usage within the school.
- Source and manage funding for ICT investments in the school.
- Support teachers and lecturers in articulating their professional development needs in relation to ICT skills.
- Facilitate development and implementation of individual professional development pathways for school staff.
- Agree and oversee timetabling and booking systems for the ICT resources available in the school.
- Act as a point of contact for reporting maintenance and technical support requirements.
- Identify areas that can be enhanced by the use of ICT and support the implementation of suitable systems for, by way of example:
  - Reporting – academic achievement and personal development comments;

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<sup>12</sup> Pelgrum, W.J. and Law, N. (2003) ICT in Education Around the World: Trends, Problems and Prospects. Unesco International Institute for Education Planning: Paris

- Timetabling;
- Finance;
- Communication; and
- Human Resource systems.

As such, the ICT Coordinator has specific professional development requirements. These may overlap with the needs of school principals and with the professional development requirements of teaching staff, but there is a sufficiently common core of requirements that warrant defining ICT coordinators as a unique group. Resources, communities of practice, training, and professional development opportunities will be essential to support the person who is appointed to this role. They require support in technical, pedagogical and leadership areas.

### **ICT Maintenance and Support Personnel**

ICT administrators need to work closely with school management to ensure that the best possible use is made of ICT resources and facilities. Their technical roles would include, but not necessarily be limited to, the following:

- Issuing all users with their own log-in codes and private areas in which to store their data;
- Setting up e-mail services so that each user has a private e-mail account;
- Preventing bandwidth abuse where necessary by limiting the size of e-mail attachments and possibly blocking certain types of downloads (for example, mp3, wmv, wma, avi, mov, exe, zip);
- Keeping copies of e-mails sent and received so that there is evidence in cases involving complaints about abuse of e-mail services.

In particular, they will need to ensure that learners' safety is protected. This will involve:

- Protecting personal data;
- Blocking dangerous/harmful sites;
- Assisting educators to find and make available positive educational sites;
- Policing, monitoring, and logging Internet usage;
- Maintaining equipment in good running order; and
- Ensuring that equipment is set up with a view to preventing damage from bad ergonomics, and also to prevent screen flicker problems (for example, triggering epileptic fits) caused by low refresh rates in monitors (60Hz or lower).

ICT maintenance and support personnel would also have various security functions, including for example:

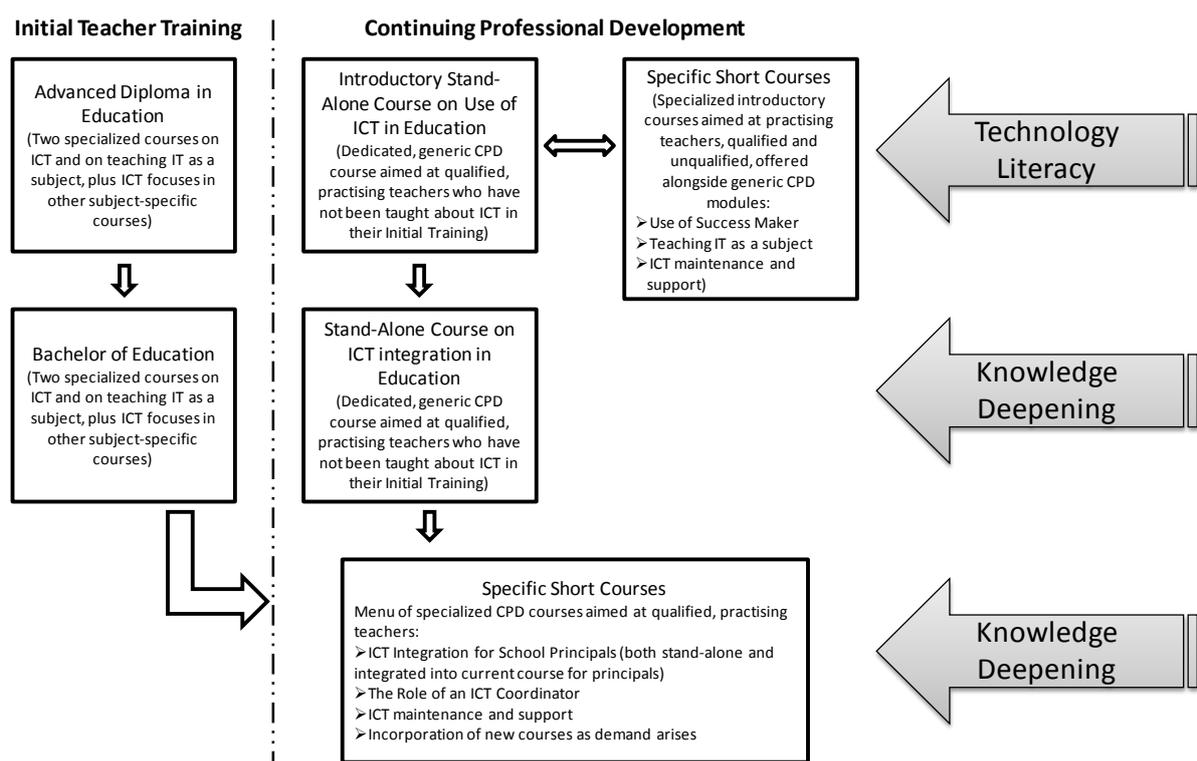
- Ensuring that the integrity of school data and systems is preserved by having adequate security policies and firewalls in place to protect against both internal (for example, from learners) and external threats;
- Having a network-wide anti-virus solution that is regularly updated;
- Ensuring that all servers and workstations are kept up to date with the required operating system updates and licensing agreements; and
- Creating backups of all important data on a regular basis, and keeping copies of these offsite.

The professional development needs of ICT maintenance and support personnel would be to acquire the skills and competences necessary to perform functions such as those illustrated in the above lists. They need to be familiar with various ICT applications being used across schools and able to support the installation, use, and maintenance of these software applications. In a rapidly changing ICT environment, ICT support personnel need to be kept current with the latest security and maintenance techniques and offerings, so they will also require ongoing support and contact from colleagues within the same environment. They also need to be able to access specialist or expert support to resolve maintenance issues outside of their competence.

### 5.3.2 Guyana ICT Professional Development Framework for Teachers

In order to respond to the varying needs outlined above, ICT Professional Development Strategy for Teachers in Guyana will commence by establishing a clear ICT Professional Development Framework for Teachers. This Framework can be presented diagrammatically as follows:

Figure 1 Guyana ICT Professional Development Framework for Teachers



Thus, the Guyana ICT Professional Development Framework for Teachers will incorporate the following initial professional development options.

- ICT components in the revised CPCE programme (which, according to current plans, will be a two-year programme leading to a two-year Associate Degree in Education):
  - Two compulsory courses to introduce teachers to technology – electronic and otherwise – and then in more detail to ICT in education, equivalent to six semester

- credits (these courses are anticipated to focus on the level of 'Technology Literacy', in terms of the UNESCO ICT CFT);
- A dedicated focus in secondary subject options to enable teachers to specialise in teaching IT as a subject;
  - Subject-specific ICT integration specializations (incorporated into subject-specific courses, not delivered as separate modules).
- ICT components in the revised UG programme (a further two years of study, which will lead to a Bachelor of Education Degree):
    - Two further compulsory courses on ICT integration in education, again equivalent to six semester credits (anticipated to focus on the level of 'Knowledge Deepening', in terms of the UNESCO ICT CFT)
    - A dedicated focus in secondary subject options to enable teachers to specialize in teaching IT as a subject;
    - Subject-specific ICT integration specializations (again incorporated into existing modules, not delivered as separate modules).
- NOTE: All of the above components are currently being integrated into the Guyana-World Bank Project on Improving Teacher Education, so should not be seen as separate to, or different, from that Project. It is also anticipated that the World Bank Project will upgrade ICT infrastructure at the CPCE and UG, both at the main campuses and regional centres, to facilitate delivery of these initial ICT Integration modules.
- A suite of courses to be offered by NCERD (with the possibility that some may, through a licensing agreement, be delivered by one or more suitable third-party suppliers and quality assured by NCERD). In the next five years, the objective will be to:
    - Create a dedicated module on ICT Integration for school principals, to be integrated into the 18-month course for school principals. In addition, it will be important to offer this module as a stand-alone course for people who have already successfully completed the course without the ICT Integration module. This module will include a specific focus on 'Using ICT in school administration'.
    - Re-package the four ICT Integration modules being designed for the new CPCE and UG ADE and B. Ed. programmes as into two stand-alone courses for qualified teachers, as well as designing a stand-alone course for qualified teachers who are teaching IT as a subject, but are not formally qualified to do so.
    - Develop a stand-alone course on using Success Maker in schools. This short course will require two versions, one for teachers who are already ICT literate and one for those who are not.
    - Design of a course for ICT Coordinators at schools.
    - Design of a course for ICT maintenance and support personnel.

## 5.4 Key Principles and Assumptions

Design of the ICT Professional Development Strategy for Teachers in Guyana has been based on the following key principles and assumptions:

- 1) The specific curriculum and teaching and learning methods of the courses to be developed in terms of the Framework presented above will still need to be defined. However, it is expected that the design process will ensure that:

- a) *All courses will be competency-based* (see next point), both in design of the curriculum and materials and in terms of how assessment is conducted.
  - b) The courses will include *appropriate blends of face-to-face learning and use of e-learning* (with the latter combining both use of institutional Virtual Learning Environments – VLEs – and existing social networking platforms, which many teachers are already accessing on a regular basis). To minimize expenses, it is proposed that CPCE, UG, and NCERD consider deploying a single VLE to be shared by all.
- 2) The Strategy will *integrate the United Nations Educational Scientific and Cultural Organization (UNESCO) ICT Competency Standards for Teachers (CST)* into the curriculum design of all courses, as this set of Standards effectively identifies the teacher as central in developing student ICT capabilities. The UNESCO ICT Competency Framework for Teachers (CFT) creates a common core syllabus that can be used to develop learning materials sharable at a global level, provides a basic set of qualifications that allows teachers to integrate ICT into their teaching; extends teachers' professional development so as to advance their skills in pedagogy, collaboration, and school innovation using ICT, and harmonizes different views and vocabulary regarding the uses of ICTs in teacher education. Given its global relevance and international recognition, the UNESCO Matrix, and accompanying model syllabus (UNESCO, 2008b) and module suggestions (UNESCO, 2008c), will be used as a framework for design and revision of professional development programmes in Guyana.
  - 3) Following on from the above, it is also anticipated that the CPCE, UG, and NCERD will seek to *submit relevant courses and modules that it designs to UNESCO for formal approval as and when the necessary structures are established within UNESCO*, in order to ensure that all professional development provided within the Guyana ICT Professional Development Framework for Teachers is internationally recognized.
  - 4) The ICT Professional Development Strategy for Teachers will seek to *construct clear learning pathways for Guyanese teachers* to move progressively from technology literacy to knowledge deepening through the initial teacher training and continuing professional development.
  - 5) Courses and modules produced through the ICT Professional Development Strategy for Teachers will *seek to build on and adapt existing national and international courses and modules* wherever possible, in order to reduce the costs of development and to improve the quality of the courses offered. Examples of sources of existing content that will be explored for possible use will include (but not be limited to):
    - a) Existing courses and modules being offered by CPCE, UG, and the NCERD (although understanding the need for course re-design to take place to locate new courses within the framework of the UNESCO CST);
    - b) Resources available through the Commonwealth of Learning, most notably within the recently designed Commonwealth Certificate for Teacher ICT Integration (CCTI), which is an Advanced Certificate in Education designed in accordance with the UNESCO ICT CFT and aimed at teachers and school leaders wishing to focus on ICT integration into school management, teaching, and learning;

- c) Materials emerging from Microsoft's investment in its Educator Learning Journey Project, which is providing a place for teachers to access personalized and varied professional development aligned to the UNESCO ICT CFT (and to other frameworks), each step of which is validated by experts in the education field and which features an implementation design based on desired student outcomes and how teachers can be best supported to help achieve them.
- 6) Extending the principle of harnessing existing content, the ICT Professional Development Strategy for Teachers will also facilitate sharing of all courses/modules and associated educational materials by *releasing them as Open Educational Resources (OER) under an appropriate Creative Commons (CC) licence*. This will be done by expanding the current Connected Classrooms project to include a repository of all curricula and content for above courses and modules so that they are openly accessible and shareable between the key participating institutions (CPCE, UG, and NCERD), as well as being accessible to all schools in Guyana and to the broader global education community.
- 7) Professional development opportunities will be *timed to coincide with rollout of ICT infrastructure*, in order to limit wastage of financial resources on training whose impact is lost because teachers or principals return to school environments where there is not the appropriate ICT infrastructure to apply skills developed. This will mean that:
  - a) ICT Integration modules in the new initial teacher education programmes will be compulsory for new teachers studying full-time in Georgetown.
  - b) These modules will also be compulsory for under-qualified teachers taking the programmes who are at schools that have ICT infrastructure.
  - c) These modules will be optional for other under-qualified teachers taking the programmes, but access to ICT will be needed to complete the modules.
  - d) All principals at schools that have received ICT will be required to complete the Principals' ICT Integration Module to be offered by NCERD.
  - e) In concert with rollout of ICT infrastructure, all principals at schools that are about to receive ICT will be required to complete the Principals' ICT Integration Module to be offered by NCERD at least one month before the ICT infrastructure is provided to the school, as part of building school e-readiness.
  - f) In concert with rollout of ICT infrastructure, all teachers at schools that have just received ICT will be required to complete at least one ICT Integration Module to be offered by NCERD within six months of ICT infrastructure having been provided to the school (excluding those teachers who have already successfully completed the modules through CPCE or UG).
  - g) Should a teacher who has not completed any ICT Integration modules transfer from a school without ICT to one that has ICT, s/he will be required to complete at least one ICT Integration Module to be offered by NCERD within six months of transfer.
- 8) Completion of all CPD modules will, as per the policy on Continuing Professional Development, *count as credits towards salary increases and promotions*.
- 9) The ICT Professional Development Strategy for Teachers will *not incorporate any focus on delivery of ICT infrastructure* to support professional development of teachers. For UG and CPCE, it is assumed that this will be covered through the Guyana-World Bank Project

on Improving Teacher Education, while ongoing investment in the ICT infrastructure of the NCERD to support professional development will be funded through the GOG.

## 5.5 Stakeholder Analysis

There are several stakeholders of this Strategy, whose relationship to and role in the Strategy is mapped out below. These are additional to the various school personnel, who are the primary beneficiaries of this Strategy and whose specific needs have already been outlined in depth above:

Table 5 Stakeholder Analysis

Key Stakeholders	Relationship to / role on the project	Degree of Influence
Ministry of Education	<ul style="list-style-type: none"> <li>• Sets policy for education in Guyana, thus sets strategic direction for this Strategy</li> <li>• Has expressed strong support for the Strategy</li> <li>• Leading current process to launch the ICT Professional Development Strategy for Teachers in Guyana in partnership with the Commonwealth Secretariat</li> <li>• Key funder of education activities of all kinds</li> <li>• Will play an active role in re-allocating budgets to institutions to ensure provision of additional capacity needed to operationalize the Strategy</li> <li>• Without Ministry commitment, the ICT Professional Development Strategy for Teachers in Guyana will not be possible</li> <li>• Will play a critical role in ensuring adherence by all role players to the Guyana ICT Professional Development Framework for Teachers</li> <li>• Most likely needs to convene planning and implementation committees for the Strategy</li> </ul>	High
CPCE and UG	<ul style="list-style-type: none"> <li>• Key providers of initial teacher education in Guyana</li> <li>• Will take responsibility for delivering requirements of Guyana ICT Professional Development Framework for Teachers within their teacher education programmes</li> <li>• Staff within institutions act as role models for teachers in ICT Integration, so require solid grounding in use of ICT for teaching and learning</li> <li>• Staff within institutions may resist Strategy if they lack confidence in use of ICT</li> </ul>	High
NCERD	<ul style="list-style-type: none"> <li>• Key provider of CPD for teachers and other key personnel in Guyana</li> <li>• Will take responsibility for delivering requirements of Guyana ICT Professional Development Framework for Teachers within their teacher education programmes</li> <li>• Staff within NCERD act as role models for teachers in ICT Integration, so require solid grounding in use of ICT for teaching and learning</li> </ul>	High

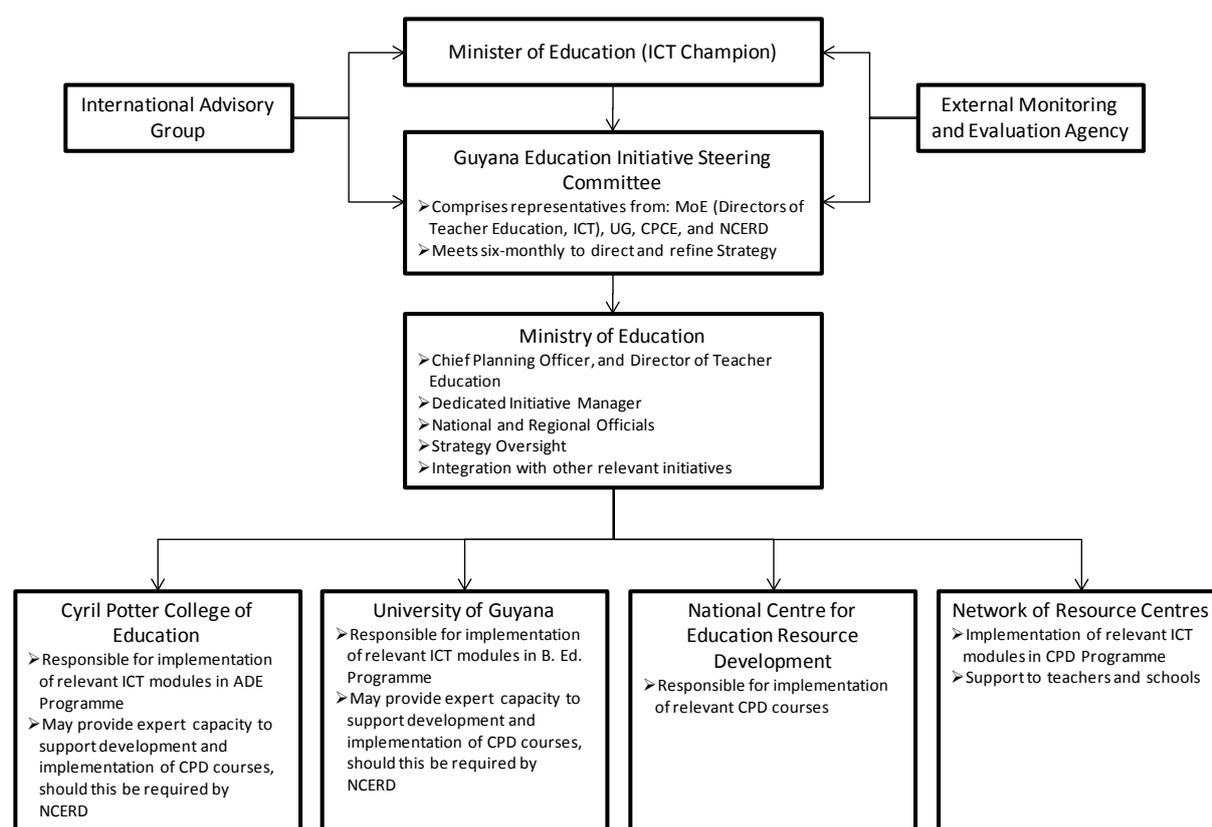
Key Stakeholders	Relationship to / role on the project	Degree of Influence
	<ul style="list-style-type: none"> <li>Staff within NCERD may resist Strategy if they lack confidence in use of ICT</li> </ul>	
World Bank	<ul style="list-style-type: none"> <li>Primary funder of education project in Guyana</li> <li>Has a strong interest in use of ICT in education, and is thus a strong advocate for this Strategy</li> <li>Currently driving the Guyana-World Bank Project on Improving Teacher Education, which will deliver requirements of the ICT Professional Development Strategy for Teachers in Guyana with respect to initial teacher education</li> </ul>	High
Caribbean Knowledge and Learning Network	<ul style="list-style-type: none"> <li>Regional mechanism established by the CARICOM Heads of Government in 2004 to encourage use of ICT and modern approaches to education towards enhancing the global competitiveness of countries in the region</li> <li>Mandated to assist regional higher education institutions in developing a virtual learning network which will provide students, colleges and universities with cost-effective access to quality e-learning programmes and knowledge resources drawn from the region and around the world</li> <li>Could support policy development around use of ICT at institutional level and national level</li> <li>Offers workshops and training programmes in the use of ICT in teaching and learning, as well as course design and teaching online using the Moodle</li> <li>Could be useful network for finding access to regionally contextualized materials and for sharing materials produced by Guyana</li> </ul>	Low
Commonwealth Secretariat	<ul style="list-style-type: none"> <li>Key inter-governmental organization, with strong interest in, and history of, supporting education in Guyana</li> <li>Leading current process to launch the ICT Professional Development Strategy for Teachers in Guyana in partnership with the Guyana MoE</li> <li>Able to offer technical assistance and support to the Strategy</li> <li>Has an interest in replicating similar Strategies in other countries if it is successful</li> </ul>	Medium
Commonwealth of Learning	<ul style="list-style-type: none"> <li>Key inter-governmental organization, with strong interest in, and history of, supporting education in Guyana</li> <li>Currently a partner of the Commonwealth Secretariat in supporting the Strategy</li> <li>Able to offer technical assistance and support to the Strategy</li> <li>Able to offer access to educational resources and materials that may be useful in the Strategy, particularly – but not only – through its CCTI</li> <li>Has an interest in replicating similar Strategies in other countries if it is successful</li> </ul>	Medium
Microsoft	<ul style="list-style-type: none"> <li>Key technology company, with strong interest in, and history of, supporting education in Guyana</li> <li>Currently a partner of the Commonwealth Secretariat in supporting the Strategy</li> </ul>	Medium

Key Stakeholders	Relationship to / role on the project	Degree of Influence
	<ul style="list-style-type: none"> <li>• Able to offer technical assistance and support to the Strategy</li> <li>• Able to offer access to educational resources and materials that may be useful in the Strategy, particularly – but not only – through its Educator Learning Journeys Project</li> <li>• Has an interest in replicating similar Strategies in other countries if it is successful</li> </ul>	

## 5.6 A Management Structure for the Strategy

A simple management structure is proposed for the Strategy, which envisages the Ministry of Education assuming overall oversight responsibility for Strategy Implementation. It is proposed that a Steering Committee be established representing all key players, which will direct the Strategy on an ongoing basis. This can be represented diagrammatically as follows:

Figure 2 Strategy Management Structure



The Committee will meet on a six-monthly basis to:

- Refine and improve the Strategy on an ongoing basis;
- Review progress with implementation and work out plans to resolve challenges and bottlenecks experienced;
- Agree priorities for the following period of activity;
- Ensure integration between the different elements of the Strategy; and

- Identify the need for any interventions to ensure alignment between the Strategy and other relevant activities in education in Guyana.

The above management structure also makes provision for appointment of a full-time Project Manager for the Initiative, who would report to this Steering Committee.

### 5.6.1 Financial Responsibilities

Based on the analysis concluded above, it is possible to locate financial responsibilities for the ICT Professional Development Strategy for Teachers in Guyana. This can be summarized as follows:

*Table 6 Breakdown of Financial Responsibilities*

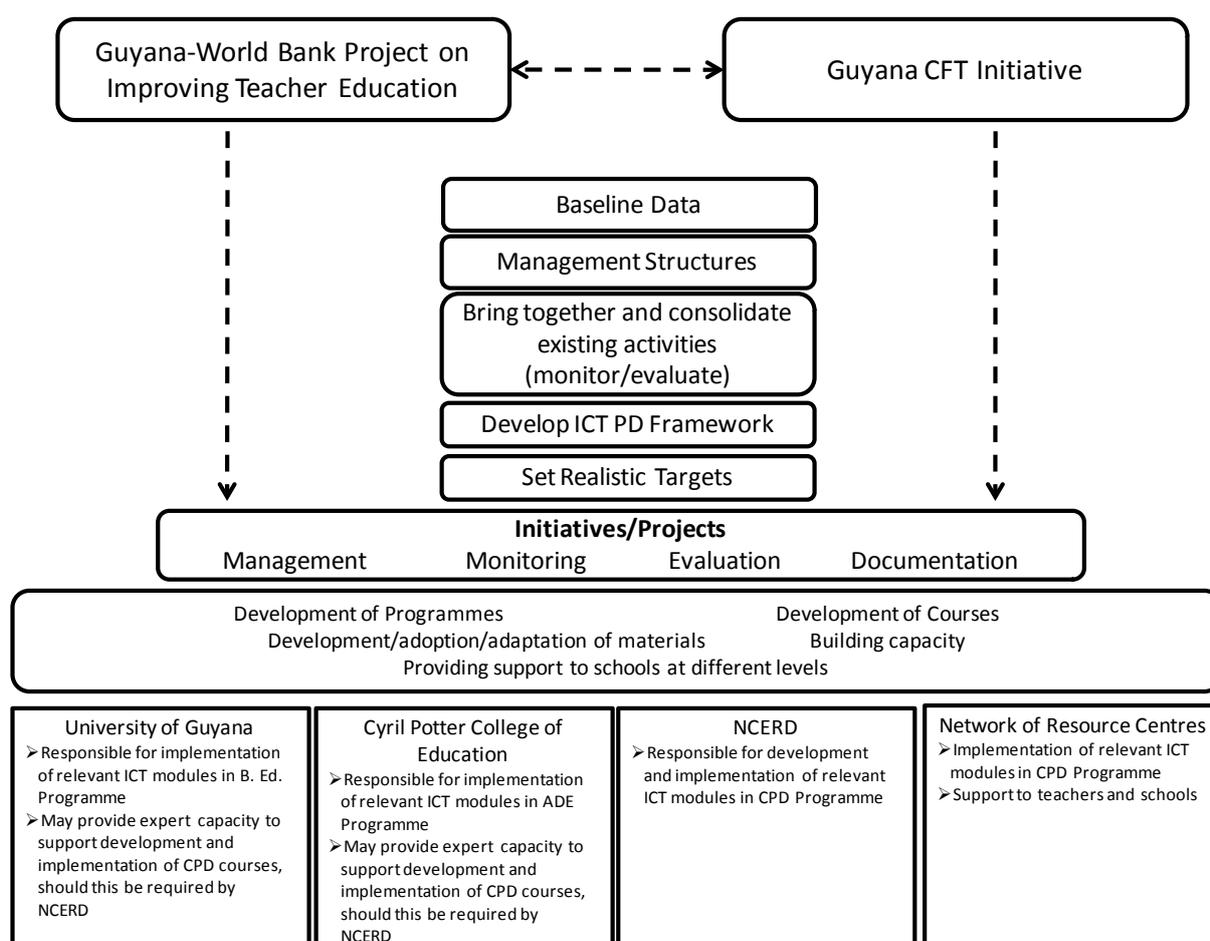
Category	Expense	Responsibility
ICT Infrastructure	Establishment of necessary ICT infrastructure at CPCE and UG to support delivery of relevant courses in ADE and B. Ed. (including infrastructure at regional centres)	To be delivered through the Guyana-World Bank Project on Improving Teacher Education
	Establishment of necessary ICT infrastructure at NCERD to support delivery of relevant CPD courses NOTE: It is anticipated that NCERD will use ICT infrastructure at schools and UG/CPCE Regional Centres for decentralized delivery of courses	Already partially completed Further funding to be integrated into MoE budgets
	Maintenance of broadband connectivity at NCERD, UG, CPCE, Regional Centres, and schools	Will be achieved through GOG plans to establish National Government Network
Course Design and Development	Design and development of modules and module components for new ADE and B. Ed. programmes	To be funded through the Guyana-World Bank Project on Improving Teacher Education
	Design and development of CPD courses as per requirements of CIT Professional Development Framework	Additional funding to be sought by MoE, with support from Commonwealth Secretariat and COL
	Review of IT curriculum for secondary learners	Partial funding available through current MoE plans to conduct review Additional funding to be sought by MoE, with support from Commonwealth Secretariat and COL
Course Delivery	ICT courses in ADE and B.Ed. programmes	Financed through UG/CPCE recurrent budgets and standard financial systems (drawing on a combination of government subsidy and student fees, as determined by CPCE and UG respectively)
	CPD courses	NCERD to be funded by MoE, as part of ICT operational plan NOTE: To achieve the objectives of this Strategy, budgets and personnel and

Category	Expense	Responsibility
		NCERD will need to be increased significantly

## 5.7 A Roadmap for the Professional Development Strategy

The scope of the ICT Professional Development Strategy for Teachers in Guyana can be represented diagrammatically as follows:

Figure 3 Scope of the Strategy



Below, a Roadmap is presented, outlining proposed targets for the first five years of the ICT Professional Development Strategy for Teachers, within the framework of the above scope:

Table 7 ICT Professional Development Strategy for Teachers in Guyana Roadmap

Year	Policy/Planning Targets	Infrastructure Targets	Course Design Targets	Course Delivery Targets
2010	<ul style="list-style-type: none"> <li>Evaluative review of current ICT Operational Plan completed and recommendations incorporated into ICT Operational Plan.</li> <li>Guyana-World Bank Project on Improving Teacher Education finalized, approved, and operational.</li> <li>Funds secured for implementation of additional elements required for the ICT Professional Development Strategy for Teachers in Guyana (see logical framework below).</li> </ul>	<ul style="list-style-type: none"> <li>Specifications for additional ICT infrastructure requirements for UG, CPCE, and NCERD in terms of this Strategy defined.</li> </ul>	<ul style="list-style-type: none"> <li>High-level design of ICT modules for ADE and B.Ed. programmes completed.</li> <li>Design of stand-alone CPD courses on Success Maker completed.</li> <li>Review of IT Subject Curriculum for Secondary Students completed and new curriculum initiated.</li> </ul>	<ul style="list-style-type: none"> <li>Baseline completed to prepare status of rollout of infrastructure to schools, as well as schedule for future rollout plans.</li> <li>Based on above baseline, comprehensive plan for rolling out Initial Training and CPD courses to teachers/principals completed to ensure synchronization of infrastructure rollout and professional development.</li> <li>Delivery of CPD courses on Success Maker to teachers in all schools receiving Success Maker for the first time.</li> </ul>
2011	<ul style="list-style-type: none"> <li>ICT Professional Development Strategy plans and targets reviewed and updated as part of annual planning cycle.</li> </ul>	<ul style="list-style-type: none"> <li>Necessary ICT infrastructure for implementation of ICT Professional Development Strategy for Teachers at UG, CPCE, and NCERD deployed and operational (including necessary infrastructure at Regional Centres)</li> </ul>	<ul style="list-style-type: none"> <li>Review of IT Subject Curriculum for Secondary Students completed and new curriculum ready for first delivery in 2012.</li> <li>Revised IT curriculum subject documents circulated to all teachers teaching IT as a subject.</li> <li>Design of ICT components (and all accompanying materials) of ADE and B.Ed. programmes completed and ready for launch in 2012.</li> <li>ICT module for Principals</li> </ul>	<ul style="list-style-type: none"> <li>Ongoing delivery of CPD courses on Success Maker to teachers in all schools receiving Success Maker for the first time.</li> <li>From mid 2011, all principals at schools receiving new infrastructure complete stand-alone CPD course on ICT for Principals one month before rollout of ICT infrastructure.</li> <li>NCERD continues to deliver current ICT courses for CPD purposes while design of new CPD courses takes place during 2011.</li> </ul>

Year	Policy/Planning Targets	Infrastructure Targets	Course Design Targets	Course Delivery Targets
			<p>Course packaged as a stand-alone module and ready for delivery to principals by mid 2011.</p> <ul style="list-style-type: none"> <li>• Design of ICT module (and all accompanying materials) for NCERD Course for Principals completed and ready for integration into the Course by end 2011.</li> <li>• ICT modules of ADE programme re-packaged as stand-alone ICT CPD courses and ready for launch in 2012.</li> </ul>	
2012	<ul style="list-style-type: none"> <li>• ICT Professional Development Strategy plans and targets reviewed and updated as part of annual planning cycle.</li> </ul>	<ul style="list-style-type: none"> <li>• All professional development sites provided broadband internet connections through National Government Network.</li> <li>• ICT infrastructure at professional development sites maintained, upgraded, and expanded as necessary.</li> </ul>	<ul style="list-style-type: none"> <li>• ICT modules of B. Ed. programme re-packaged as stand-alone ICT CPD course and ready for launch in mid 2012.</li> <li>• Modules on Teaching IT as a Subject from ADE programme re-packaged as stand-alone ICT CPD course and ready for launch in 2013.</li> </ul>	<ul style="list-style-type: none"> <li>• All new and current teachers taking ADE and B. Ed. Programmes complete ICT components as per curriculum requirements.</li> <li>• All participants enrolled in NCERD Course for Principals complete module on ICT for Principals as part of course.</li> <li>• All principals at schools receiving new infrastructure complete stand-alone CPD course on ICT for Principals one month before rollout of ICT infrastructure.</li> <li>• Systematic plan initiated to deliver CPD Course on ICT for Principals to principals whose schools received ICT infrastructure prior to 2011 and who have not yet completed the Course (including pre-2011 graduates of the NCERD Course for Principals).</li> <li>• From January, 2012, all teachers at schools receiving ICT infrastructure complete at least one introductory ICT Course.</li> </ul>
2013	<ul style="list-style-type: none"> <li>• Review of ICT Professional</li> </ul>	<ul style="list-style-type: none"> <li>• ICT infrastructure at</li> </ul>	<ul style="list-style-type: none"> <li>• Design of CPD course (and</li> </ul>	<ul style="list-style-type: none"> <li>• Ongoing delivery of CPD courses on Success</li> </ul>

Year	Policy/Planning Targets	Infrastructure Targets	Course Design Targets	Course Delivery Targets
	<p>Development Strategy for Teachers in Guyana completed and necessary refinements made to improve the Strategy based on experience</p>	<p>professional development sites maintained, upgraded, and expanded as necessary.</p> <ul style="list-style-type: none"> <li>• Systematic increases in bandwidth secured annually for each professional development site to accommodate growth in demand.</li> </ul>	<p>all accompanying materials) for School ICT Coordinators completed and ready for launch in 2014.</p>	<p>Maker to teachers in all schools receiving Success Maker for the first time.</p> <ul style="list-style-type: none"> <li>• All participants enrolled in NCERD Course for Principals complete module on ICT for Principals as part of course.</li> <li>• All principals at schools receiving new infrastructure complete stand-alone CPD course on ICT for Principals one month before rollout of ICT infrastructure.</li> <li>• Ongoing delivery of CPD Course on ICT for Principals to principals whose schools received ICT infrastructure prior to 2011 and who have not yet completed the Course (including pre-2011 graduates of the NCERD Course for Principals).</li> <li>• All teachers at schools receiving ICT infrastructure complete at least one introductory ICT Course.</li> <li>• Systematic plan initiated to deliver introductory ICT Course to teachers whose schools received ICT infrastructure prior to 2012 and who have not yet completed any ICT Course.</li> <li>• Interested teachers complete additional ICT courses from growing suite of available CPD courses.</li> </ul>
2014	<ul style="list-style-type: none"> <li>• ICT Professional Development Strategy plans and targets reviewed and updated as part of annual planning cycle.</li> </ul>	<ul style="list-style-type: none"> <li>• ICT infrastructure at professional development sites maintained, upgraded, and expanded as necessary.</li> <li>• Systematic increases in bandwidth secured annually for each professional development site to accommodate growth in demand.</li> </ul>	<ul style="list-style-type: none"> <li>• Review cycle of current CPD courses commences</li> <li>• Finalize plans for addition of new CPD courses</li> </ul>	<ul style="list-style-type: none"> <li>• Ongoing delivery of CPD courses on Success Maker to teachers in all schools receiving Success Maker for the first time.</li> <li>• All participants enrolled in NCERD Course for Principals complete module on ICT for Principals as part of course.</li> <li>• All principals at schools receiving new infrastructure complete stand-alone CPD course on ICT for Principals one month before rollout of ICT infrastructure.</li> </ul>

Year	Policy/Planning Targets	Infrastructure Targets	Course Design Targets	Course Delivery Targets
				<ul style="list-style-type: none"> <li>• Complete backlog of delivery of CPD Course on ICT for Principals to principals whose schools received ICT infrastructure prior to 2011 and who have not yet completed the Course (including pre-2011 graduates of the NCERD Course for Principals).</li> <li>• All teachers at schools receiving ICT infrastructure complete at least one introductory ICT Course.</li> <li>• Ongoing delivery of introductory ICT Course to teachers whose schools received ICT infrastructure prior to 2012 and who have not yet completed any ICT Course.</li> <li>• Interested teachers complete additional ICT courses from growing suite of available CPD courses.</li> <li>• At least 50 teachers complete ICT Coordinators Course.</li> </ul>

By combining the Roadmap above with current ICT Infrastructure rollout targets in Guyana and the 2006/2007 statistics on numbers of schools and teachers, it is possible to estimate likely required rates of rollout for the above courses. As 2010 is predominantly a year for planning the launch of the Strategy, figures are presented for 2011 to 2014 only. These notional figures are based on the following assumptions:

- Figures assume constant annual levels of ICT infrastructure rollout over the life of the project to meet the targets of 100% of secondary schools and 50% of primary schools receiving ICT infrastructure by 2013, although there are likely to be variances in the actual rates of rollout.
- Rollout of ICT infrastructure for secondary schools is assumed to incorporate Community High Schools and General Secondary Schools only, not Secondary Department of Primary Schools.
- It is assumed that, on average, 2 teachers per secondary school need to be trained to teacher IT as a subject.
- Participant numbers take into account new infrastructure rollout and a need to eliminate a backlog of teachers who have not yet received any form of professional development.
- It is assumed that 30% of teachers taking an introductory CPD course on ICT will be interested in enrolling for the Advanced Course in the following year.

These notional figures are presented in the following table:

*Table 8 Notional CPD Course Enrolments*

CPD Course	2011	2012	2013	2014
Introduction to SuccessMaker	677	677	677	677
Introduction to ICT (stand-alone version of ADE modules)	N/A	2,133	2,133	2,133
Teaching IT as a Subject	N/A	96	96	96
Advanced ICT Integration (stand-alone version of B. Ed. Modules)	N/A	N/A	640	640
ICT for Principals	109	134	134	134
School ICT Coordinator's Course	N/A	N/A	N/A	50

## 5.8 Three-Year Results

Extracting from the above roadmap, it is necessary to secure additional finances to invest in key components of the plan for which funding is not currently available. The following results have been identified for the first three years of the ICT Professional Development Strategy for Teachers in Guyana:

- 1) ICT in Education policies and plans are reviewed in order to ensure that results are integrated clearly to take account of necessary dependencies and prerequisites, deadlines are realistic, ICT infrastructure models are suitable for all schools, and full implementation plans are developed.
- 2) An ICT Professional Development Framework for Teachers in Guyana and accompanying implementation guidelines is developed, accepted by all key players in the country, and underpins all ICT-related professional development in the Guyanese schooling system.
- 3) Capacity of all relevant staff at the MoE, UG, CPCE, and NCERD in ICT integration is developed sufficiently to enable successful implementation of the ICT Professional Development Strategy for Teachers in Guyana.

- 4) Completed review and improvement of IT curriculum for secondary students (in support of current plans), taking into account ICT operational plan targets and new opportunities arising and defining clearly professional development requirements for teachers teaching IT as a subject.
- 5) Development of all ICT Integration courses and associated materials as per requirements of Guyana ICT Professional Development Framework for Teachers, adhering to the UNESCO ICT CFT and formally approved by UNESCO for purposes of international certification as soon as UNESCO has established necessary processes to process such approvals.
- 6) Connected Classrooms portal expanded to include repository of all curricula and content for above courses and modules to be openly accessible.
- 7) Monitoring system established to track implementation of the strategy against key, defined metrics.

## **5.9 Logical Framework**

The Strategy design is summarized in the logical framework presented below:

	<i>Indicators</i>	<i>Sources of verification</i>	<i>Risks/Assumptions</i>
<b>General Objective</b>			
<p>Ensure that all Ministry of Education officials, teacher development management and staff, school principals, administrators, and teachers are competent to harness ICT effectively to support high quality teaching and learning in Guyanese schools, with:</p> <ul style="list-style-type: none"> <li>• All able to integrate the use of basic ICT tools into the standard school curriculum, pedagogy, and classroom structures, knowing how, where, and when (as well as when not) to use technology for classroom activities and presentations, for management tasks, and to acquire additional subject matter and pedagogical knowledge in support of their own professional development;</li> <li>• Most able to use more sophisticated methodologies and technologies with changes in the curriculum that emphasize depth of understanding and application of school knowledge to real world problems and pedagogy in which the teacher serves as a guide and manager of the learning environment and students are engaged in extended, collaborative project-based learning activities that can go beyond the classroom and may involve local or global collaborations; and</li> <li>• A critical mass having acquired sophisticated professional skills with the pervasive use of technology to support students who are creating knowledge products and are engaged in planning and managing their own learning goals and activities and to both model the learning process for students and serve as model learners through their own ongoing professional development—individually and collaboratively, within schools that are, themselves, becoming continuously improving, learning organizations.</li> </ul>			
<b>Strategy Objectives</b>			
<ul style="list-style-type: none"> <li>• Establish a structured, coherent ICT Competency Framework for Teachers in Guyana, providing clear learning pathways through to the Knowledge Creation level of the UNESCO ICT CFT</li> <li>• Design and operationalize all necessary courses and modules, with underpinning high quality educational materials, to provide necessary learning pathways to Guyanese teachers and other key personnel</li> <li>• Deliver initial and ongoing professional development opportunities to drive ICT integration in Guyana</li> </ul>			
<b>Results</b>			
1) ICT in Education policies and plans reviewed.	<ul style="list-style-type: none"> <li>• Review of ICT in education policies and plans completed by October, 2010</li> <li>• Results of review are integrated into relevant policies and plans by December, 2010</li> <li>• Full implementation plans for all aspects of ICT in education rollout completed by December, 2010</li> </ul>	<ul style="list-style-type: none"> <li>• Workshop reports</li> <li>• Review report</li> <li>• Revised policies and plans</li> <li>• Implementation plans</li> </ul>	<ul style="list-style-type: none"> <li>• Political commitment is secured from all relevant parties to complete review</li> <li>• Commitment is secured from all relevant parties to adjust current targets where these are unrealistic</li> <li>• Funds can be secured in the short term to support the review</li> </ul>

	<b>Indicators</b>	<b>Sources of verification</b>	<b>Risks/Assumptions</b>
2) An ICT Professional Development Framework for Teachers in Guyana.	<ul style="list-style-type: none"> <li>An ICT Professional Development Framework for Teachers in Guyana and accompanying implementation guidelines is developed and accepted by all key players in the country by December, 2010</li> <li>Where they include some focus on ICT, all new courses and programmes aimed at teachers are aligned to ICT Professional Development Framework for Teachers in Guyana and this is explicitly described in the curriculum for these courses and programmes.</li> </ul>	<ul style="list-style-type: none"> <li>Document describing ICT Professional Development Framework for Teachers in Guyana</li> <li>Implementation guidelines document</li> <li>Course/programme curricula</li> </ul>	<ul style="list-style-type: none"> <li>Commitment is secured from all relevant parties to participate in design of ICT Professional Development Framework for Teachers in Guyana and adhere to the Framework once complete</li> <li>Funds can be secured in the short term to support development of the Framework</li> </ul>
3) Capacity of all relevant staff at the MoE, UG, CPCE, and NCERD in ICT integration developed.	<ul style="list-style-type: none"> <li>Baseline of current ICT integration competence of relevant staff completed by December, 2010</li> <li>Relevant courses and other activities identified for staff to complete to develop their competence in ICT Integration by December, 2010</li> <li>All staff complete capacity development courses during 2011 to develop relevant capacities</li> </ul>	<ul style="list-style-type: none"> <li>Baseline report</li> <li>Implementation plan for capacity development process</li> <li>Attendance/participation records of relevant courses and other activities</li> <li>Certificates of completion of courses</li> </ul>	<ul style="list-style-type: none"> <li>Existing courses from around the world can be identified and adapted for local delivery in Guyana</li> <li>Additional staff required for implementation of ICT Professional Development Strategy for Teachers in Guyana are recruited at MoE, UG, CPCE, and NCERD</li> <li>Staff are released to complete courses</li> <li>Staff participation in courses is sufficiently sustained to ensure successful completion</li> </ul>
4) Completed review and improvement of IT curriculum for secondary students.	<ul style="list-style-type: none"> <li>Review of IT Subject Curriculum for Secondary Students completed and new curriculum ready for first delivery in 2012</li> <li>Revised IT curriculum subject documents circulated to all teachers teaching IT as a subject by end of 2011</li> </ul>	<ul style="list-style-type: none"> <li>Review report</li> <li>Curriculum subject documents</li> </ul>	<ul style="list-style-type: none"> <li>No identified risks to complete this result</li> </ul>

	<b>Indicators</b>	<b>Sources of verification</b>	<b>Risks/Assumptions</b>
5) Development of all ICT Integration courses and associated materials.	<ul style="list-style-type: none"> <li>• Design of stand-alone CPD courses on Success Maker completed by December, 2010</li> <li>• ICT module for Principals Course packaged as a stand-alone module and ready for delivery to principals by mid 2011</li> <li>• Design of ICT components (and all accompanying materials) of ADE and B.Ed. programmes completed and ready for launch in January 2012</li> <li>• Design of ICT module (and all accompanying materials) for NCERD Course for Principals completed and ready for integration into the Course by end 2011</li> <li>• ICT modules of ADE programme re-packaged as stand-alone ICT CPD courses and ready for launch in January, 2012</li> <li>• ICT modules of B. Ed. programme re-packaged as stand-alone ICT CPD course and ready for launch in mid 2012</li> <li>• Modules on Teaching IT as a Subject from ADE programme re-packaged as stand-alone ICT CPD course and ready for launch in 2013</li> <li>• Design of CPD course (and all accompanying materials) for School ICT Coordinators completed and ready for launch in 2014</li> </ul>	<ul style="list-style-type: none"> <li>• Curriculum documents</li> <li>• Course materials</li> <li>• Course delivery schedules</li> </ul>	<ul style="list-style-type: none"> <li>• ICT Professional Development Framework for Teachers in Guyana is completed according to schedule</li> <li>• Guyana-World Bank Project on Improving Teacher Education is finalized and approved for implementation as per current expectations</li> <li>• UG, CPCE, and NCERD are all committed to delivery of ICT Professional Development Strategy for Teachers in Guyana</li> <li>• Additional staff are recruited at UG, CPCE, and NCERD to support design and delivery of new courses</li> <li>• Financial resources are secured to support implementation of new courses</li> </ul>

	<b>Indicators</b>	<b>Sources of verification</b>	<b>Risks/Assumptions</b>
6) Connected Classrooms portal repository of all curricula and content for above courses.	<ul style="list-style-type: none"> <li>Repository for curricula and content of courses within ICT Professional Development Framework for Teachers in Guyana is established within Connected Classrooms portal by December, 2010</li> <li>Course materials are uploaded into repository, with appropriate Creative Commons licences embedded, as they are finalized</li> </ul>	<ul style="list-style-type: none"> <li>Connected Classrooms portal</li> <li>Dedicated repository space on portal</li> <li>Online links to materials</li> </ul>	<ul style="list-style-type: none"> <li>Commitment is secured from all relevant parties to share curricula and materials online</li> <li>Any emerging copyright issues can be resolved to enable release of materials under appropriate Creative Commons licences</li> <li>Technical skills exist within Connected Classrooms portal project to develop and launch repository</li> </ul>
7) Monitoring system established.	<ul style="list-style-type: none"> <li>Baseline of current ICT competence levels of all teachers and other relevant personnel in Guyana completed by June, 2011</li> <li>Design of monitoring system completed by June, 2011, aligned with design of baseline survey and requirements of ICT Professional Development Framework for Teachers</li> <li>Monitoring system kept up to date in real time and made accessible to key players online as professional development activities are completed</li> <li>External evaluation of progress with implementation of ICT Professional Development Strategy for Teachers in Guyana completed annually, with first report completed in November, 2011</li> </ul>	<ul style="list-style-type: none"> <li>Baseline survey instruments and report</li> <li>Monitoring system design</li> <li>Monitoring system reports</li> <li>Evaluation reports</li> </ul>	<ul style="list-style-type: none"> <li>Difficulties in accessing schools do not inhibit completion of baseline survey by identified deadline</li> <li>Monitoring system can be hosted and accessed online</li> <li>All participating organizations commit to logging activities within monitoring system to enable real-time monitoring</li> </ul>

## 5.10 Activity Schedule

Drawing from the above Logical Framework, the following high-level schedule of activities for the defined Results has been prepared. Deadlines assume a start date of 1<sup>st</sup> August, 2010:

Activity	Deadline
<b>1. ICT in Education policies and plans reviewed.</b>	
1.1. Appoint consultant to complete review of polices and plans	15 <sup>th</sup> August, 2010
1.2. Complete desktop review of policies and plans to identify key concerns	30 <sup>th</sup> August, 2010
1.3. Complete consultancy visit to conduct series of meetings and workshops to engage on improvements to policies	30 <sup>th</sup> September, 2010
1.4. Revised policies and targets prepared, reviewed, and accepted by all key parties	30 <sup>th</sup> October, 2010
1.5. Complete further consultancy visit to complete and present policy documents and prepare implementation plans	15 <sup>th</sup> November, 2010
1.6. Finalize detailed implementation plans	15 <sup>th</sup> December, 2010
<b>2. An ICT Professional Development Framework for Teachers in Guyana.</b>	
2.1. Appoint consultant to support development of ICT Professional Development Framework	31 <sup>st</sup> August, 2010
2.2. Complete desktop research to support development of Framework	30 <sup>th</sup> September, 2010
2.3. Complete consultancy visit to discuss and develop draft Framework	30 <sup>th</sup> September, 2010
2.4. Prepare detailed Framework and circulate for comment/refinement	15 <sup>th</sup> October, 2010
2.5. Submit final Framework to MoE for approval	31 <sup>st</sup> October, 2010
2.6. Complete necessary political processes to adopt final Framework as official policy	15 <sup>th</sup> December, 2010
<b>3. Capacity of all relevant staff at the MoE, UG, CPCE, and NCERD in ICT integration developed.</b>	
3.1. Appoint local research agency/consultant to complete baseline study of current capacity	31 <sup>st</sup> August, 2010
3.2. Prepare survey instruments	15 <sup>th</sup> September, 2010
3.3. Administer survey	15 <sup>th</sup> October, 2010
3.4. Compile results of survey and complete necessary analysis to identify key skills gaps	15 <sup>th</sup> November, 2010
3.5. Identify appropriate courses and other relevant activities to develop capacity as per gaps identified in survey, combined with agreed schedule for implementation of capacity development	15 <sup>th</sup> December, 2010
3.6. Implement rolling series of professional development activities to develop capacity of staff at MoE, UG, CPCE, and NCERD, as per implementation plan	15 <sup>th</sup> December, 2011
<b>4. Completed review and improvement of IT curriculum for secondary students.</b>	
4.1. Appoint subject specialists and teachers to support review of curriculum	15 <sup>th</sup> January, 2011
4.2. Team to complete review and improvement of curricula through combination of desktop work and workshop activities	30 <sup>th</sup> June, 2011
4.3. Prepare final curriculum documents based on review, including layout and editing	31 <sup>st</sup> August, 2011

Activity	Deadline
4.4. Prepare printed copies of curriculum documents and circulate to schools for review by teachers	30 <sup>th</sup> September, 2011
4.5. Upload curriculum documents onto MoE website	30 <sup>th</sup> September, 2011
5. <i>Development of all ICT Integration courses and associated materials.</i>	
For each course:	
5.1. Appoint team to develop course	Variable deadlines for each course
5.2. Complete detailed curriculum document for course, outlining key outcomes, proposed teaching and learning methods, and alignment with framework	
5.3. Complete scan of existing courses and materials that can be harnessed to create course	
5.4. Complete development of initial version of course, through combination of desktop work and workshop activities	
5.5. Pilot draft course and gather feedback from participants	
5.6. Review and improve course based on feedback from pilot	
5.7. Complete final packaging for course	
5.8. Ensure copyrights are cleared to enable released of course materials as OER	
5.9. Release course materials online via Connected Classrooms repository	
6. <i>Connected Classrooms portal repository of all curricula and content for above courses.</i>	
6.1. Prepare functional specification for repository	30 <sup>th</sup> September, 2010
6.2. Develop repository within Connected Classrooms portal	15 <sup>th</sup> November, 2010
6.3. Complete quality check of repository to fix bugs	15 <sup>th</sup> December, 2010
6.4. Upload course materials into repository as they become available	Ongoing
7. <i>Monitoring system established.</i>	
7.1. Appoint local research agency/consultant to complete baseline study of ICT competence of teachers and other relevant personnel	30 <sup>th</sup> September, 2010
7.2. Prepare survey instruments	30 <sup>th</sup> October, 2010
7.3. Pilot and refine survey instruments to ensure they work successfully	30 <sup>th</sup> November, 2010
7.4. Administer survey	31 <sup>st</sup> March, 2011
7.5. Compile results of survey and complete necessary analysis to identify key skills gaps	31 <sup>st</sup> May, 2011
7.6. Use baseline survey to design appropriate monitoring system within MoE, in consultation with UG, CPCE, and NCERD	30 <sup>th</sup> June, 2011
7.7. Build monitoring system based on design	30 <sup>th</sup> September, 2011
7.8. Ongoing input of data into monitoring system by key parties to ensure real-time monitoring of progress	Ongoing
7.9. Monthly reports circulated on status of implementation	Ongoing
7.10. Identify evaluation agency to complete annual external evaluation	30 <sup>th</sup> September, 2010
7.11. Evaluation agency to prepare detailed implementation plan for evaluation process for approval by MoE	31 <sup>st</sup> October, 2010
7.12. Evaluation agency to implement plan and prepare annual evaluation reports for submission by 30 <sup>th</sup> June each year	30 <sup>th</sup> June annually

## **5.11 Monitoring and Evaluation Strategy**

As can be seen from the above logical framework and activity schedule, provision has been made for ongoing monitoring and evaluation of the ICT Professional Development Strategy for Teachers in Guyana. It is envisaged that this will comprise three key elements:

- 1) Completion of a detailed baseline survey to determine the level of ICT competence of teachers in Guyana at the outset of the Initiative;
- 2) Design, development, and maintenance of an online Monitoring System designed to track delivery of capacity building in response to the gaps identified in the baseline survey, updated in real time by the agencies delivering professional development (principally UG, CPCE, and NCERD), so that progress in delivery can be monitored on an ongoing basis;
- 3) Commissioning in the first year of implementation of a comprehensive external evaluation study, with annual formative evaluation reports designed to feed into and improvement implementation of the ICT Professional Development Strategy for Teachers in Guyana.

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## 6 Appendix One: Notional Budgets

### 6.1 Budgets

A detailed three-year budget has been prepared to achieve the results defined in the logical framework above. This budget runs through to July, 2013, which makes provision for completion of design of all the courses specified in the logical framework.

These budgets are based on the following assumptions:

- 1) Inflation has been calculated at 4%.
- 2) The budgets do not include costs of full-time staff at the MoE, UG, CPCE, and NCERD or the cost of appointing a full-time Initiative manager. It is assumed that these costs will be absorbed into the mainstream budgets of the relevant organizations in order to ensure long-term sustainability of those costs.
- 3) Likewise, the budgets do not provide for the costs of the International Advisory Group, as it is assumed that the international participants in this Advisory Group will cover their own costs.
- 4) The costs of developing pre-service courses for integration into the new programmes to be delivered by UG and CPCE are not included, as it is assumed that these costs are incorporated into budgets for the Guyana-World Bank Project on Improving Teacher Education.

Based on these assumptions, the following budgets have been developed:

**PROJECT SUMMARY BUDGET**

	<b>TOTAL</b>
Personnel	\$817 044.72
Travel & Workshops	\$101 645.96
Extraordinary Items	\$38 400.00
<b>TOTAL</b>	<b>\$957 090.68</b>

**OUTPUT ONE SUMMARY BUDGET**

**ICT in Education policies and plans reviewed**

	<b>TOTAL</b>
Personnel	\$23 000.00
Travel & Workshops	\$8 150.00
<b>TOTAL</b>	<b>\$31 150.00</b>

**OUTPUT TWO SUMMARY BUDGET**

**An ICT Professional Development Framework for Teachers in Guyana**

	<b>TOTAL</b>
Personnel	\$15 600.00
Travel & Workshops	\$5 125.00
<b>TOTAL</b>	<b>\$20 725.00</b>

**OUTPUT THREE SUMMARY BUDGET**

**Capacity of all relevant staff at the MoE, UG, CPCE, and NCERD in ICT integration developed**

	<b>TOTAL</b>
Personnel	\$24 960.00
Travel & Workshops	\$8 670.00
Extraordinary Items	\$30 600.00
<b>TOTAL</b>	<b>\$64 230.00</b>

**OUTPUT FOUR SUMMARY BUDGET**

**Completed review and improvement of IT curriculum for secondary students**

	<b>TOTAL</b>
Personnel	\$46 020.00
Travel & Workshops	\$6 425.00
Extraordinary Items	\$7 800.00
<b>Sub-Total</b>	<b>\$60 245.00</b>
<b>TOTAL</b>	<b>\$60 245.00</b>

**OUTPUT FIVE SUMMARY BUDGET**

**Development of all ICT Integration courses and associated materials**

	<b>TOTAL</b>
Personnel	\$380 523.04
Travel & Workshops	\$40 112.56
<b>TOTAL</b>	<b>\$420 635.60</b>

**OUTPUT SIX SUMMARY BUDGET**

**Connected Classrooms portal repository of all curricula and content for above courses**

	<b>TOTAL</b>
Personnel	\$20 063.68
<b>TOTAL</b>	<b>\$20 063.68</b>

**OUTPUT SEVEN SUMMARY BUDGET**

**Monitoring system established**

	<b>TOTAL</b>
Personnel	\$306 878.00
Travel & Workshops	\$26 143.40
<b>TOTAL</b>	<b>\$333 021.40</b>

**YEAR ONE PROJECT BUDGET**

	<b>Unit Type</b>	<b>Cost per Unit</b>	<b>Number of Units</b>	<b>Cost</b>	<b>TOTAL</b>
<b>Personnel</b>					\$246 950.00
ICT in Education Consultant	days	\$1 000.00	23	\$23 000.00	
ICT in Education Trainer	days	\$650.00	39	\$25 350.00	
Education Specialist (Course Design)	days	\$650.00	184	\$119 600.00	
DTP and Graphic Design Expert	days	\$500.00	20	\$10 000.00	
Content Editor	days	\$500.00	30	\$15 000.00	
Researcher	days	\$650.00	13	\$8 450.00	
Evaluator	days	\$650.00	67	\$43 550.00	
Web Developer	days	\$500.00	4	\$2 000.00	
<b>Travel &amp; Workshops</b>					\$45 175.00
International Air Travel	Round trip	\$2 500.00	7	\$17 500.00	
Daily Subsistence Allowance	daily cost	\$175.00	89	\$15 575.00	
Local Air Travel	Round trip	\$500.00	11	\$5 500.00	
Local Ground Travel	Average Provision per trip	\$100.00	21	\$2 100.00	
Workshop Attendance (venue, refreshments, materials)	daily cost per participant	\$50.00	90	\$4 500.00	
<b>Extraordinary Items</b>					\$15 000.00
Professional Development Allocation (CPCE, UG, NCERD, MoE)	Average cost per person	\$1 000.00	15	\$15 000.00	
<b>TOTAL</b>					<b>\$307 125.00</b>

**YEAR TWO PROJECT BUDGET**

	<b>Unit Type</b>	<b>Cost per Unit</b>	<b>Number of Units</b>	<b>Cost</b>	<b>TOTAL</b>
<b>Personnel</b>					\$383 032.00
ICT in Education Trainer	days	\$676.00	10	\$6 760.00	
Education Specialist (Course Design)	days	\$676.00	144	\$97 344.00	
DTP and Graphic Design Expert	days	\$520.00	25	\$13 000.00	
Content Editor	days	\$520.00	38	\$19 760.00	
Researcher	days	\$676.00	76	\$51 376.00	
Research Field Worker	days	\$260.00	500	\$130 000.00	
Evaluator	days	\$676.00	62	\$41 912.00	
Web Developer	days	\$520.00	44	\$22 880.00	
<b>Travel &amp; Workshops</b>					\$26 494.00
International Air Travel	Round trip	\$2 600.00	3	\$7 800.00	
Daily Subsistence Allowance	daily cost	\$182.00	49	\$8 918.00	
Local Air Travel	Round trip	\$520.00	9	\$4 680.00	
	Average Provision				
Local Ground Travel	per trip	\$104.00	19	\$1 976.00	
Workshop Attendance (venue, refreshments, materials)	daily cost per participant	\$52.00	60	\$3 120.00	
<b>Extraordinary Items</b>					\$23 400.00
Professional Development Allocation (CPCE, UG, NCERD, MoE)	Average cost per person single unit (incl distribution to schools)	\$1 040.00	15	\$15 600.00	
Curriculum document		\$15.60	500	\$7 800.00	
<b>TOTAL</b>					<b>\$432 926.00</b>

**YEAR THREE PROJECT BUDGET**

	<b>Unit Type</b>	<b>Cost per Unit</b>	<b>Number of Units</b>	<b>Cost</b>	<b>TOTAL</b>
<b>Personnel</b>					\$187 062.72
Education Specialist (Course Design)	days	\$703.04	134	\$94 207.36	
DTP and Graphic Design Expert	days	\$540.80	20	\$10 816.00	
Content Editor	days	\$540.80	30	\$16 224.00	
Researcher	days	\$703.04	7	\$4 921.28	
Evaluator	days	\$703.04	62	\$43 588.48	
Web Developer	days	\$540.80	32	\$17 305.60	
<b>Travel &amp; Workshops</b>					\$22 956.96
International Air Travel	Round trip	\$2 704.00	2	\$5 408.00	
Daily Subsistence Allowance	daily cost	\$189.28	39	\$7 381.92	
Local Air Travel	Round trip	\$540.80	9	\$4 867.20	
Local Ground Travel	Average Provision per trip	\$108.16	19	\$2 055.04	
Workshop Attendance (venue, refreshments, materials)	daily cost per participant	\$54.08	60	\$3 244.80	
<b>TOTAL</b>					<b>\$210 019.68</b>

## 7 Appendix Two: People Consulted

Name	Organization	Position
Trudi van Wyk	Commonwealth of Learning	Education Specialist: eLearning
Anthony Ming	Commonwealth Secretariat	Adviser (Informatics): Governance & Institutional Development Division
Viola Rowe	Cyril Potter College of Education	Vice Principal (Administration)
Omeshwar Singh	Cyril Potter College of Education	I.T. Lecturer
Deborah Thomas	Cyril Potter College of Education	Principal
Names Not Supplied	Kawall Primary School	Principal and Selection of Teachers
Greg Butler	Microsoft	Worldwide Education Strategy Director
Hon. Shaik K.Z. Baksh M.P	Ministry of Education	Minister of Education
Get Name	Ministry of Education	Chief Planning Officer
Yoganand Indarsingh	Ministry of Education	Director of ICT
Get Name	Ministry of Education	Teacher Education (Get Official Title)
Mohandatt Goolsarran	National Centre for Educational Resource Development	Director
Marcia Thomas	National Centre for Educational Resource Development	Get Official Title
Pauline Stanford	National Centre for Educational Resource Development	Get Official Title
Sheldon Blair	National Centre for Educational Resource Development	I.T. Officer
Ed Caesar	University of Guyana	ICT Task Force Team Leader
Azed Khan	University of Guyana	Lecturer (Science)
Victorine Solomon	University of Guyana	Lecturer (Reading & Language)
Denise Maltay	University of Guyana	Lecturer (Literacy-Reading & Language)
Bridget Ogowewo	University of Guyana	Lecturer (Curriculum & Instruction)
Hazel Simpson	University of Guyana	Lecturer (Curriculum and Social Studies)
Claudith Thompson	University of Guyana	Lecturer (Literacy & Language)
Elsa Cromarty	University of Guyana	Lecturer (English)
Peter Wintz	University of Guyana	Lecturer (Mathematics)
Raymond Khan	University of Guyana	Manager: Computer Services
Khemraj Narine	University of Guyana	Computer/Network Technician (Centre for Information Technology)
Robert Hawkins	World Bank	Get Official Title
Angela Demas	World Bank	Get Official Title

<b>Name</b>	<b>Organization</b>	<b>Position</b>
Walter Phillips	World Bank	Guyana Teacher Education Initiative Consultant

## 8 Appendix Three: Country Case Studies

### 8.1 ICT Implementation in Schooling and Teacher Professional Development in Chile

#### 8.1.1 Chilean Context

Chile has close to 16 million inhabitants, 11,000 schools and 140,000 teachers. Primary and secondary education is compulsory.

The Chilean Ministry of Education started its ICT in education policy, named 'Enlaces' (links), in the early 1990s, aiming to establish a network of schools that could use ICT to enhance teaching and learning, and to connect with the local, national, and international community: a network of learners. Each regional office or branch of the Ministry of Education has an ICT specialist who coordinates national ICT projects (i.e. infrastructure improvements).

In 2010, Chile has a ratio of 24:1 students per computer, and close to 80% of teachers have had some training in ICT. A network of 24 universities all over the country is responsible for teacher training and for technical support to every school. Approximately 200,000 community members, mainly parents, have been also trained in basic ICT uses (Internet and basic software such as MS Office).

From an infrastructure perspective, 90% of primary and secondary schools have ICT laboratories<sup>13</sup> (only a small proportion of small rural schools are still behind) and 75% have Internet access (however, fewer than 10% have good bandwidth). More than 60% of teachers own a computer, and 80% of them have Internet access at home. Close to 80% of secondary students own a mobile telephone. From a social perspective, 75% of the more vulnerable students have access to ICT only in their schools.

Enlaces started as a research project and evolved into an official *Centre of ICT for Education* at the Ministry of Education, with a regular budget approved by Parliament. As of 2010, close to 70 full-time professionals work at the Centre.

In summary, after two decades, Chile has acquired an almost universal level of basic ICT infrastructure in each school and most teachers have a basic proficiency level in the uses of ICT. This scenario enables it to move forward towards more meaningful and more pedagogical uses of ICT for learning and teaching.

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<sup>13</sup> Enlaces has defined an infrastructure standard for different schools (pre-primary, primary, secondary urban and rural). A basic primary school has an ICT laboratory for every 16 classrooms, each with a set of computers, a projector, scanner, and printer. In addition, every four classrooms have a portable computer and a projector. The library and the teacher's room have also computers and a printer.

## 8.1.2 Challenges

The main challenges identified by the Chilean ICT in education policies are presently the following:

- Challenge: Ensuring a proper and meaningful integration of the technology in normal pedagogical activities inside the classroom, to enhance teaching and learning. Teachers are willing to use technology in the subjects they teach but are not sure about when, for how long and why using it, what ICT resources to select, how to organize their teaching and how to evaluate learning. Technology is still underused and computer labs are mostly used by a small proportion of teachers for regular learning activities. Teachers complain about insufficient local technical support to ensure a smooth and predictable use of technology inside the classroom

New strategies: a new general 'ICT for Quality Education Plan' has been designed with more specific teacher training options, more relevant to the teacher's needs according to their particular context (i.e. in rural classroom with children from different levels), sharing best practices among teachers (through an educational Web site); replacing old technology, improving electrical outlets and cables.

- Challenge: Technology is underused for management purposes at all levels and only simple tools such as spreadsheets are commonly used.

New strategies: training principals and staff about school management; offering simple but scalable management tools; sharing management practices. Gradually making compulsory the digital flow of data and documents between schools and the Ministry.

- Challenge: How to use technology to help students acquire higher-level skills (information management, critical thinking, etc.), how to organize resources towards this goal, how to measure it.

New strategies under design: piloting several ideas on a small scale: 1:1 model including PC for teachers; working in international collaborative projects; using ICT for extra-curricular projects defined by the students.

- Challenge: How to bridge the gap between the more advanced uses of ICT by students at home and in the streets, compared with the uses at school. How to use ICT as a lever for a better learning environment, given that ICT motivates students.

New strategies under design: mainly research projects on educational uses of mobile technology and social networks (i.e. Facebook).

### 8.1.3 Teacher Professional Development

Enlaces is presently deploying a new 'ICT for Quality Education Plan' to enhance teacher professional development, as well as to promote use of ICT for learning, teaching, and managerial activities. The budget for this Plan is USD\$200 million and has been in place since 2007. The Plan has three main pillars:

- Closing the Digital Divide to achieve a ratio of 10 students per computer by 2011 by incrementing the quality and quantity of ICT resources in each school, and by improving connectivity.
- Digital competencies for teachers, principals and school staff, with workshops at different levels.
- A new generation of digital resources for learning, in particular a new selection of educational software available through an on-line catalogue (<http://www.catalogored.cl/>), educational games, and new devices (i.e. interactive blackboards).

In each pillar, the strategies are based on competences and standards. The plan relies on an initial diagnosis at each school (<http://www.competenciastic.cl/>) and on a road map to achieve the established standards. The Plan includes all K-12 levels (K level for the first time).

At each school, the plan has to be properly integrated, by the local community, into its own *Improvement Plan* (compulsory). The community has an important role in performing a diagnostics on its present ICT competencies and in establishing a road map for achieving their educational goals.

The school has to make an explicit commitment related to the integration of ICT into their daily routines, goals and plans. Specifically:

- Relate the use of ICT with learning outcomes as defined in their Improvement Plan.
- Integrate ICT into their strategies to improve teaching and management.
- Improve student's ICT competence levels with explicit goals at the end of primary and at the end of secondary education. To achieve these goals, Enlaces offers a Progress Map of Digital Learning, an on-line competence evaluation tool and a set of training workshops.
- Make a plan for a sustainable level of ICT infrastructure at the school.

The school is also responsible for the maintenance of the ICT resources.

The plan is based on a set of standards for teachers, principals and staff members. A 'Functional Map of Competencies' for teachers has been defined, which should be used in both pre and in service teacher training. The challenge for teachers is to enhance learning and teaching activities through improved ICT competencies. To this aim, Enlaces has designed a set of workshops according to the needs of each teacher, principal and school staff, in the context of the 'ICT for Quality Education Plan'.

The following is a list of the available workshops, organized in three plans:

Basic Plan: self-learning web-based module of 60 pedagogical hours on basic competencies for the use of ICT inside the classroom. Competencies included are: integration of ICT into the

teacher's lesson plans; basic skills to work with a computer; use of productivity software (spreadsheets, word processors, etc.) to construct learning material; use of Internet (mail and navigation) as a professional and educational tool; ICT for administrative uses; ethical and legal aspects related to data privacy, intellectual ownerships and digital content.

Common Plan: transversal competencies for a Digital Era. Its aim is to work on the curricular integration of ICT and is offered for teachers, principals and administrative staff.

Differentiated Plan:

- ICT management and support. Offered for the professional in charge of the ICT infrastructure at each school. Its aim is to provide the tools for a proper support of the ICT infrastructure and for assistance to teachers in the integration of ICT into the curriculum.
- Leadership and ICT: for all professionals inside a school. Its aim is to offer tools to promote the proper integration of ICT in all activities at the school: administration, pedagogy, communication, etc.
- ICT competencies for pre-primary teachers: hands-on workshops to learn how to use ICT for curricular planning and for classroom uses. Learning to participate in a virtual community of teachers using different Internet tools. Learning the use of educational software and Internet content inside the classroom.
- Innovating with ICT in levels 1 to 4: similar to previous workshop.
- Integrating ICT in levels 5 to 8: similar to previous workshop.
- Curricular integration of ICT in secondary level: similar to previous workshop.
- Enhancing pedagogical support using ICT: a workshop for the professionals responsible for the general pedagogical unit at each school. Its aim is to learn the tools that will help other teachers to integrate ICT into their work.

To apply to any of these workshops, each teacher must first go through an ICT Competencies Diagnostics Test (<http://www.competenciastic.cl/>).

#### **8.1.4 Lessons Learned**

Chile has been applying different ICT strategies in its educational system for almost two decades, with different outcomes. It has heavily focused on teacher training and on infrastructure, but so far and, in general, it has only achieved a very basic level of pedagogical uses of ICT, mostly with innovative teachers and early adopters and less so with mainstream teachers.

One of the lessons learned is that teachers require much more than general purpose training about ICT and its many potential uses in schools. The perceived needs are of more practical, curriculum related and hands-on approaches and of achieving much higher confidence levels in the uses of ICT inside a classroom (particularly in front of technologically proficient students).

A second related lesson is the need of proper and more specific models and exemplary cases of ICT use, that have been proved in classrooms/contexts similar to their own (i.e. teaching mathematics to 45 teenagers from an urban low-income community or a classroom of 12 children aged 6 to 12 at different learning levels of reading comprehension in a one-classroom rural school setting).

A third and related lesson is the need of a much higher investment at each school in technical support in order for teachers to rely on the available technology (without the need of regularly investing on a Plan B in case of failures).

## **8.2 Teacher Professional Development in Use of ICT in South Africa**

The South African schooling system comprises public and private schools that are demarcated according to general education and training (GET) and further education and training (FET). A National Qualifications Framework (NQF) frames levels of education and qualifications, producing a vertically hierarchical system from GET to FET to Higher Education and Training (HET) bands. Successful completion of GET (grades R-9) leads to FET (grades 10-12), and successful completion of FET leads to HET. Primary school falls in the GET phase and covers Grades R-7 and high school starts in the GET phase, in grade 8 and straddles into the FET phase to grade 12. FET is offered in the schooling system as well as in specialized colleges which have a vocational training focus.

Governance of schools at national and provincial levels is through the National Department of Education (nDoE) and provincial departments of education (pDoEs) and at school level through principals and school governing bodies or school board of directors. The nDoE formulates policy, sets norms and standards for education and teacher training, and monitors and evaluates all levels of the schooling system. The pDoEs are responsible for providing effective education for all schools in the respective provinces by providing resources to public schools, and organizing support for curriculum training and other teacher training aimed at improving teacher quality for effective teaching and learning. School principals and governing bodies or board of directors are responsible for formulating policy at school level in line with national and departmental policies and for the day to day running of schools.

In 2007, there were 26,099 public and independent schools in South Africa, with a total enrolment of 12, 410, 501 learners and 395,452 teachers. South Africa faces many challenges in its schooling system, especially with regards to access to technology and teacher readiness to integrate available technologies into the curriculum. There are many programmes that seek to address these challenges, some of them specifically focusing on technology access or teacher training and others on both technology access and teacher training. These programmes are being implemented in a robust policy environment with policies that are mainly geared towards creating an enabling environment for adoption of ICTs for teaching and learning.

### 8.2.1 ICT Policies and Education

The White Paper on e-Education identifies the benefits of new technologies as being those of educational management, educational administration, communication, curriculum integration, collaboration between learners and teachers, facilitating higher order cognitive skills among learners, motivating learning and preparing learners to be workers in the knowledge economy. Essentially, ICT policies in education address issues of infrastructure, technology access, connectivity access and teacher training.

The White Paper on e-Education makes teacher training a pivotal aspect in the envisaged adoption of ICT for teaching and learning, citing that ‘ICTs will be central to the pre-service training of recruits and the ongoing professional development of practicing teachers’,<sup>14</sup> through collaboration between higher education institutions and the nDoE. Further, the White Paper specifies that a national framework for competencies for teachers must be developed, crucially aligned with the NQF and articulating with the Norms and Standards for Educators. This framework has been developed as Guidelines for Teacher Training and Professional Development in ICT and was approved by the Deans’ Forum in 2007. Crucially, this framework locates teacher development in both pre-service and in-service spheres, as currently most ICT teacher training is at in-service level, and suggests several approaches for ICT skills development for practicing teachers and student teachers, including: making ICT professional development compulsory; fast tracking students already in HEIs to reach at least adoption<sup>15</sup> level of ICT for teaching and learning by the time they complete their studies; from 2008, ensuring that all students leaving HEIs with a teaching qualification have reached adaptation level; training all teachers with access to ICT to reach adaptation level by 2010; and training subject advisors to appropriation level so that they can assist teachers to gain access to ICT knowledge for teaching and learning.

Although learning ICT skills is an important aspect of learning to integrate ICT into teaching and learning, the Guidelines emphasize that ICT professional development should focus primarily on

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<sup>14</sup> *ibid*, p.22

<sup>15</sup> The Guidelines for Teacher Training and Professional Development in ICT outlines the development levels that would be used to gauge teacher level of ICT competence as specified in the White paper on e-Education and these are:

- *Entry level.* The teacher is computer literate and is able to use computers. However, frustrations and insecurities are common in the introduction of ICT. At this level, teachers are likely to lack confidence.
- *Adoption level.* The teacher is able to use various ICTs, including computers, to support traditional management, administration, teaching and learning, and is able to teach learners how to use ICT.
- *Adaptation level.* The teacher is able to use ICT to support everyday classroom activities at an appropriate NCS level, assess the learning that takes place and ensure progression. He/she is able to reflect critically on how ICT changes the teaching and learning processes and to use ICT systems for management and administration. Productivity increases at this level.
- *Appropriation level.* The teacher has a holistic understanding of the ways in which ICT contributes to teaching and learning. He/she has an understanding of the developing nature of ICT, and an awareness that it is integral to the structure and purposes of the NCS. He/she has the experience and confidence to reflect on how ICT can influence teaching and learning strategies, and to use new strategies.
- *Innovation level.* The teacher is able to develop entirely new learning environments that use ICT as a flexible tool, so that learning becomes collaborative and interactive. ICT is integrated as a flexible tool for whole-school development through redefining classroom environments and creating learning experiences that leverage the power of technology.

educational goals and be needs driven, responding to requirements of specific school subjects. While the Guidelines for Teacher Training and Professional Development in ICT are quite specific about approaches to ICT teacher professional development, they are silent on specific training on teacher training, for example ICT teacher training with a specific focus on enhancing learning for learners with special educational needs, an area that needs special attention considering that in South Africa there are an estimated 64,603<sup>16</sup> learners with special educational needs. Training teachers to enable them to use the various technologies that will enhance learning for these learners is an area that deserves special policy consideration.

### **8.2.2 Teacher Training in South Africa**

Teacher education in South Africa has always been provided by NGOs, private providers, teacher unions, nDoEs, pDoEs, and publicly funded tertiary institutions that offer pre-service and in-service teacher training and professional development. NGOs offer most of the in-service training while the tertiary institutions offer both pre-service and in-service training. Some qualifications are credit based while others are non-credit based and are in the form of short skills programmes. The trend is that all pre-service programmes are accredited and lead to recognized qualifications while most of the in-service programmes are non credit based and do not lead to recognized qualifications. Pre-service teaching degrees can be in the form of a composite four-year Bachelor of Education degree or a three-year Bachelor of Arts, Bachelor of Science or Bachelor of Commerce, which is capped by a one-year postgraduate Certificate in Education.

Traditionally, most pre-service teacher training took place at colleges of education before they were merged but now, it is taking place mainly in universities with a few of teaching practice in schools. Another model is emerging where teacher training is or systematically located in both university and schools in school-based teacher training programmes called learnerships, which are driven by the Education and Training Sector Education and Training Authority (ETDP SETA)<sup>17</sup>.

There are also several programmes aimed at teacher upgrade of qualifications. Currently, the National Professional Diploma in Education (NPDE) and ACE qualifications are offered by universities with a view to upskilling teachers to reduce the shortage of quality teachers. Some programmes have a specific subject focus and are meant to improve teachers' content knowledge and pedagogical skills, particularly in mathematics, science, and English.

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<sup>16</sup> GautengOnline. no date. ICT Education for Learners with Special Educational Needs: <http://www.gautengonline.com/Documents/ELSEN%20Final%20Report.pdf>

<sup>17</sup> The ETDP SETA is one of the 25 SETAs established through the National Skills Development Strategy to address skills shortages in specific sectors. ETDP SETA is responsible for skills development in the Education Sector. SETAs are funded through the Skills Development Levies that companies pay as a percentage of their payroll to the Department of Labour. Public institutions, for example provincial departments of education, do not pay the Skills development Levy but ring fence a percentage of their payroll for skills development.

### 8.2.3 Teacher Training and ICT

In the area of ICT and teacher training, SNSA has developed and is responsible for coordinating reputable programmes that have trained many teachers in South Africa. These programmes are:

- *Educators' Development Network (EDN) which has directly trained 7,000 educators, and trained another 20,000 teachers in ICT integration using 1,000 facilitators;*<sup>18</sup>
- *Microsoft Partners in Learning which has been responsible for the training of 13,500 teachers.*<sup>19</sup>

SNSA coordinates the Intel Teach to the Future programme which has been adapted by the University of Johannesburg; the University of Pretoria, and the University of Fort Hare for components of B Ed, ACE, and PGCE and staff training. UKZN also provides ICT teacher education through its ACE programme in ICT integration and Tshwane University of Technology has a specialization in computer applications technology.<sup>20</sup>

There are also various levels of training that are offered by training consultants who operate as private providers and are contracted by provinces for teacher training. Systematic provincial training that is offered in programmes such as GautengOnline and Khanya as well as training that is offered as part of skills programmes funded by the ETDP SETA also play a huge role in teacher training using ICT. Some of these examples are described in more detail below.

#### 8.2.3.1 Microsoft Partners in Learning (PiL)

SNSA has been the Microsoft PiL implementation partner since 2005. Globally, Microsoft PiL's objectives are to

*Support the dual commitment by Microsoft to advance the quality of education and provide alternative channels for economic progress. By building partnerships with governments and schools around the globe, Partners in Learning works to integrate technology into daily teaching, learning, and research.*<sup>21</sup>

The South African Microsoft PiL supports this global vision through its objective of

*Support [ing] Microsoft's long-term vision for education – to empower teachers, students and lifelong learners to achieve their full potential by providing greater access to the latest computer technologies, and training for its most effective use.*<sup>22</sup>

Currently, PiL is offered as an in-service training programme, and SNSA independently offers the training with no HEI involvement. PiL training for teachers takes a vertical progression approach, and includes a number of different course focuses, namely: ICT Skills for Teachers, ICT Integration (WebQuests), ICT Leadership for Education Managers, 21<sup>st</sup> Century School Leadership, and Peer Coaching. The training is regarded as being vertically progressive as skills are introduced incrementally as teachers gain confidence, starting with basic computer skills

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<sup>18</sup> Isaacs, S. 2007. Survey of ICT and education in Africa: South Africa country report: [www.infodev.org](http://www.infodev.org), p.16

<sup>19</sup> SchoolNet South Africa. 2007. Report on SchoolNet training prepared for the Western Cape Department of Education.

<sup>20</sup> Isaacs, S. 2007. Survey of ICT and education in Africa: South Africa country report: [www.infodev.org](http://www.infodev.org), p.16

<sup>21</sup> Microsoft. What is Partners in Learning? <http://www.microsoft.com/education/partnersinlearning.msp>

<sup>22</sup> NBA. 2007. Microsoft Partners in Learning South Africa: Monitoring and evaluation report year 2.

and moving on to more complex training on integrating ICTs into the curriculum. Training is generic, concentrating on offering generic skills for ICT integration that teachers can apply for their specific subject areas.

PiL training makes use of computers, and usually training takes place in schools where clusters of teachers from various schools are trained within the locality in a school that has a well-resourced computer laboratory where the computers are connected to the Internet. Microsoft PiL training is fulfilling a crucial role in teacher training in order for teachers to be able to make effective use of computers that are being deployed in schools. The fact that PiL training takes place in schools enables teachers to get comfortable with the technologies that they are intended to use within their comfort zones. Training in the computer labs at different schools also shows the way in which the programme recognizes particular contexts in which teachers work, hence, trainers will be able to deal with all the challenges that teachers experience within their resource allocations when training takes place in school labs.

However, in cognisance of the technical challenges that may confront trainers at the training sessions, based on the knowledge of resource challenges facing schools in relation to technology, trainers are advised by SNSA to take printed training notes, anticipate problems and 'be prepared to make changes to the training to avoid wasting time'.<sup>23</sup>

PiL training has several major strengths that make it a good model for replication and adaptation in other contexts:

- PiL has a strong conceptual understanding of ICT implementation in schools, and it adopts a holistic approach that appreciates that in order for ICT adoption to be successful, school leadership has to be actively involved in supporting this adoption, hence PiL's inclusion of the Leadership course, which not only gives principals and educational managers ICT skills but empowers them on how to implement ICTs in their schools and educational institutions.
- PiL training for teachers and principals and other educational managers is tailored to accommodate trainees with varying levels of computer literacy, hence, the same course has basic, intermediate and advanced level tasks.
- PiL training takes place in school laboratories, taking place in real contexts where teachers work, and so the training gives teachers an opportunity to work through any technical challenges that may be encountered in their schools during the training.
- Training takes the form of clusters, where teachers from different schools are trained in one school laboratory. This draws teachers from different schools together to share ideas and potentially results in networked communities of practice after the training.
- The allocation of trainers based on the language of the community is also a huge strength of the PiL as the trainer is then able to code switch and adequately address training issues without any language barriers getting in the way, where teachers need the use of local languages. Otherwise, training is in English.

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<sup>23</sup> Partners in Learning. Facilitators' Guide: [http://www.school.za/PILP/docs/Trainer/trainer\\_guide.doc](http://www.school.za/PILP/docs/Trainer/trainer_guide.doc)

- Clustering is a cost-effective measure as PiL course costing is not based on individual fees but on a group of people to maximize economies of scale.
- Training is facilitator led so there is modelling to scaffold teacher learning, and assisted practice by teachers which is intended to end in application in schools.

A potential weakness to the model is the length of the training, which has been cited in all evaluations by some trainees as inadequate, especially for beginner computer users, who may spend the first two days struggling with fears of which buttons to press when the course is moving along. Adoption of computers for teaching may well depend on the teachers' response to initial training and it is very important for initial training to accommodate the pace of the trainees so that they understand what they are learning and have the motivation to continue exploration beyond the initial training.

### 8.2.3.2 Intel® Teach

Intel® Teach was officially launched in South Africa on 10<sup>th</sup> March 2003, and is considered as an advanced course that links ICT skills to pedagogy and is aimed at teachers who already make use of ICT but would like extended knowledge on how to apply their knowledge in pedagogical practice. Intel® Teach was first implemented in South Africa and has been adapted by several teacher training institutions as part of their pre-service<sup>24</sup> and in-service training programmes as will be highlighted later in the report. SNSA was appointed as South Africa's Regional Training Authority in November/December 2002. The South African Council of Educators (SACE) endorses Intel® Teach to the Future for teacher professional development.<sup>25</sup>

Intel® Teach is a programme that is aimed at improving

*ICT fluency among South African teachers. Through their Intel Teach Program training, South African teachers are better prepared to develop technology-enriched projects and project based approaches that promote 21<sup>st</sup> century learning among their students.*<sup>26</sup>

This aim supports the objectives of the e-Education White Paper (2003) and those of the new curriculum, as the development and use of project-based learning will develop learners' questioning approaches, higher order cognition that integrates ICT, and collaborative learning.

In 2006, the fourth year of implementation of Intel® Teach, there were changes to materials and the training model. Initially, the material was designed for a four-day modularized training, and the modules could be used for stand-alone training for specific professional development needs, but in the 2006 revisions, Thinking Tools were also presented as a stand-alone.<sup>27</sup> In 2006, the course's revision also involved incorporating portfolios developed by South African

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<sup>24</sup> SchoolNet Africa. 2004. Towards a strategy on developing African teacher capabilities in the use of information and communication technology (ICT): [http://www.school.za/sharing/index\\_sharing.htm](http://www.school.za/sharing/index_sharing.htm)

<sup>25</sup> Neil Butcher and Associates. 2004. Intel® Teach to the future programme South Africa Year one evaluation report: <http://www.school.za/research/index.htm>

<sup>26</sup> Intel. no date. Case Study: South Africa Intel Teach Programme – The Intel Teach program promotes the effective use of technology in South African schools: [http://download.intel.com/education/worldahead/8240\\_SouthAfrica\\_CS\\_03.pdf](http://download.intel.com/education/worldahead/8240_SouthAfrica_CS_03.pdf)

<sup>27</sup> Neil Butcher and Associates. January 2007. Intel® Teach to the future programme South Africa Year four evaluation report: <http://www.school.za/research/index.htm>

teachers during training, and focused more on the planning and preparation of effective pedagogic projects integrating ICT, paying particular attention to curriculum outcomes and assessment strategies earlier on in the planning.<sup>28</sup>

In terms of the training model, the train the trainer model was dropped in 2006 and replaced by training of two senior trainers from each province who would in turn run training that is sometimes funded by provincial education departments, in schools in their province. Despite the fact that there are now provincial trainers in schools, other schools can request SNSA to run training in their schools for a fee. In 2007, revision to the training approach was the introduction of a systematic quality assurance mechanism for nationwide portfolio assessment, which entails the assessment of all portfolios by SNSA.<sup>29</sup>

As with PiL training, Intel® Teach training is generic and is aimed at teaching teachers the concept of creating projects for learners and aligning these with curriculum outcomes and assessment standards. The fact that teacher trainees create projects and implement them makes teachers aware of how to create projects and they can apply this knowledge to make specific projects for their own subject specializations. Like PiL training, Intel® Teach training in the main makes use of computers for training as it hopes to harness the strengths of computers for pedagogy. Trainees involved in the distance model also need reliable Internet and email access.

The strengths of Intel® Teach are:

- The training is facilitator-led so there is room for modelling to scaffold teacher learning, and teachers can ask the facilitator to demonstrate where they do not understand during practical exercises.
- Because training happens in groups, teachers are able to learn from each other what aspect of technologies can best be implemented at what times and how these can be incorporated into lessons. Potential communities of practice that extend beyond the training can also be formed.
- The training is very intricately aligned to the curriculum as teachers from the beginning develop practical teaching and assessment tasks that they try to perform themselves to evaluate usability before using them in the classroom. In this regard, the training empowers teachers to develop their own teaching resources.
- The model of training facilitators in provinces who can train teachers in that province is a cost effective model if the facilitators are well trained and knowledgeable. When provinces make use of their own trainers, this potentially increases the number of teachers the programme can reach because of reduced costs of training.
- Teachers are expected to have basic ICT skills to participate effectively in this training.
- The training can be used for both pre-service and in-service training.

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<sup>28</sup> Intel. no date. Case Study: South Africa Intel Teach Programme – The Intel Teach program promotes the effective use of technology in South African schools: [http://download.intel.com/education/worldahead/8240\\_SouthAfrica\\_CS\\_03.pdf](http://download.intel.com/education/worldahead/8240_SouthAfrica_CS_03.pdf)

<sup>29</sup> SchoolNet SA. 2007. Report on SchoolNet Training prepared for the Gauteng Department of Education

- The Intel® Teach training can be replicated for in pre-service or in-service training as is or components of it can be adapted and integrated into professional teacher qualifications as has already been done elsewhere, thereby saving costs in course development.

A potential weakness of the training is that the time allocation of two hours per module may be too demanding for some teachers, although the training expectation that teachers already should have basic ICT skills could be argued as being responsible for this time allocation, on the basis that teachers engage with activities and not learning computer functions.

### 8.2.3.3 Educators' Development Network (EDN)

The Educators' Development Network is a distance learning programme that was developed by SNSA, the SA Institute for Distance Education (SAIDE), and the SA-Finnish Collaboration Programme in the Education Sector (SCOPE). EDN aims to create online learning communities of teachers and help develop teacher pedagogy through the use of e-mail conversations among participants, and between participants and mentors.<sup>30</sup> The target audience for the EDN training is in-service teachers and those with no prior ICT experience can also participate in the course, and can start with a two-day on-site training session using the school's computer facilities, introducing them to the learning approach and the tools required. SchoolNet SA makes use of 100 trainers who have been trained nationally to give this introductory training and then make follow up visits to schools and to give refresher courses when required.<sup>31</sup>

EDN modules take between six to 12 weeks to complete and they are self-paced although teachers are encouraged to work according to weekly milestones to gain maximum value from online discussions. Teachers share ideas, feedback and documents online and some of the ideas are discussed after trying them in the classroom. All online interaction is tracked and managed by SchoolNet's EDN database and all group and mentor communication is tracked and archived. The shared portfolio of work that teachers develop is also archived.<sup>32</sup>

Teachers are guided through their learning by mentors for the non-accredited courses and by tutors for the accredited courses. The roles of the mentors and tutors are to offer support and encouragement and assess learners as outlined by SNSA:

*Mentors (for non-accredited courses) and tutors (for accredited courses) undergo online training that simulates the same approach to learning. During the modules the mentors/tutors are in touch with each other and a mentor coordinator. This ensures the best quality of mentoring and support at all times. The role of the mentors is to support and encourage the educators to improve their skills when using ICT to enhance teaching and learning. The mentor is not a tutor and does not assess assignments, but does provide formative feedback to educators when they submit documents for comment. Tutors concentrate more on the informal formative assessment of work leading up to assignments in accredited modules.<sup>33</sup>*

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<sup>30</sup> Foulds, S, H. 2002. Internet based teacher development: virtual communities of practice? Unpublished M Ed Thesis. University of the Witwatersrand.

<sup>31</sup> SchoolNet SA. EDN approach to learning: <http://www.school.za/edn/approach.htm>

<sup>32</sup> SchoolNet SA. What is the Educators'; Network (EDN)? <http://www.school.za/edn/index.htm>

<sup>33</sup> SchoolNet SA. EDN approach to learning: <http://www.school.za/edn/approach.htm>

The advantages of the EDN course are:

- It is flexible in relation to time to completion. Teachers can self pace their progress and complete the course when they can.
- The online community can provide motivation for completion, if teachers participate in the online community.
- Availability of accredited and non-accredited modules means that those who want to take introductory courses and learn about ICT integration without the stress from pressure of rigorous assessment can do so while those who want to take accredited courses and get rewarded by getting credits towards a formal and accredited qualification can also do so.
- Availability of an online community encourages sharing of ideas and, in some cases, may even encourage the trial of pedagogical ideas in the classroom.
- Availability of mentors and tutors to offer support means that teachers are always supported when they have queries or need support.
- Because it is a distance course, it can reach a very large audience of teachers who are committed to working through the materials on their own.
- Teachers who like discovering on their own will like this course as it will take them through self discovery of how complex a computer can work for pedagogy in their own time and on their own without the pressure of criticism from more adept users, which may be the case in face-to-face training, where those who are ICT adept may complain that they are being slowed down by the novices.

The major weakness of the course may be that because of its distance education mode, teachers may not have enough motivation to complete the course so completion rates may be low. Low completion because of low motivation may also be caused by the fact that there is no modelling of practice from an expert, so the course may not suit teachers who are dependent on being shown how to use the technology.

#### **8.2.3.4 University of KwaZulu Natal (UKZN) Advanced Certificate in Education (ACE)**

UKZN has cooperated with SchoolNet SA to establish the ACE in ICT Integration. The materials are based on the EDN course, jointly developed by SNSA, SAIDE and Department of Education (SCOPE Project), with an assessment strategy developed by SNSA. The UKZN's ACE ICT Integratio) also includes Intel® Teach as an elective module. This ACE has been offered since 2005, and is an exclusively distance education based qualification with no face-to-face contact sessions for the EDN components of the ACE, but the Intel® Teach component is conducted face-to-face at the student teachers' schools.

The objective of the UKZN ACE is the use of ICT (largely computers and the Internet) as a tool to enhance teaching and learning to achieve curriculum goals in the classroom and improve learning outcomes. The use of ICT for teaching and learning will support learners' development of critical thinking, problem solving, collaboration and independent learning as espoused by the South African curriculum as well as the Draft e-Education White Paper.

Most of the content for the UKZN ACE ICT Integration course is the same as the modules for the EDN accredited modules. However, the modules for the ACE are classified as core modules and

elective modules. Core modules are compulsory and have to be completed by all students who register for this course. Elective modules are modules that learners can choose from and have differing credit weighting. The number of elective modules students can select is based on their weighting and how far it helps them achieve the credits required for the course, in addition to the core modules' credits.

Strengths of the UKZN ACE ICT Integration are:

- It is based on the programme that has been successfully tried by SchoolNet SA.
- The fact that the programme is based on distance learning enables working teachers to access it as they can conduct self-study after hours. The advantage of this distance mode is that the cycle and duration of training will be controlled by university calendars, so, while there is a distance element, the university timeframes encourage students to complete the programme in specified timeframes, and this may result in good completion rates.
- Time for completion of the programme is flexible as students:  
*May register for one of the modules included in the ACE without having to register for the complete ACE. This is referred to as registering for non-degree purposes. This be will accredited (assuming that assessment requirements are achieved) and could be recognized for the ACE at a later stage provided that the educator registers for the ACE within 2 years of completing the module i.e. if an educator completes a module in 2005 it could be recognized if the same educator registered for the complete ACE no later than 2007.<sup>34</sup>*
- The availability of a community of learning through email discussions means teachers can learn from each other.
- The fact that each group of students has a tutor means professional and personal help is always available to students.

### 8.2.3.5 University of Johannesburg

The University of Johannesburg (UJ) has three qualifications in which technology is used for teacher training. These are:

- Bachelor of Education (B Ed);
- Bachelor of Education Honours (B Ed Hons); and
- Advanced Certificate in Education (ACE) Educational Computing.

UJ's B Ed degree is an undergraduate qualification that entails four years of full-time study. To enrol on this programme, students have to have a matriculation exemption or conditional matriculation exemption or a D symbol or higher at Higher Grade or a C symbol or higher at standard. While the modularized component of ICT integration is at the fourth year of the B Ed, in the first year of study of the B Ed, in each semester students are offered Computer Literacy for Educators as a subject.<sup>35</sup>

Since 2005, UJ began using Intel® Teach to support pre-service teacher education. Intel® Teach is used as the basis of the module *Professional Studies 4B Module 2 - Computers in Education: a*

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<sup>34</sup> SchoolNet & UKZN. ACE ICT Integration – Registration Costs:[http://ace.schoolnet.org.za/docs/reg\\_costs.htm](http://ace.schoolnet.org.za/docs/reg_costs.htm)

<sup>35</sup> University of Johannesburg. Faculty of Education. B Ed Degree:  
<http://www.uj.ac.za/LinkClick.aspx?fileticket=hKI8qrrPOxY%3d&tabid=2896>

*cross-curricular perspective*. This module is well placed in the fourth year as, by that time, students will have completed several blocks of school practice modules and will have significant classroom practice experience to recruit from when working on this module. The objective of the programme is to design an appropriate subject based, computer based teaching and learning programme.<sup>36</sup>

The strengths of the University of Johannesburg programmes that use technologies for teacher training are:

- There are different pathways to the programmes, some are pre-service full-time and others in-service part-time so they appeal to different audiences.
- The programmes are accredited so professional recognition is given to those who qualify.
- Students can access computers and the Internet from a well-resourced institution.
- All of them have a contact component where students can meet and share ideas, and can get the lecturers to scaffold learning through demonstration.

A potential weakness could be the outreach of the programmes, which could only be accessed by people who can afford to pay for tertiary education.

#### **8.2.3.6 The University of Pretoria (UP)**

UP has four qualifications that make use of technology for teacher training. These are:

- Bachelor of Education Honours (B Ed Hons) in Computer Integrated Education;
- Advanced Certificate in Education (ACE) in Computer Integrated Education;
- Postgraduate Certificate in Education (PGCE) with a module in Information and Communication Technology; and
- Masters in Education (M Ed) in Computer Integrated Education.<sup>37</sup>

The strengths UP's programmes that use technologies for teacher training are similar to those of UJ, as both universities more or less follow similar paths to delivery of these programmes:

- There are different pathways to the programmes, some are pre-service full-time and others in-service part-time, so they appeal to different audiences.
- The programmes are accredited, so professional recognition is given to those who qualify.
- Students can access computers and the Internet from a well-resourced institution.
- All of the programmes have a contact component where students can meet and share ideas, and can get the lecturers to scaffold learning through demonstration.

A potential weakness of the programme could be the outreach of the programmes, which could only be accessed by people who can afford to pay for tertiary education. The PGCE module could also be a challenge to students as most students on the PGCE may not have enough pedagogic experience to be able to make practical sense of what they are expected to do with the assignments, hence perhaps the poor performance in portfolio tasks that was noted above.

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<sup>36</sup> University of Johannesburg. Faculty of Education. Faculty Qualifications and Regulations 2007: <http://www.uj.ac.za/Portals/0/docs/FacultyYearbooks2007/Education2007.pdf>

<sup>37</sup> The Masters degree aims to train people who want to move out of teaching to become consultants and will not be discussed in this report.

### 8.2.3.7 The Khanya Project

The Khanya project, established in 2001 is driven by the Western Cape Education Department.<sup>38</sup> The Khanya Project is largely responsible for the high level of availability of computers for teaching and learning that was evident in the discussion on technology access previously. While Khanya has a strong technology focus, it also has a very strong teacher training thrust as it believes that its focus

*Is not on providing computer technology for the sake of making learners computer literate, but rather to use technology as a teaching aid, hence to improve curriculum delivery.*<sup>39</sup>

In relation to teacher professional development, Khanya's objectives are encapsulated in the following goal:

*By the start of the 2012 academic year, every educator in every school of the Western Cape will be empowered to use appropriate and available technology to deliver curriculum to each and every learner in the Western Cape.*<sup>40</sup>

The objectives to improve teacher training are intricately tied with those to improve curriculum delivery as evidenced by the following secondary objectives as stated in the Khanya project business plan:

- *Increase educator capacity and effectiveness by means of technology.*
- *Harness the power of technology to deliver curriculum.*
- *Providing an opportunity for learners to benefit from a variety of learning styles.*
- *Integrate appropriate and available technology into the curriculum delivery process as different technologies mature.*
- *Use technology to assist all disabled learners to maximize learning.*
- *Improve Senior Certificate and FETS results, as well as learner outcomes in all grades, in terms of number of passes and quality of results.*
- *Increase the number of learners taking Mathematics and Science on the higher grade and coping successfully.*
- *Increase the number of learners qualified and competent to enter tertiary education institutions after obtaining their Senior Certificates and FETS.*
- *Improve numeracy and literacy in lower grades in order to build a stronger foundation for future matriculants.*
- *Prepare all learners for the Information Age.*
- *Narrow the digital divide.*
- *Create a technology rich province.*
- *Provide all educators and learners in the province with an e-mail address.*<sup>41</sup>

In relation to teacher training using ICTs, the Khanya project relies on multiple methods and programmes for training the Western Cape teachers for example, ICDL training, distance learning, the cascade model of training, where trainers are trained to train other teachers in the province and the facilitation model where Khanya makes use of their trained 10 facilitators to offer teacher training. Khanya has noted that all of these models have weaknesses in terms of effective teacher training on ICT integration. The cascade model was considered to be

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<sup>38</sup> This project is managed by a provincial education department

<sup>39</sup> *ibid*

<sup>40</sup> *ibid*

<sup>41</sup> *ibid*

problematic because the master trainers were trained under conditions fraught with time constraints and they also did not have ample time to impart their skills to other teachers. Distance learning models of training were found to be adequate in training teachers with already existing levels of ICT competence, but they were did not succeed in training teachers who had no prior computer skills. The ICDL training was found to be too advanced for all teachers at the four pilot schools where it was tried as teachers did not have prior ICT expertise.<sup>42</sup> However, the facilitation model is considered to be working well as facilitators are offering needs based training according to the needs of teachers at each school.<sup>43</sup>

### **8.2.3.8 Gauteng Online (GoL)<sup>44</sup>**

GautengOnline, like Khanya, is a major provincially-driven effort at technology access and teacher training. The stated objectives of GautengOnline are:

- *To build a Province-wide schools' computer network, and thereby: Contribute towards building the human resources capacity of the Province & the country through the provision of quality education;*
- *Contribute towards stimulating positive economic activity in the country through the creation of a strong local IT industry that has a capacity for IT development & innovation;*
- *Enhance the efficacy of government for improved service delivery & a better life for all;*
- *Position the Province at the cutting edge of change through technological innovation; and*
- *Bridge the digital divide.*<sup>45</sup>

GautengOnline's goal is to issue each school with a 25-workstation computer laboratory, with Internet and e-Mail, to be used for curriculum delivery. GoL also aims to train every teacher in each school to be able to use computers for curriculum delivery.

In 2005, the time at which its teacher training was evaluated, GoL training was based on a two-pronged approach:

- An initial course for all teachers in the form of orientation training that would comprise 24 hours of contact time in the school lab with facilitators and eight hours of teacher self paced assignments that teachers completed in their own time.
- After the orientation training, schools would identify two teachers who would be trained on aspects of laboratory administration. These staff members would be involved with lab management at the school, assist teachers in their school with computer usage and deal with common computer functionality problems. The advanced course was supposed to be 16 hours of contact time and eight hours of self-study and assignment work for teachers.

The strengths of GoL teacher training, based on data from the evaluation conducted in 2005 are:

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<sup>42</sup> Khanya website. Annual Khanya Report – April 2006:

[www.khanya.co.za/projectinfo/docs/Annual%20khanya%20Report%202006.doc](http://www.khanya.co.za/projectinfo/docs/Annual%20khanya%20Report%202006.doc)

<sup>43</sup> du Toit I. no date. The effects of ICT curriculum support on the measured skills levels of learners of two sub-projects of the Khanya project: <http://www.khanya.co.za/news/events/files/wcceisabel.pdf>

<sup>44</sup> Neil Butcher & Associates. 2005. GautengOnline Evaluation Research: Training Provided to Schools

<sup>45</sup> GautengOnline. 2008. Background info about GautengOnline: <http://www.gautengonline.com/>

- The course design process enabled each training provider to adapt their existing courses to fit the purpose. This meant that providers and their facilitators would be making use of training material that they were already familiar with, thereby increasing their confidence in working with the material. However, this strength can become a weakness if the material that the providers use is not pre-assessed by the Department of Education, as adapting originally weak or inappropriate material would lead to a transfer of training of teachers using weak and inappropriate material for the training.
- Most of the course material was blended e-learning, which meant that teachers would rely on facilitators at the training sessions and also had back up from the training material that could be used for self learning to reinforce skills and knowledge learnt in the contact sessions. The e-learning material allowed for practice of skills if teachers had access to the labs. Having printed material at hand in ICT training is very useful in contexts which may be beset by technical problems.
- The Gauteng Department of Education paid for the course, and it was able to train a large number of teachers at the same time. However, this could also turn into a weakness in that when courses are paid for, if there are no accountability mechanisms put in place, some teachers may attend the courses just because they regard them as free courses. Also, such a huge investment at the same time would be positive if the training offers value for money but it is weak training if it becomes a waste of resources.
- Training took place in the school laboratories, where real problems that could be encountered during application of computers for pedagogy were encountered during the training. This exposed teachers to ways in which trainers changed focus from training where the technology could not be relied on.
- There is an inclusive focus on laboratory installation and teacher training for learners with special educational needs.

A major weakness of the training was the duration of contact aspects of the course, which was regarded as very short by course participants. In some of the training sessions, faltering technology hampered the training and in training where a majority of the teachers did not have good ICT skills, this meant there was no modelling to show the teachers exactly how to work with the technology.

#### **8.2.3.9 Digital Education Enhancement Project (DEEP)**

The DEEP project, completed in 2003, was a pilot project on the use of mobile technology to improve teacher knowledge and pedagogical skills and in turn improve the quality of learning. This project took the form of applied research, with the research involving 24 teachers from 12 schools in the rural part of Eastern Cape South Africa. The handheld computers used for this training were bought from small grant awards from the Open University and Hewlett Packard. At the beginning of the project, all the 24 teachers were novice users of hand held computers. Professional development activities and resources were loaded on to the hand held computers and teachers were shown how to use the hand held computers.<sup>46</sup>

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<sup>46</sup> Leach, J. no date. The potential of hand held computer technology to serve the needs of teacher education in African rural settings.

The objective of the DEEP project was to explore the extent to which use of ICT in teacher training could help widen access to, and improve the quality of teacher education in the developing world, and the extent to which this training would in turn improve teaching and learning in literacy, numeracy and science.

Initially, DEEP teacher training involved basic ICT skills and training on how to use various ICT functions for specific learning areas, through the use of provided resources. This was accomplished at a two-hour session where teachers were introduced to basic applications,

*Use of the camera, how the infrared beam facility could enable document sharing, and how the device could be synchronized with the shared laptop... Teachers were also shown how to locate and open the programme resources on the hand helds, including e-books, how to book mark and annotate pages, make new notes and access related multimedia assets (e.g. audio of Martin Luther King; video clips of classroom practice; flash animation of a well known fable).<sup>47</sup>*

Subsequent to this initial training, curriculum aligned training was offered and teachers on this programme worked in pairs at each school to collaboratively work through the materials and evaluate and adapt them for teaching.

Teacher learning was located within a social practice theory framework, which emphasizes that learning is a social activity which is situated in particular contexts where learners draw on cultural artefacts and tools to mediate learning and make learning a developmental and transformative process.<sup>48</sup> In this regard, teachers were asked to get together in their school pairs and study and work through the resources that they had been provided with, working from a teacher guide, CD-Rom professional development activities, the programme website and a school portfolio which required teachers to gather evidence of student and teacher outcomes. The learning programme for teachers was based on a three-term timeframe of school-based learning which incorporated curriculum focus activities with web based classroom activities which became more challenging as teachers progressed through the training, for example, tasks began with simple literacy word processing and web based activities about local animals and progressed to more challenging tasks where research findings were emailed to other schools.

The major strengths of the DEEP project were:

- The choice of technologies: hand held computers provided non invasive learning for teachers and their portability meant that learning could take place anywhere, anytime. Learners were also excited about the technology because of the multimedia aspects and the camera so they were excited to use it. Other supporting technologies like laptops and printers meant that technologies were being used in complementarily with each other and not in isolation so technologies became effective for teacher and learner production and presentation and communication. In terms of replication of this training model, hand held computers are much cheaper than laptops and computers, and can be easily transported to

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<sup>47</sup> Leach et al. 2006. DEEP IMPACT: an investigation of the use of information and communication technologies for teacher education in the global South. DFID Research Report

<sup>48</sup> Leach et al. 2006. DEEP IMPACT: an investigation of the use of information and communication technologies for teacher education in the global South. DFID Research Report

training sites, although the ideal would be for them to be used as complementary to laptops and desktops.

- The location of the project: in rural school settings, lack resources could isolate teachers from continuing professional development, but this project showed that mobile technology could offer effective teacher training to 'out of reach' teachers, in a supportive communal environment.

A major weakness of the project was that it was tried on a very small group of teachers which does not show how the project would have fared if implemented to scale, especially regarding issues of management of the devices working with a bigger group which would remove somewhat the personalized relations that may have been created between the trainers and the teachers participating in the pilot. It is also doubtful if a project implemented at such a small scale would do much to influence policy.

#### **8.2.4 Conclusion**

Most of the teacher training programmes discussed in this report on South Africa use a social constructivist approach to teacher training. This approach is appropriate as it forms the cornerstone of the principles underlying learner centred approaches to teaching and learning entrenched in the national curriculum. As teacher trainees learn how to make projects in WebQuests or Intel® Teach or design projects on the university programmes, they are modelling what they as teachers are meant to be facilitating learning with their learners in the classroom.

The report has suggested, in the discussion of the DEEP project, that small scale training programmes are unlikely to influence policy on teacher development and ICT. However, programmes that have a national reach, like SNSA programmes have had some positive influence on teacher training policy. SNSA's contributions to ICT professional development, and specifically the Intel® Teach programme, are acknowledged as an important platform for teacher development in ICT in South Africa in the e-Education White Paper. It has also been reported about Intel® Teach:

*In July 2007 representatives from Intel® met with the Deputy President of South Africa, Ms P Mlambo-Ngcuka who requested Intel® to assist by providing an outline of a 5 year strategy that would coordinate professional development in ICT for teachers. SchoolNet assisted by formulating an implementation plan that would [direct] the national e-Education policy. .... It is [likely] that with the recent developments in planning of the implementation of this policy that Intel® Teach will feature very prominently on the agenda of the national department in the years to come.<sup>49</sup>*

The report has drawn from a range of service providers: an NGO, higher education institutions, provincial education department driven models and a research funded project, to show the possibilities available for provision of teacher training using ICT, highlighting what the strengths and weaknesses of each model are. These strengths and weaknesses are crucial for determining

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<sup>49</sup> SchoolNet SA. 2007. Report on SchoolNet Training prepared for the Gauteng Department of Education

models for replication and adaptation in other contexts, and will be highlighted in summary, in the following table.

*Table 9 Strengths and weaknesses of SA models of teacher training using ICTs*

<b>Model Of Training</b>	<b>Strengths</b>	<b>Weaknesses</b>
<p>NGO driven: SchoolNet SA</p>	<p>Can reach many teachers as training focuses on training groups of teachers as opposed of focusing on the individual.</p> <p>Group training can lead to communities of learning and practice being formed for development of practice and sharing of ideas.</p> <p>Training is subsidized, and because of group training costs for training are relatively lower.</p> <p>There is a strong evaluation focus to programmes so programmes undergo change and improvement.</p> <p>Invests in people (facilitator training) to help train other teachers.</p> <p>Very good quality material is used as this material has been redeveloped and enhanced over the years.</p> <p>Training Local trainers reduces the cost of training.</p> <p>Training takes place in school laboratories, in real environments where teachers work.</p>	<p>Training is usually of fixed duration which has been regarded as too short by teachers with no ICT skills at the beginning of the training.</p> <p>Sustainability of training could be threatened because of reliance on donor funding to make the training affordable to a majority of teachers but the training of trainers within localities addresses the issue of financial sustainability as SNSA is investing in people rather than keeping a limited pool of trainers who travel to offer training.</p>

Model Of Training	Strengths	Weaknesses
<p>Provincial model: Khanya; GautengOnline</p>	<p>Addresses both technology access and teacher training.</p> <p>Training takes place in school laboratories.</p> <p>There is high assurance of funding sustainability because of provincial government as the driver of the project.</p> <p>Training can reach many teachers quickly over a short period of time.</p> <p>Departments develop or provide guidance and support towards the development of the materials for training.</p> <p>Training takes place in school laboratories, in the teachers' real contexts.</p>	<p>Too much departmental involvement in technology access and training may create an over dependence and if schools are not weaned quickly they may develop a dependence and entitlement syndrome. A shared responsibility scheme would enable schools and teacher to own the equipment and the training.</p>
<p>Higher Education Institutions B Eds, PGCEs, ACEs</p>	<p>Programmes are flexible in their modes of delivery and can accommodate working teachers.</p> <p>Teachers can access good resources at universities.</p> <p>Programmes are accredited and teachers are accredited for their input into the programme.</p> <p>There are facilitators, who can demonstrate to students and assist with practical application. An exception to this is the distance learning UKZN ACE.</p>	<p>Training is removed from the context of the teachers' work.</p>

Model Of Training	Strengths	Weaknesses
Research funded: DEEP	<p>The research focus could enable the implementation of the training to be rigorous.</p> <p>Training is located in the teachers' real working contexts.</p> <p>Training is face-to-face so there is demonstration and assistance offered to teachers if needed.</p>	<p>Sustainability is very low. Unless the study influences policy somehow, it is likely to end with the completion of the research project.</p>

There is still some progress that needs to be made in terms of teacher training and mobile technologies, as the DEEP project so far is the only known project that highlights the potential of mobile technologies for teacher training and for teaching and learning. There is scope to explore other technologies like mobile telephones as teaching and learning tools. South Africa also still has a way to go in opening up teacher training in assistive technologies to other training programmes, as currently this training seems to be dedicated only to special needs education teachers. Precedents have been set in mobile teacher training and training in assistive technologies, and if ICT integration and roll out are viewed as development and as processes, the South African national and provincial departments of education and HEIs have shown that they have a commitment to developing teacher ICT competencies, and eventually implementation of training programmes in assistive technologies, mobile technologies and those that specifically encourage indigenous knowledge and languages is likely to take place. However, a policy focus that highlights these focus areas as important for teacher training is needed.

It is also important to include as a policy imperative, the importance of evaluation of teacher training programmes. Most universities do not seem to be evaluating the impact of their training programmes, and for ICT implementation, especially now at the beginning, evaluation is needed to determine how students are making use of the skills they are acquiring, especially when the site of training is removed from the work contexts of the students, like in university ICT training.

## **9 Appendix Four: The Dimensions of an Effective Professional Development Strategy for Teachers in the Use of ICT**

### **9.1 The UNESCO ICT Teacher Competency Framework**

The Guyanese Ministry of Education has identified teacher training as central to achieving the goals of an ICT-enabled citizenry. Further, the attainment of ICT skills is equated with national development, that is, economic and social development. This approach to the development of ICT articulates with the United Nations Educational Scientific and Cultural Organization (UNESCO) ICT Competency Standards for Teachers (CST), which identifies the teacher as central in developing student ICT capabilities. As such, teacher training is a key component to the development of ICTs as it prepares the teachers to develop these student capabilities (UNESCO, 2008a).

UNESCO's ICT Competency Standards for Teachers are located within a broader policy context of educational reform and sustainable development which views education as a cultural relay which inculcates societal values including the role of the citizen in economic development. The ICT-CST project views ICT as 'engines for growth and tools for empowerment [which] have profound implications for education change and improvement' (UNESCO, 2008a: 7). For UNESCO, educational change through ICTs encompasses three approaches: technology literacy, knowledge deepening and knowledge creation, and these approaches have different implications for pedagogy, teacher practice and professional development, curriculum and assessment, and school organization and administration. In relation to pedagogy, the use of ICTs requires teachers to develop skills to develop 'innovative ways of using technology to enhance the learning environment, and to encourage technology literacy, knowledge deepening and knowledge creation,' (UNESCO, 2008a: 9). As such, teacher professional development has to focus on developing teachers' knowledge and skills to develop technology literacy, knowledge deepening, and knowledge creation in relation to components of the educational system, that is, policy, curriculum and assessment, pedagogy, the use of technology, school organization and administration, and teacher professional development.

According to UNESCO, the three approaches to educational reform have different demands for teacher education, with the technology literacy approach being the most basic and requiring the most basic policy changes as the aim of this approach is to encourage and facilitate student uptake of new technologies to support social and economic development. Professional development aimed at supporting the technology literacy approach focuses on developing teachers' technological literacy to integrate basic ICT tools into the curriculum. This technology literacy approach requires a focus on equitable distribution of technological resources to enable access by as wide a population as possible to lessen the digital divide. The outlay of

technological tools at this stage is a precursor for possible success of all three approaches to educational development.

Knowledge deepening educational changes are deeper and they are likely to have greater impact on learning. Knowledge deepening requires students as citizens to apply school knowledge for complex problem solving in the workplace to add value to national development, for example through innovation that provides solutions to national challenges. To achieve this approach to educational reform, teacher professional development should focus on providing teachers with the knowledge and skills to use more complex methodologies and technologies. Change in the curriculum should include establishing a complex relationship between school knowledge and real world problems and can involve collaboration between students at local and global levels with the teacher managing the learning environment (UNESCO, 2008a).

The knowledge creation approach to educational improvement is the most complex as it aims to create a citizenry that engages in and benefits from knowledge creation, innovation, and participation in lifelong learning. Curriculum changes to achieve the aims of this approach are inculcating skills in collaboration, communication, creative thinking and innovation and critical thinking. Teachers can model these skills to their students through their own professional development where they develop more sophisticated skills on using technology and collaborate with peers to design projects that challenge students to exercise the aforementioned skills (UNESCO, 2008a).

UNESCO proposes a matrix combining the technology literacy, knowledge deepening and knowledge creating approaches with the six components of policy, curriculum and assessment, pedagogy, the use of technology, school organization and administration, and teacher professional development (UNESCO, 2008b). Each of the cells of the matrix below constitutes a module in the ICT-CST framework (UNESCO, 2008c).

*Table 10 ICT CST framework*

<b>Policy and Vision</b>	<b>Technology Literacy</b>	<b>Knowledge Deepening</b>	<b>Knowledge Creation</b>
<b>Curriculum and Assessment</b>	Basic knowledge	Knowledge application	21 <sup>st</sup> century skills
<b>Pedagogy</b>	Integrate technology	Complex problem solving	Self management
<b>ICT</b>	Basic tools	Complex tools	Pervasive tools
<b>Organization and Administration</b>	Standard classroom	Collaborative groups	Learning organizations
<b>Teacher Professional Development</b>	Digital literacy	Manage and guide	Teachers as model learners

*Source: UNESCO ICT –CST Implementation Guidelines*

This matrix, and the accompanying model syllabus (UNESCO, 2008b) and module suggestions (UNESCO, 2008c), can be used as a framework for revision of professional development programmes and allows flexibility that suits the providers although adaptations are subject to review by the ICT-CST Endorsement Board (UNESCO, 2008b).

## 9.2 Professional Development Options

In consider effective professional development for teachers in use of ICT, a key principle is that there is no single best practice or general recipe for success. Consequently, it is necessary to consider multiple dimensions that need to be considered when analysing the options available for professional development. Many of these represent choices that will need to be made by providers of professional development, but it will also be important to consider how the e-Education Initiative can ensure the creation of a professional development strategy that facilitates the growth of a relevant and useful range of options for educators across this spectrum of choice.

The professional development of educators, management, and administrative staff to support the integration of ICT into teaching and learning can be done in a range of ways. On an ongoing basis, therefore, choices will need to be made with regard to what strategies are adopted to:

- Provide accessible and relevant information to the range of audiences;
- Encourage and support sharing of information and experience through communities of practice;
- Provide incentives and support for reflective practice and sharing of research and experience;
- Publicize and support the offering of relevant formal courses which meet the needs of the various target audiences at their various levels of development.

In terms of formal course offerings, choices need to be made on an ongoing basis with regard to:

- Who participates in professional development;
- When professional development takes place;
- Who makes up a professional development group, if applicable;
- Accreditation and degree of difficulty of professional development offerings;
- Who provides professional development; and
- Why educators might participate in professional development.

The e-Education Initiative requires a professional development framework within which these decisions can be made and reviewed on an ongoing basis by a wide range of interested parties.

Who participates in professional development refers to the target audience – leaders/managers, administrators, teachers or lecturing staff and departmental officials. Who makes up a professional development group may constitute a further disaggregation of a defined target audience. So, for example, teachers or lecturers with a particular specialization (learning area, subject or programme) or teaching and at particular grade levels may be

targeted. A distinction may also be made between teachers or lecturing staff just entering the profession or those with little experience and those who are more senior and/or more experienced. It may also be possible to aim to have educators from the same school – or at least from the same region – all engaged in a professional development offering simultaneously.

When educators participate in professional development hinges first on whether it takes place before taking up a teaching or lecturing position (pre-service) or when employed in a teaching or lecturing position (in-service). Timing may also be considered in relation to access to ICT infrastructure. An intervention may, for example, be made before developing a School ICT Integration Plan or before having access to computers.

In planning professional development interventions, consideration needs to be given to the following:

- Degree of difficulty;
- Expected levels of ICT access;
- Site of learning for contact time; and
- Duration and scheduling of contact time.

Choices about degree of difficulty of offerings may be mapped to the various ICT development levels: Technology Literacy, Knowledge Deepening, and Knowledge Creation. Guidelines may be provided on the expected level of competence to guide participants in selecting appropriate offerings. Alternately, an entrance requirement may be specified.

The assumed level of ICT access by the participant has a direct bearing on the design of the formal professional development offering. For example, if no personal ICT access at home or in the school can be assumed, then professional development might need to be designed around computer access in a training venue. This may be shared access (for example, two or three participants per computer) or individual access in the training venue. A provider may also make arrangements to ensure that there is access to computers outside of formal contact time. This may be done through a communal training facility being available for bookings and use by course participants. A provider may assume that educators have access to ICT in their school, or they may expect personal computer access (for example, each educator has a laptop or access to a computer at home). Assumptions regarding expected levels of ICT access thus influence the design of the intervention.

The site used for contact time, where applicable, also impacts on design choices. For example, the contact time may be provided at a central training venue with computer equipment (i.e. not at a school). Alternately, contact time may be arranged to be provided in a school. The participants – although not necessarily all employed by that school – would then at least have some familiarity with this environment. It may be preferable to make use of the participants' own school for the contact time where possible. Participants may also be given the flexibility to personalize their computer use if the intervention is conducted with them bringing their own end-user devices for training (PDAs or laptops).

Scheduling of contact time is also significant in the design of formal professional development offerings. If contact time is during the school day, leave of absence and alternative arrangements for relief teaching at the school need to be made. Afternoon, evening, or weekend sessions may be more flexibly accommodated by the school, although they may require additional motivation from participants. School holidays (often the first or last few days of a holiday) may also be used to schedule contact time for an intervention.

The above are all issues that will influence the design of specific professional development offerings. Typically, these decisions will be made by those responsible for designing, developing and offering professional development services. Thus, there should be no requirement to specify choices or limit options when planning implementation of such professional development at a macro level.

Providers also have a range of choices about the mode of delivery of a professional development offering. These include options pertaining to:

- Length (in terms of notional hours) and duration of the offering;
- Cohort and contact group size;
- Total contact time (where there is contact);
- Materials used; and
- Informal learning opportunities.

The length of the professional development intervention may be measured in terms of notional hours of learning. This is the 'average' time that the 'average' student will spend engaged in all related activities in order to complete the professional development. This includes contact time, time spent on completing assignments, independent reading and investigation, and so on. Duration of the offering refers to the period over which the professional development should be completed. It could, for example, be a one-day intervention, or extend over a fortnight, a term, a year, or potentially even longer.

The number of educators engaged in a professional development offering simultaneously would also be an important consideration where groups are required. A big enough group might be required to allow for collegial support group work and to create an atmosphere of mutual support and collegial competition. This would be distinct from contact group size – which is how many participants engage in the same contact session at any one time. The choices in this regard may be a function of both pedagogical objectives and ICT access in the contact session venue.

Providers also face choices regarding the types of learning materials they provide to participants. For example, providers may opt to use no materials or to provide a printed guide which allows for easy reference while working through activities on a computer. Alternately, a web resource may be provided which has the advantage of allowing participants to view materials at their own time if they have Internet access. Web-based materials may also be updated easily, and allow for participants' work to be published and shared within the training

materials framework. Providers may also opt to develop interactive and structured learning pathways. These may either be online or on CD or DVD.

Another dimension to be considered is whether or not to encourage informal learning opportunities within a structured course offering. Options may be provided to include and direct participants to additional online readings and resources. Similarly, providers may provide print-based materials and resources that allow for extension activities or organize collaboration or show casing opportunities, such as inviting and encouraging participants to research seminars, to attend trade exhibits, or participate in conferences.

Finally, there are various options in relation to learner support which can be used at various points in the offering and selected to suit the purpose. These include:

- Assessment;
- Collaboration (with peers);
- Mentoring (with trainer or facilitator); and
- Access to support.

Providers of professional development must make choices with regard to how learner progress is measured and reported (assessment). They may, for example, choose not to have any assessment or for participants to assess themselves. They may encourage peer assessment or measure and report on progress by the training facilitator. Various combinations of the different types of assessment may be conducted at different points in the programme or course offerings – and may be for summative or formative purposes.

There are also various options to encourage collaboration among participants in professional development. Informal team learning study groups may be formed, or groups may be assessed together to enforce teamwork amongst the participants. Collegial coaches or ‘learning buddies’ may be appointed. This may be done within the current cohort of participants or using those with more experience. There may be synchronous collaboration provided through face-to-face contact or collaboration platforms such as scheduled telephone meetings, video conferences, or chat sessions. Collaboration may also be asynchronous using online forums, discussion lists, or e-mail. Similar collaboration techniques may be used for mentoring roles. Mentoring is distinct from collaboration in that collaboration is peer-to-peer collegial support between participants, whereas a mentor is a senior or more experienced colleague rather than a peer.

How participants access support from the professional development provider or facilitator is also an important consideration in the programme design. Such support may be provided through formal contact sessions, via an appointment booking system, telephone contact, e-mail, or simply via written facilitator feedback provided on assignments.

The above analysis of options demonstrates clearly that selection of a single long-term ‘solution’ for delivery of professional development in support of the Guyana’s ICT Professional Development Framework for Teachers is neither possible nor desirable. Rather, there will be a requirement to work within existing structures and processes to develop mechanisms which

seek to ensure that all educators in the schooling system receive the professional development they require in order to be able to harness the educational benefits of ICT for the greatest positive impact. Consequently, when planning and implementing professional development for Guyana, various cross-cutting options need to be taken into account when planning professional development within each of the above dimensions.

## **Initial Training and Ongoing Professional Development**

### **Pre-Service Training (Teacher Training)**

Pre-service training for educators needs to provide trainee educators a sound knowledge of ICT, competency in teaching, managing the classroom, and organization skills, mastery of the subject matter they teach, and proficiency in various educational resources, including technology.<sup>50</sup> Naturally, as educators increasingly integrate ICT use into the teaching of school curricula in the long term, more and more trainee educators will graduate with a range of ICT skills.<sup>51</sup> ICT skills need to be integrated thoroughly into pre-service training so that newly-qualified educators entering their profession emerge with the required skills. CPCE and UG will need to restructure or redesign courses to include ICT components in pre-service programmes, and may need to develop and update ICT course components in consultation with the Ministry of Education to ensure that educators' transition from pre-service to in-service training is smooth.<sup>52</sup>

In-service training is currently the dominant means of developing ICT amongst educators.<sup>53</sup> However, around the world, pre-service training of educators includes consideration for developing computer literacy to equip educators with practical ICT skills in advance of starting in their teaching careers. This may be done as a dedicated computer literacy course or integrated across course offerings. Most education training providers have moved beyond simple ICT skills integration and now tackle pedagogical issues about use of ICT while ensuring that educators can use ICT effectively to enhance learning. Some also impart skills in the development of educational software and resources for teaching.<sup>54</sup> Use of ICT can also enhance pre-service training more broadly as it grants access to a wealth of better educational resources, provides multimedia good teaching practice simulations, encourages educator-to-trainee collaboration, and improves productivity in non-teaching tasks.

Approaches to pre-service training vary. In the Republic of Korea, for example, educator training colleges include core ICT courses and a significant amount of funding has been set aside for equipping the colleges (including certified distance education institutions) with hardware and software. In Australia, undergraduate learner educators are obliged to take courses

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<sup>50</sup> GautengOnLine. No date. Education Plan: Implementation Strategy.

<sup>51</sup> No author. ICT for Education in Asia and the Pacific, UNESCO Bangkok. Infoshare Vol 6 2004/05

<sup>52</sup> UNESCO Bangkok. 2004. Asia and the Pacific Regional Bureau for Education. Schoolnet toolkit. Vancouver: Commonwealth of Learning. [http://www.unescobkk.org/fileadmin/user\\_upload/ict/e-books/SchoolNetKit/SchoolnetKit.pdf](http://www.unescobkk.org/fileadmin/user_upload/ict/e-books/SchoolNetKit/SchoolnetKit.pdf)

<sup>53</sup> Infoshare. 1997. Enriching the Capacities of Teachers and Other Educational Professionals. Vol. 13, No.1, January-March, p.9.

<sup>54</sup> UNESCO Bangkok. No date. 'Implementing SchoolNet Programmes.' Retrieved on October 24, 2007 and available at: [http://www.unescobkk.org/fileadmin/user\\_upload/ict/e-books/SchoolNetKit/guidebook3.pdf](http://www.unescobkk.org/fileadmin/user_upload/ict/e-books/SchoolNetKit/guidebook3.pdf)

focusing on the use of computers in the classroom, while postgraduate diploma courses include subjects such as computer ethics, robotics, and the evaluation of curriculum software. Some countries train educators to develop educational software and course materials. China has projects focusing on the developing educational resources. In Australia, post-graduate educator training courses train learners in the development of multimedia educational software<sup>55</sup>.

As another Australian example, the RMIT University in Queensland State has reorganized its pre-service courses so that they incorporate ICT into many aspects of teacher activities. Yelland reports that RMIT believe:

*(ICTs) have changed the ways in which information is accessed, the nature of learning, the relationship between the teacher and student and the organization of the classroom. The design of the B.Ed is premised on the belief that new learning provides a framework that will prepare the teachers of the 21st century to work in new and dynamic ways. In this way traditional disciplines are recognized in specific courses but the content and skills inherent to each are also embedded in other courses and the connections between them in both theoretical and practical ways are emphasized. New learners utilize new technologies across traditional subject boundaries and are engaged in rich tasks that are authentic and meaningful for them.*<sup>56</sup>

In other examples, existing courses have adopted ICT-related modules. At Queensland University of Technology an 11-week course on 'Using Technology in the Curriculum' has been offered to student teachers. It is a blended course of face-to-face interventions as well as online interactions.<sup>57</sup>

The Enlaces Programme works with 30 universities across Chile to assist in the training and technical assistance components. Pre-service teacher training programmes last four to five years and are provided in 36 universities and a small number of tertiary level professional institutes. Teachers are equipped to teach at pre-school, basic, secondary or special education schools. The Enlaces programme has had a deliberate strategy to support universities in transforming their pre-service teacher training programmes. In particular, the Chilean Government has defined a fund to support four one-year improvement projects awarded to 17 universities on a competitive basis. A key focus of the improvement projects is to link teacher training programmes to changes occurring in the educational system as a result of the educational reform being implemented. There are four levels of action involved with the improvement projects:

- Introduction of ICT as a subject in the teacher education pre-service curriculum.
- Permeate all teaching with elements of ICT (a cross-sectional objective of the curriculum).
- Develop a comprehensive programme to (i) familiarize all academic staff with ICT and its potential, ensure that they are computer literate, (ii) have student teachers use ICT in the design and organization of teaching activities and (iii) teach specific ICT courses.

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<sup>55</sup> No author. ICT for Education in Asia and the Pacific, UNESCO Bangkok. Infoshare Vol 6 2004/05 <http://www.unescobkk.org/education/ict/v2/info.asp?id=10935>

<sup>56</sup> Yelland, N. (2003). The Use of Information and Communications Technologies in the Australian Context. Retrieved September 28, 2006 from the UNESCO Bangkok Web site: <http://www.unescobkk.org/index.php?id=1294>

<sup>57</sup> Ibid.

- Establish a formal ICT centre at university, designed to assist all teacher education activities through specialized staff, specific courses, and on-site support.<sup>58</sup>

From the above, it clear that, around the world additional Government investments have been made to support universities in their efforts to shift their pre-service educator training programmes to include an integration of ICT across the curriculum and to harness ICT use across the various roles of professional educators.

### **In-Service Training (Continuing Professional Development)**

In service training includes structured learning, face-to-face learning, and distance learning opportunities<sup>59</sup> conducted while already employed as an educator in a school. There is a wide range of possible modes of delivery – including workshops, seminars, and short courses – offering structured opportunities to acquire new skills, develop knowledge of subject matter, and improve skills in the use of technology in the classroom.<sup>60</sup> These will be discussed in some detail below.

Ongoing formal and informal pedagogical support may be enhanced by ICT, as remote communication is made possible efficiently and cheaply. ICT can help to overcome educators' isolation by connecting them to their peers, mentors, curriculum experts and their global teaching community.<sup>61</sup> Such support may focus on educators' daily needs and challenges.<sup>62</sup> Educators require further training and professional development in ICT, while at the same time this technology can provide part of the solution to these needs.

### **Modes of Delivery**

Recent advances in technology imply a shift in the role of educators from being the main source of knowledge and instruction in a classroom to that of facilitating learners' learning via a range of sources. Professional development of educators in ICT needs to reflect this shift, which implies that professional development in use of technology should demonstrate the pedagogical forms that educators may use in their classrooms. For instance, it could combine lectures or presentations with small group discussions, individual activities, collaborative activities, and provide opportunities for educators to reflect on their teaching practice and how to change this with the use of technology. The learning materials could conceivably use a variety of formats, including print, e-mail attachments, CD-ROM, DVD, and online materials.

Most professional development in ICT should follow basic principles of good adult learning – that is, it should be social and cooperative, present opportunities to share experiences, and alternate instruction with discussion, reflection, application and evaluation. Moreover,

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<sup>58</sup> Ministry of Education ICT and teacher education in Chile. Trends and Issues., Chile, August 1999. Retrieved 15 October 2006. cited in NEPAD e-Schools Business Plan

<sup>59</sup> . infoDev. No date. Knowledge Map: Educators, Teaching and ICTs. [www.infodev.org/en/Publication.157.html](http://www.infodev.org/en/Publication.157.html)

<sup>60</sup> GautengOnLine. No date. Education Plan: Implementation Strategy.

<sup>61</sup> GautengOnLine. No date. Education Plan: Implementation Strategy.

<sup>62</sup> . infoDev. No date. Knowledge Map: Educators, Teaching and ICTs. [www.infodev.org/en/Publication.157.html](http://www.infodev.org/en/Publication.157.html)

technology allows a highly collaborative approach, especially peer-to-peer sharing of the challenges and frustrations of using technology for teaching and learning. Along the lines of these principles, there is also a need to develop support communities and systems involving peers, mentors, and experts, rather than merely providing one-off training events that end contact with educators thereafter.<sup>63</sup> This is not always necessary, however, and there are certain instances where simple information sources distributed to the appropriate target will serve the intended pedagogical objective. For example, a short briefing document aimed at school principals summarizing international research on how a digital camera can be used to help manage learner records may simply be read by the school management and thereby serve its purpose. Likewise, certain new software applications may be distributed with a simple user-friendly manual and require little or no structured collaboration on its use.

Below is an analysis of different generic delivery options that might be considered when designing professional development interventions for Guyana. Again, given the approach to professional development outlined above, it is likely that, in most instances, choices between these options will be made by professional development providers during the design of new products and services, rather than imposed centrally. In some instances, it may well be the case that providers choose to mix and match the basic options presented below. Delivery options presented below have been drawn from UNESCO<sup>64</sup> and SchoolNet South Africa research.<sup>65</sup>

It is worth highlighting that some of the modes of delivery options are more appropriate to formal course offerings, while other modes are appropriate for more informal ongoing professional development and general access to information and support. Choice would depend on the level and purpose of the professional development intervention. For example, centralized face-to-face delivery may be more appropriate for an accredited basic ICT entry level course or for an orientation to school management information systems.

### **Centralized Face-to-Face Delivery**

This involves one trainer working at a central training venue, usually involving between 10 and 20 participants, but sometimes more. A course usually lasts between about one and five days, without follow-up onsite support. Educators are taught ICT content by an experienced trainer in a workshop setting. Their choices for access depend on the purpose of the course. The big advantage of this type of training is having access to a specialist facilitator or trainer who is well versed in the subject matter of the course, answering questions as they arise.

This is the dominant form of in-service professional development used by the Enlaces programme in Chile where in-service training for teachers occurs in various ways but tends to make use of centralized face-to-face delivery. In Chile:

- All forms of in-service education include elements of ICT preparation.

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<sup>63</sup> GautengOnline. No date. Education Plan: Implementation Strategy.

<sup>64</sup> UNESCO Bangkok. No date. Implementing SchoolNet Programmes. [http://www.unescobkk.org/fileadmin/user\\_upload/ict/e-books/SchoolNetKit/guidebook3.pdf](http://www.unescobkk.org/fileadmin/user_upload/ict/e-books/SchoolNetKit/guidebook3.pdf)

<sup>65</sup> SchoolNet Africa. 2004. Towards a Strategy on Developing African Teacher Capabilities in the Use of ICT. Draft report.

- There are structured courses organized by a national *Centre for In-Service and Educational Experimentation and Research*, for which teachers pay. This Centre has no nationally allocated budget.
- Universities offer structured courses at post-certificate or Master's level.
- There are international short-term study leave programmes and subject-based improvement courses, which form part of the Educational reform initiative.
- Teacher workshops provide opportunities for school-based professional development.<sup>66</sup>

At the school-level in Chile, practically all ICT in-service training is linked to the Enlaces programme. When a school enters the programme, at least 20 teachers are trained through school-based workshops. The training usually occurs in three phases over two years.

- Phase one: Teachers become familiar with the educational software used by Enlaces and with word processing.
- Phase Two: Teachers take part in one of the following workshops: (i) Using educational software in the classroom, (ii) Collaborative learning projects via e-mail, (iii) Use of software tools to improve administrative tasks and processes in the school and (iv) How to integrate the computer in project-based learning.
- Phase Three: Teachers teach their students how to use the 'La Plaza' software (the core of the Enlaces material).<sup>67</sup>

An advantage of this mode of delivery is that participants can learn from each other and develop a sense of collaborative learning. Expensive infrastructure is not necessarily needed, nor is one computer per educator, although the latter may well be preferable. A drawback is that the quality of the workshop depends on the quality of the instructor, while educators who are scared of technology do not have much time to learn by doing and may tend to retain less information.

Strengths of this mode of delivery include:

- It is easy to implement.
- It is cost effective.
- Logistics are manageable.
- There is a direct supportive relationship between trainer and learner.
- Exposure is concentrated.

Challenges include the following:

- The model is relatively expensive.
- It lacks flexibility in that educators must attend the training together at a pre-arranged time.
- Educators may find it difficult to secure adequate one-on-one time with the trainer during the course.

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<sup>66</sup> Ministry of Education, ICT and teacher education in Chile. Trends and Issues. Chile, August 1999. Retrieved 15 October 2006 cited in NEPAD e-Schools Business Plan

<sup>67</sup> Ministry of Education, ICT and teacher education in Chile. Trends and Issues. Chile, August 1999. Retrieved 15 October 2006 cited in NEPAD e-Schools Business Plan

- Information retention rates may be poor if sessions are intensive and follow-up support is limited.<sup>68</sup>
- Venues other than the educator's own school can cause insecurity due to different configurations of computer equipment.
- Lack of ongoing support and further training can lead to lack of transfer of what has been learnt to the classroom.
- It can preclude sufficient practice and thus result in lack of retention of learning.
- It can be difficult to secure educator availability. Training typically must take place during school holidays, or schools must provide temporary replacements for educators if workshops are held during school hours.

For longer course interventions, this type of delivery can be very useful when used as an introduction and to sustain interest and motivation over the course of a programme. There is intense activity during the contact sessions and the participants are well supported, provided the participant-to-facilitator ratio is suitable.

### **Decentralized Face-to-Face Delivery / Cascade Delivery ('Fan' or 'Echo' Training)**

This model involves face-to-face training and is sometimes used to achieve impact on a large scale. It focuses on training by a core resource team of national level master trainers and educator trainers via national or sub-regional training programmes. The groups trained are then expected to conduct similar training programmes to train educators, in a multiplier effect.<sup>69</sup>

This type of model may be appropriate for the training directed at administrators and managers on the use of new ICT applications, or management and administration software. A core group of people will need to be made familiar with the system and then used to support and train others throughout the system.

Strengths of this delivery option are that:

- The model is scalable.
- Educators can commit undivided attention rather than working in their spare time.
- An intense training programme can be designed and followed exactly to be replicated on a large scale. Having well designed materials which are consistently used help this process.

Challenges include the following:

- The quality of training may be diluted if the second-level trainers are not as good in practice as their original trainers, or if they have not had enough time to fully absorb the new concepts and skills before they themselves become the trainers.<sup>70</sup>

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<sup>68</sup> UNESCO Bangkok. No date. Implementing SchoolNet Programmes. [http://www.unescobkk.org/fileadmin/user\\_upload/ict/e-books/SchoolNetKit/guidebook3.pdf](http://www.unescobkk.org/fileadmin/user_upload/ict/e-books/SchoolNetKit/guidebook3.pdf)

<sup>69</sup> UNESCO Bangkok. No date. ICT in Primary and Secondary Education: Training workshops for educator educators. <http://www.unescobkk.org/index.php?id=2645>

<sup>70</sup> UNESCO Bangkok. No date. Implementing SchoolNet Programmes. [http://www.unescobkk.org/fileadmin/user\\_upload/ict/e-books/SchoolNetKit/guidebook3.pdf](http://www.unescobkk.org/fileadmin/user_upload/ict/e-books/SchoolNetKit/guidebook3.pdf)

- There may be a rapid loss of quality as training cascades, however this depends on the quality of initial training, the monitoring of further provision and support provided to second level trainers.
- It becomes difficult to monitor either the impact or quality as implementation of the model is scaled up.
- It can be expensive.

### **Distance and e-Learning Delivery**

In this mode of delivery, participants are trained remotely without any face-to-face contact with facilitators. Various ICTs may be used to include built-in forms of interaction and support systems. Lecture courses are delivered using manuals, diskettes, videotapes, CD ROMs, or the Internet. There are various forms of distance and e-learning delivery options – the unifying feature being the lack or reduction of contact sessions compared to other forms of independent study. However, well designed distance education need not exclude some form of contact, face-to-face or otherwise.

For example, participants may work in groups through a set of web-based materials, communicating via e-mail and online web forums with each other and the group facilitator. The group facilitator checks participants' progress via activities, facilitates interaction and supports members, possibly also assessing their learning progress. Participants undertake the course work in their own time and at their own pace, but in a set time frame, with activities due on specific dates.<sup>71 72</sup>

There are several basic models for distance or online professional development: course supplement model, online lecture model, online correspondence model and online collaborative model<sup>73</sup>:

#### *Distance learning – Correspondence Model*

Here, correspondence models make use of paper-based materials which are distributed to the participants via the postal system. Communication with the facilitator is then generally via the submission of assignments – also conducted via the postal system. Formal summative assessment is generally conducted in an invigilated central venue.

Strengths of this model are that:

- Correspondence courses can be cost-effective, although materials design costs must be considered to ensure a high quality learning experience.
- This is an accessible option for to people living in remote areas.
- There is no need for a training venue in this model.
- This tends to be considered accessible as it is cost effective; student fees may be lower than other offerings.

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<sup>71</sup> UNESCO Bangkok. No date. Implementing SchoolNet Programmes. [http://www.unescobkk.org/fileadmin/user\\_upload/ict/e-books/SchoolNetKit/guidebook3.pdf](http://www.unescobkk.org/fileadmin/user_upload/ict/e-books/SchoolNetKit/guidebook3.pdf)

<sup>72</sup> SchoolNet Africa. 2004. Towards a Strategy on Developing African Teacher Capabilities in the Use of ICT. Draft report.

<sup>73</sup> GautengOnLine. No date. Education Plan: Implementation Strategy.

Challenges include:

- Correspondence courses tend to be characterized by very little collaboration or interaction between participants – unless this is a specific design feature of the course.
- Interaction and engagement between the facilitator and participant tends to be limited to assignment feedback.
- Correspondence via the postal system is slow and this tends to decrease motivation.
- If correspondence is the only mechanism for communication, this provides very limited learner support.
- It is difficult to establish a relationship between participant and facilitator or between peers.
- Retention rates tend to be low.
- Quality is often poor.
- This option does not provide opportunities to model ICT use.

#### *Distance Learning – Online Lecture Model*

This involves one-way delivery of high quality content, and provides a method for lowering the cost of instruction and reaching a greater number of participants for the same outlay cost. This may be viewed as a digital version of the correspondence model, where materials are distributed via the Internet or e-mail.

Much can be invested in developing online instructional resources, with instructors providing personal contact by responding to assignments and examinations, providing mentor support, moderating discussion groups, and providing online ‘office hours’ for questions and collaborative project work. It may be an effective form of professional development at a reasonable cost if participants are motivated and disciplined.

The online lecture model may be easily extended to become an online correspondence model. In this case there is less investment in designing and delivering content and more in providing online facilitation and interaction. Many correspondence training colleges have moved from using postal systems to using the Internet to deliver course material and exchange student course work.

Strengths of the model include:

- This builds on the correspondence model and courses may be well designed and structured. Given that there is no printing or publication cost, distribution costs may be lower than other comparable models.
- There is no need for a training venue in this model.
- Lecture materials and information may be updated electronically without incurring additional production costs (such as printing and postage).
- As online access is assumed, this tends to be combined with several communication and collaboration tools and applications which helps to provide more regular and accessible learner support (than the correspondence model).

- A database-driven tracking system (specialized Learning Management System or LMS) can provide detailed quantitative information on learner progress.
- With the addition of online communication tools (e-mail, discussion lists, chats and so on) greater learner interaction between peers and with the facilitator is possible.

Challenges include:

- The distribution cost saving for providers can tend to be transferred to a learner cost in having regular and reliable online access.
- The online lecture model tends to mirror the correspondence model with information flowing from facilitator/provider to participants.
- Self-paced reading comprises much of the training – which means this model is suitable only for participants who are highly motivated.

#### *Distance Learning – Online Collaborative Model*

This makes use of the full potential of technology for peer-to-peer collaboration during online learning courses. Collaboration is typically asynchronous, which is vital where different time zones come into play. It is also less expensive than other comparable models and fairly easy to implement. Enrolment is usually limited to a maximum of 20 educators, but these groups may form part of courses with far greater enrolments. The model also emphasizes facilitation by experts and trust-building activities for the educators enrolled. It has explicit schedules, many types of high quality learning materials, continuous assessment, and quality assurance regarding instructional design, content of subject matter, delivery and impact. Drawbacks are that it takes more time to design and deliver, and therefore costs more, than traditional face-to-face programmes. It has many advantages, including having a higher impact, that it models what teachers can do in the classroom, and that it provides learning anywhere and anytime.

This is an extension of the e-learning model that additionally uses ICT as a communications medium to provide mentor support for learners (with each learner assigned to an e-mentor who supports his/her learning progress), and creates collaborative groups for learners for feedback and mutual support, fostering communities of practice.

Strengths of this model include:

- This format is relatively inexpensive to produce and does not necessitate costly infrastructure.
- There is no need for a training venue in this model.
- Programmes can easily be scaled up as logistical and scheduling constraints are minimal, and more efficient use is made of the skilled trainers acting as group facilitators.
- A database-driven tracking system (specialized LMS) can provide detailed quantitative information on learner progress.
- Learning pathways are more flexible for educators, who choose the courses in which they are interested.
- Direct one-to-one support may be provided to individuals by e-mail through e-mentors.
- This approach can help to create learning communities of participants who are in contact with each other during and after the formal course offering.

- There tends to be a reduced drop-out rate through increased learner support in comparison to the correspondence models.

Challenges include:

- Educators will require reliable and stable connectivity and technical infrastructure.
- Educators must be self-motivated, disciplined and must have some basic ICT skills (for example, using e-mail).
- There is a risk that a course may be designed as a series of written lectures with little or no interactivity between the participants and the material (and so be more like the correspondence model – as limited use is made of the communication tools).
- Digital content may not fully exploit the interactive potential of ICT and may not sufficiently hold the participants' interest.
- This model is highly dependent on good ICT access and stable connectivity for ongoing communication for both participants and facilitators.
- Using only digital tools can make it slow to establish virtual relationships and online communities.

#### *Distance Learning – Independent Self-Study Model*

In this model, educators work on their own through printed materials or computer-based training (CBT) software and multimedia applications, typically used for skills training such as learning new applications.<sup>74</sup> When computer-based, learners engage in purely online learning interacting solely with the computer.

This model includes activities such as educators working independently to access journal articles, lesson plans or read up about approaches to teaching a particular section of work. This may or may not be part of a formal course offering. Opportunities to read and engage in the general educational community of practice are encouraged. This may lead to the accumulation of professional development credits if evidence of engagement with suitable learning materials is provided.

Where computers are required, this is not a suitable model for educators who do not have any ICT skills. Participants in an online course need to have good ICT skills to make use of the materials and communication functionality.

Strengths of this model include:

- It can be scaled to reach a large number of learners.
- This model may cost less than face-to-face options, provided levels of facilitator support and engagement are managed.
- There is no need for a training venue in this model.

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<sup>74</sup> 13. UNESCO Bangkok. No date. Implementing SchoolNet Programmes. [http://www.unescobkk.org/fileadmin/user\\_upload/ict/e-books/SchoolNetKit/guidebook3.pdf](http://www.unescobkk.org/fileadmin/user_upload/ict/e-books/SchoolNetKit/guidebook3.pdf)

- This model provides participants flexibility in terms of time and access – for example, it may allow effective provision of training to educators in rural schools where travel logistics may be prohibitive.
- A database-driven tracking system (specialized LMS) can provide detailed quantitative information on learner progress.

Challenges include:

- Care needs to be taken to build in levels of direct facilitator interaction and support with individual learners.
- Course design needs to deliberately encourage peer interaction or participants may lose motivation working in isolation from others.
- Relatively high levels of ICT skills and individual motivation are required from participants.
- High levels of language use are also typically required, as there is limited synchronous mediation by facilitators.
- This model is highly dependent on good ICT access and stable connectivity for ongoing communication for both participants and facilitators.
- Using only digital tools can make it slow to establish virtual relationships and online communities.

#### *Distance Learning – Blended Learning Model*

A highly effective model for in-service professional development of educators is now widely accepted as involving a mixed mode of delivery: a combination of contact and distance modes with improved learner (educator) support being identified as an essential ingredient of this model. Blended learning is generally considered to be a highly successful approach to professional development.

*Blended models combine face-to-face learning with online learning in a variety of combinations involving differing proportions of each. Often this involves a 'block' of face-to-face interaction, varying from one to two weeks, followed by a longer period of time engaging with an online environment. Anderson & Baskin (2002) suggest that 'blended' approaches that combine face-to-face and computer-mediated communications have some merit in tackling sustainability issues. Moore & Barab (2002) found that periodic face-to-face sessions were essential in sustaining the momentum and engagement of participants in a virtual learning environment (VLE). Furthermore, Brosnan & Burgess (2003) conclude that an initial face-to-face component was valuable in developing an effective social network which, in turn, encouraged greater participation, more open contributions and sharing of reflection on practices. Moore & Barab (2002) used a blended approach in teacher preparation and concluded that the face-to-face sessions had great value in establishing long-term relationships. In a similar vein, Brosnan & Burgess (2003) found that the initial face-to-face component resulted in establishing more effective social networks and, as a consequence, greater student participation.<sup>75</sup>*

In a blended learning approach, the above models are combined, as needed, into one professional development intervention. Typically, most programmes begin with basic ICT skills acquisition in a face-to-face course, followed by e-learning. Educators on e-learning

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<sup>75</sup> Hahn, V, (2001). What Makes for Effective Teacher Professional Development in the Use of ICT? Christchurch: Christchurch College of Education.

programmes can be supported by follow-up on-site training visits, or with support from more experienced colleagues at their school.<sup>76</sup> This model combines one or more face-to-face contact sessions with online study of modules that are supported online by peers as well as a mentor, and further supported by follow-up face-to-face visits.

Strengths include:

- Costing is comparable to the large-scale, purely face-to-face model.
- A database-driven tracking system (specialized LMS) can provide detailed quantitative information on learner progress.
- Mentor support in this model reduces the dropout risk that characterizes much distance learning.
- Mentors can increase the level of quality by mediating learning and facilitating formative assessment.
- Educators have the advantage of being able to test new ideas and approaches in their own classrooms while the course is in progress, and have access to advice and support from peers and mentors when problems arise.
- Motivation levels may be kept high by including energizing face-to-face sessions, which help to punctuate and consolidate virtual communities and collaborative relationships. This refers to both peer-to-peer and participant-to-facilitator relationships.

Weaknesses of this approach include:

- It requires that participants have a basic level of computer expertise.
- Time constraints can be problematic if educators work in their free time only.
- This is a relatively expensive option with the training costs being comparable to those of conducting face-to-face workshops.

## Mentoring

Mentor support is considered to be a most effective mechanism in the area of learner support. Several recent initiatives in educator training and appraisal globally have drawn on the merits of mentorship programmes. Mentoring focuses have been on pre-service teacher education and induction programmes. At pre-service teacher education level, mentoring has been aimed at ensuring support of the student educator during school-based training or the teaching practicum. Mentors at this level have been tasked with providing the student teacher with a holistic schooling experience that goes beyond having student teachers learn teaching performance survival skills to pass their teaching practice component of the teacher training course. Instead, they learn about whole school processes like administration, interacting with the school community and participating in extra mural events in addition to teaching. Examples of pre-service mentoring are the teacher education learnerships in South Africa,<sup>77</sup> and school-

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<sup>76</sup> 13. UNESCO Bangkok. No date. Implementing SchoolNet Programmes. [http://www.unescobkk.org/fileadmin/user\\_upload/ict/e-books/SchoolNetKit/guidebook3.pdf](http://www.unescobkk.org/fileadmin/user_upload/ict/e-books/SchoolNetKit/guidebook3.pdf)

<sup>77</sup> For descriptions of this mentoring see, EPU Natal's Level 6 Learnerships Evaluation: 2005; Karlsson, J. & Berger, M. 2006. Well grounded and prepared new teachers: Reflecting on the promise of learnerships. *Perspectives in Education*, 24(1), 53 - 64; Mawoyo M. & Robinson, M. 2005. The organisation of pedagogy in . Other studies that explores the notion of mentoring in South African schools for pre-service teacher training but not focusing on learnerships are: Robinson, M. 2001. Teachers as

based teacher education in England and Wales, Australia, New Zealand, Canada, Romania and many other countries that initiated school-based teacher education for pre-service teacher education.<sup>78</sup>

Mentoring in induction has also been widely practised in the United States of America, where the intention of mentoring has been to support beginning teachers' transition into teaching, in professional development schools, with the aim of reducing high teacher attrition rates due to burn out. Both of these mentoring focuses assume that the student or beginning teacher is being mentored by a more experienced and knowledgeable professional whose role is that of

*Demonstrating and articulating personal attributes, system requirements, pedagogical knowledge, modelling, and feedback for the development of a mentee's teaching practices.*<sup>79</sup>

In most mentoring programmes, a general mentor, who is responsible for the wellbeing of the student and beginning teacher by assisting with administrative issues and offering emotional support, and a separate subject specialist are assigned as mentors.

The mentoring focuses for pre-service and induction programmes in teacher education can be adapted for ICT professional development, where at least three approaches to mentoring can be adopted. The first option is based on leadership at the general level, where an ICT coordinator is needed to play a supportive role to educators who are entry-level ICT users, as well as to support those at higher levels of competence to continue being innovative in their use of ICT. The second approach could be based on tangible issues to do with integration and can be based on the matching of educators according to the aforementioned levels of Technology Literacy, Knowledge Deepening, and Knowledge Creation to match mentoring teams or pairs. The third – which may involve components of either of the first two – focuses on e-mentoring.

### *ICT coordinator-based mentoring*

When ICT coordinators become mentors, they will use their leadership role to encourage and support adoption of ICT by different personnel in the school, including administrators and educators. In addition to articulating the value of ICT, coordinators have to lead by example and be seen to be using ICT for their own role function. Because the ICT coordinator's mentoring role is generic, mentoring can occur in the form of using ICT to source information and research

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mentors: A critical view of teacher development in South African Schools. *Perspectives in Education*, Volume 19(2): 99 – 114; Robinson, M. 2000. *Mentoring and teacher development: A case study* (unpublished dissertation (D. Ed), University of the Western Cape) and Quick, G & Sieborger, R. 2005. What matters in practice teaching? The perceptions of schools and students. *South African Journal of Education*, 25(1), 1-4.

<sup>78</sup> See for example, Board of Teacher Registration Qld. 2003. *The Multiple Faces of Internships: Report of Phase One of a BTR Project on Internships in Preservice Teacher Education*. Retrieved on 2 August 2006 from: <http://www.btr.qld.edu.au/pdf/phaseone.pdf>; Ciasca1, L. 2001. Developments in 'Mentoring' in Romanian Initial Teacher Training. *Mentoring and Tutoring*, Vol 9(2), 101 – 111; Edwards, A. and Protheroe, L. 2004. Teaching by proxy: understanding how mentors are positioned in partnerships. *Oxford Review of Education*, 30(2), 183 – 197; Hagger, H and McIntyre, D. 2006. *Learning teaching from teachers: Realizing the potential of school-based teacher education*. Maidenhead and New York: Open University Press.

<sup>79</sup> Hudson, P. 2004. From generic to specific mentoring: a five-factor model for developing primary teaching practices. Paper presented at the AARE Conference, Melbourne, 2004. Available on: <http://eprints.qut.edu.au/arcghive/00000971/01/hud04076.pdf>, p.6-7

on best practice and sharing this with the rest of the staff through e-mail or face-to-face meetings, as well as including ICT integration issues on the weekly school departmental meeting agenda, to keep the momentum alive for educators at different levels of ICT adoption. The ICT coordinator can facilitate meetings in the school, using presentation equipment like a laptop and a data projector to model good practice. As a mentor who may be removed from the everyday pedagogical use of ICT because they are the principal of a school and are playing much more of an administrative role in the institution, the ICT coordinator should be receptive to learning from teachers or lecturers who are using ICT for teaching and learning, and this learning can occur during the ICT slot at weekly meetings. In this way, the mentoring relationship becomes symbiotic with the ICT coordinator sharing research and educators sharing practice.

There are several strengths of this approach to mentoring. As a leader with the ability to make decisions about acquisition and application, an ICT coordinator who becomes a mentor is kept informed about developments in ICT integration at the school and becomes aware of priorities in terms of acquisition, as well as professional development needs and opportunities available for his or her staff in the area of ICT. It also becomes easier for a committed ICT coordinator to consolidate and flag issues in the ICT Integration Plan because of the closeness the coordinator might have with the educators and lecturers and the issues that they have. This is also a cost-effective model, as mentoring takes place within the day-to-day activities of running the school.

Challenges to this mentoring approach could include the following:

- If the ICT coordinator is not committed, he or she may discourage adoption of ICT by other educators due to negativity or lack of exemplary behaviour in ICT use;
- If the ICT coordinator is the head of the school, the mentoring role may be subordinated by what are considered more urgent issues in the running of the school; and
- An undemocratic ICT coordinator may force his or her preferred ICT model on educators and lecturers even when it is not a preferable model.

#### *Pair- or group-based peer mentoring*

Pair- or group-based mentoring may involve educators who are at the higher levels of using ICT pairing with and mentoring educators at entry level, or forming a group with educators at different levels to use their knowledge and acquired expertise to model and articulate good ICT-based pedagogy. Mentoring can take place through simulation of lessons or live observation and post-observation discussion of the mentor's lessons.

Strengths of peer mentoring include:

- Experienced educators get a chance to showcase their knowledge and skills to other educators in a collegial atmosphere that may help to extend their knowledge and skills.
- Because all educators involved in the mentoring programme will know each other, there is a non-threatening atmosphere that could enhance learning.
- Educators who are not yet proficient in ICT use get motivated by seeing other educators at that level and may therefore aspire to reach it.

- It encourages educators to work in a context where their work is not private but open, and this may give educators a renewed sense of importance of their profession.
- Educators will share ideas and learn from each other.
- Mentoring encourages collaborative relationships within the school;
- Mentoring becomes self-reproducing: educators who are mentored at Technology Literacy, Knowledge Deepening, and Knowledge Creation levels can themselves become innovative ICT educators and an experience of being mentored may motivate them to become mentors themselves, thereby mentoring the next generation of educators in ICT integration.
- The cost of this model is time, so it is relatively cheap.

Challenges to peer mentoring include

- Time to observe or to simulate lessons may be hard to find, as all educators have their own classes and it may be difficult to organize common time where observation may take place.
- Space for mentoring has to be made available where ICT tools are available for modelling, and this may depend on how much space is available for use in the school.
- If the mentor does not encourage collegial relationships but a hierarchical one, this may impede learning.
- Pair mentoring, where a mentor works with only one protégé, may not be as beneficial as group mentoring. Group mentoring generates a reservoir of repertoires that can be drawn on for educators' work in the school, whereas the repertoires are fewer with pair mentoring.
- Pair mentoring is likely to lead to imitation of the mentor whereas group mentoring is likely to lead to adaptation from the reservoir of resources generated.
- Mentoring may be less effective for learning if principles behind pedagogy are not explicitly articulated.

### *e-Mentoring*

ICT offers the possibilities of e-mentoring, where educators in dispersed locations can communicate with each other and share ideas about best practice in ICT pedagogy. E-mentoring can be especially beneficial if educators at the beginning of their adoption of ICT for teaching and learning engage with local and international educators who are already experienced in ICT pedagogy, to bounce off ideas and get guidance on practical challenges of ICT pedagogy. Three examples of e-mentoring in support of professional development for ICT use will be given here. In South Africa, Schoolnet SA reaches schools in rural areas to train teachers in the use of ICT for teaching and learning. Training takes place via the Internet. Mentors are trained online to support novice teachers on ICT integration. During the training of mentors, expert mentors from other regions and countries join the online community to support ICT teacher educators.

In England, MirandaNet, a non-profit professional association, works with educator volunteers who are willing to develop educational use of ICTs in their own practice and that of colleagues by sharing information and resources, and through discussions on the Internet. The MirandaNet community in England has led to the creation of other communities in the Czech Republic, Chile, and China. An example of mentoring topics discussed on MirandaNet discussions includes

interactive whiteboards, where educators who have this technology discuss what interactive whiteboards are and how they can best be used on their own and with other technologies. Online mentoring in a dispersed community is very important for providing and comparing cultural and technological variations among countries and schools.<sup>80</sup>

In Australia, eLearn Australia, founded in 2004, provides elearning support, mentoring, and professional development for organizations, educators, and trainers. eLearn provides professional development based on strong pedagogical foundations. eLearn's website contains news, courses, events, and resources.<sup>81</sup>

The advantages of e-mentoring are that mentoring can take place anytime and anywhere, depending on arrangements between the mentor and educators who want to be mentored. Mentoring is based on the specific needs of the novice teacher, so learning becomes a just-in-time exercise. Because all that is needed is e-mail or telephone communication, e-mentoring is a relatively inexpensive model of professional development. Because online and telephonic discussions are not as intimidating as personal face-to-face training, novice teachers may be more willing to ask what may be considered stupid questions during face-to-face training. A weakness of e-mentoring could be that there is no modelling of good ICT pedagogy by the expert teacher, but only explication, although dedicated mentors can support their explications by sourcing and recording their practice and sending videos of good ICT pedagogy to their mentees.

E-mentoring may be undertaken in conjunction with face-to-face support. This encourages a school-based approach, where the real context of the school can be fully understood before remote support is offered to specific staff. For example, such a mentoring approach may usefully be adopted to support a school during its initial exposure to ICT. The mentor may be directly involved in the school during this time. Over time, this school-based support role may diminish, being replaced by remote support and e-mentoring to key staff members.

### **Communities of Practice**

Some countries have supported the establishment of educator communities in order to foster the development of new learning cultures. There is great interest in participatory approaches to professional development, where educators are involved in initiating and designing their own professional development, share materials and ideas, and discuss challenges and solutions. This approach will also help educators to become model lifelong learners. Case studies have indicated that a model of learning by doing may be a good starting point for initiating forms of future staff development linked to the curriculum.<sup>82</sup> Such communities of educators are referred to as communities of practice. They are groups of educators that share common specializations – whether in their role as managers or leaders or as researchers, or in their

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<sup>80</sup> UNESCO Division of Higher Education. 2002. Information and communication technologies in teacher education: a planning guide. Paris: UNESCO.

<sup>81</sup> Sutton, C. 2005. eLearn Australia, <http://www.elearnaustralia.com.au/joomla/>

<sup>82</sup> Pelgrum, W.J. and Law, N. (2003) ICT in Education Around the World: Trends, Problems and Prospects. Unesco International Institute for Education Planning: Paris

specialization: by grade level, or by content focus area. These groups share common interests and problems, and often have similar working environments. Through the community, they are able to share ideas, resources, and approaches with peers in the community. This may be done through study groups, collegial networks, or subject specialization associations. However with the advent of the Internet, communication with the community members in between face-to-face events is much cheaper and more efficient than ever before. Educators may join online communities of practice and share resources ideas and ask advice of a community sharing their challenges and interests, but whom they may never have met. This online community may be limited to a country or span several continents.

This approach as key element of a professional development and support strategy for educators has been undertaken in several places around the world. In India there are online teachers' forums where teachers are able to plan their classroom sessions and share and learn through each others' experiences.<sup>83</sup> In Australia 'membership of an online learning community with other [educators] through chats, bulletin boards and e-mail' is one of the options in its online professional learning strand.<sup>84</sup>

Strengths of this option include:

- Educators are able to share frustrations, challenges, and innovations with a network of peers.
- Resources are circulated and learning materials generated and shared.
- An environment of collegial collaboration is created, motivating and stimulating educators to try new approaches.
- Educator isolation in subject specializations can be overcome, as a network of people focusing on the same issues is readily available to ask for advice and share experiences. This is particularly useful among educators in remote areas or in highly specialized roles. For example, educators in rural multi-grade classrooms may benefit from a network of educators in the same situation, while school principals may consult other senior managers on leadership issues.
- This is a relatively inexpensive approach as it is based on collegial collaboration and not on expert input and design.

Challenges include:

- It requires that participants have a fairly high level of computer expertise.
- This option is highly dependent on good ICT access and stable connectivity for ongoing communication among community members.

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<sup>83</sup> Reddi, U.V. and Sinha, V.(no date) India – ICT Use in Education. UNESCO Meta-survey on the Use of Technologies in Education. Retrieved September 20, 2006 from website:  
[http://www.unescobkk.org/fileadmin/user\\_upload/ict/Metasurvey/NEPAL.PDF#search=%22India%20ICT%20use%20in%20education%20Ms%20Usha%20Vyasulu%20Reddi%2C%20Ph.D%22](http://www.unescobkk.org/fileadmin/user_upload/ict/Metasurvey/NEPAL.PDF#search=%22India%20ICT%20use%20in%20education%20Ms%20Usha%20Vyasulu%20Reddi%2C%20Ph.D%22), cited in NEPAD e-Schools Business Plan

<sup>84</sup> Office of Learning and Teaching, Department of Education, ICT Professional Learning Strategy 2005-2007, Victoria State, Australia [http://www.sofweb.vic.edu.au/ict/pdfs/ICT\\_pl\\_strategy\\_final.pdf](http://www.sofweb.vic.edu.au/ict/pdfs/ICT_pl_strategy_final.pdf)

- Using only digital tools can make it slow to establish virtual relationships and online communities. As such a mentor or coach may be required to stimulate engagement and participation in the community.

### Accessing Information and Guides

The Australian approach to ICT professional learning includes an e-learning partners' strand, where industry partners with Government to support leaders and managers. A strong focus in these partnerships is to develop digital content. Developing and distributing digital content is seen as an important contribution to professional learning as, without access to digital materials and the know-how on how to create own digital materials, educators cannot learn to integrate them into their classrooms or lectures, while using digital content supports e-learning imperatives at schools.<sup>85</sup>

In addition the Australian Online Professional learning strand includes opportunities for:

- *Individual, self-guided learning;*
- *Enrolment in an online course;*
- *Membership of an online learning community with other [educators] through chats, bulletin boards and e-mail;*
- *Progressing through standardized course content; and*
- *Using a research framework to develop your own learning plan.*<sup>86</sup>

This is the most flexible learning strand, but it is recognized that participating educators 'will require a foundation level of ICT skills and familiarity with online tools'.<sup>87</sup>

Individual, self-guided learning is one of the main strategies adopted by BECTA. This is actively supported by creating easily accessible short guides presented in plain language and designed for niche educators to read as a trusted source of quick reference and inspiration.<sup>88</sup> These are provided and distributed as printed brochures as well as made available as PDF files in the BECTA searchable database which lists guides by key target audience and topic.<sup>89</sup> BECTA has also developed several publications, videos, and audio clips which showcase the use of ICT in real classroom contexts across the schools and TVET sectors in the United Kingdom. These bring integration of ICT into the curriculum to life while providing authentic contexts on which future endeavours by educators can be modelled.

The important point to highlight is the importance of collating and, in some instances, procuring or developing digital content to support professional development processes. Here, the overlap between professional development and curriculum and content becomes clear. The importance

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<sup>85</sup> Office of Learning and Teaching, Department of Education, ICT Professional Learning Strategy 2005-2007, Victoria State, Australia [http://www.sofweb.vic.edu.au/ict/pdfs/ICT\\_pl\\_strategy\\_final.pdf](http://www.sofweb.vic.edu.au/ict/pdfs/ICT_pl_strategy_final.pdf)

<sup>86</sup> Office of Learning and Teaching, Department of Education, ICT Professional Learning Strategy 2005-2007, Victoria State, Australia [http://www.sofweb.vic.edu.au/ict/pdfs/ICT\\_pl\\_strategy\\_final.pdf](http://www.sofweb.vic.edu.au/ict/pdfs/ICT_pl_strategy_final.pdf)

<sup>87</sup> Office of Learning and Teaching, Department of Education, ICT Professional Learning Strategy 2005-2007, Victoria State, Australia [http://www.sofweb.vic.edu.au/ict/pdfs/ICT\\_pl\\_strategy\\_final.pdf](http://www.sofweb.vic.edu.au/ict/pdfs/ICT_pl_strategy_final.pdf)

<sup>88</sup> See BECTA, <http://becta.org.uk>

<sup>89</sup> See BECTA, <http://becta.org.uk>

of developing professional development content which is then provided in easily accessible print digital formats is explored in the following section.

Strengths of this option include:

- Centralized investment in researching information and communicating key messages ensures that there is a trusted source and avoids duplication of effort across materials developers.
- Guides can be targeted at specific audiences and break down the scope of investigation into manageable chunks.
- A wide range of examples – particularly showcasing real classroom and lecture environments – may be collected to showcase approaches and raise questions about how to improve on undertakings in using ICT.
- Tracking trends in technology development and educational applications can be an onerous task, as this is a rapidly changing environment. Having a central repository of trusted and independent information about technology products and their potentials and pitfalls, coupled with contextual examples of their use in real classroom environments, is a valuable resource for educators and professional development providers alike.
- Once developed and available online, materials, guides and showcase studies may be used in various ways: for example, analysed in formal professional development course offerings, distributed and discussed via pertinent communities of practice, or accessed by individuals for self-paced learning and engagement.

Challenges include:

- Investing in such guides and materials requires research, communication and production expertise and investment.
- Resources may not be accessed and used if simply published online – various ‘push’ strategies are required to ensure their appropriate distribution (for example through mediated communities of practice, events and formal professional development offerings).

### **Action Research**

Part of the Australian e-Learning partners’ strand of its Queensland State’s *ICT Professional Learning Strategy* includes a programme designed to support reflective practice through encouraging action research amongst educators and supporting ICT integration into pedagogical practice. This is a powerful professional development model, as educators structure a research framework and then investigate their own teaching and learning strategies, documenting this for their own learning and professional development.

Although this supports the expected role of all competent educators as being a lifelong learner and researcher,<sup>90</sup> this type of professional development approach is likely to be most

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<sup>90</sup> DoE, Norms and Standards for Educators, seven roles of the competent educator

appropriate for higher levels of ICT development and may align to postgraduate studies programmes such as Master's or PhD level.<sup>91</sup>

Strengths of this option include:

- It provides an academic research framework for educators to engage in reflective practice which is critical for improving teaching and learning.
- An action research framework involves directed support from a supervisor, course facilitator, or academic, which can help to shift pedagogical practice and overcome professional isolation.
- There is a clear research output from the intervention which can be used as a basis for formal accreditation and/or accumulation of professional development credits.
- Research output may be used as a valuable showcase of authentic use of ICT in a real learning context.

Challenges include:

- This approach requires a high level of skill from the educator undertaking the research, and so may be most appropriate for higher development levels in the UNESCO ICT CFT.
- Working within a research framework and methodology may add a complicating dimension and detract from organic reflective practice and the core objective of encouraging ICT integration and improved teaching practice and ICT development levels.
- This requires individual mentoring and support as action research projects are designed in relation to a unique context. This may make it an expensive option.

### **Events (Conferences, Trade Shows, Showcasing Events)**

Events designed to provide information, showcase approaches and bring communities of educators together under a common theme can be very effective ways or energizing and exposing groups of educators to a wide range of ideas and new networks of collegial support and engagement.

This approach is one of the key elements of the Australian Queensland State's *ICT Professional Learning Strategy*, which has ICT events and conferences as its third learning strand. This is intended to provide educators 'with access to specialist information and exciting opportunities to further develop their eLearning capacities'.<sup>92</sup> Some of these conferences and events focus on general ICT use and provide a broad range of opportunities for educators to develop eLearning capabilities and knowledge, while others provide educators with access to expert knowledge to develop specialist ICT skills.<sup>93</sup> Conferences often include opportunities for:

- Education and industry leaders to present the latest findings in ICT research or strategies to integrate ICT into teaching, learning and the curriculum.

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<sup>91</sup> Office of Learning and Teaching, Department of Education, ICT Professional Learning Strategy 2005-2007, Victoria State, Australia [http://www.sofweb.vic.edu.au/ict/pdfs/ICT\\_pl\\_strategy\\_final.pdf](http://www.sofweb.vic.edu.au/ict/pdfs/ICT_pl_strategy_final.pdf)

<sup>92</sup> Office of Learning and Teaching, Department of Education, ICT Professional Learning Strategy 2005-2007, Victoria State, Australia [http://www.sofweb.vic.edu.au/ict/pdfs/ICT\\_pl\\_strategy\\_final.pdf](http://www.sofweb.vic.edu.au/ict/pdfs/ICT_pl_strategy_final.pdf)

<sup>93</sup> Office of Learning and Teaching, Department of Education, ICT Professional Learning Strategy 2005-2007, Victoria State, Australia [http://www.sofweb.vic.edu.au/ict/pdfs/ICT\\_pl\\_strategy\\_final.pdf](http://www.sofweb.vic.edu.au/ict/pdfs/ICT_pl_strategy_final.pdf)

- Focused discussion and hands-on activities exploring selected aspects of e-Learning.<sup>94</sup>

BECTA has a similar schedule of events pertaining to ICT use in schools and the TVET system.<sup>95</sup> Its approach includes a substantial schedule of trade shows hosted in cities and local towns around the country. BECTA events include online discussions and scheduled digital interaction – such as viewing a live interview with a key expert and having the opportunity to pose questions to them (the results of which are all then archived for future use) or a facilitated chat or discussion forum on a specific topic which then has a start and end date for debate.

Strengths of this option include:

- A dynamic schedule of events helps to motivate and create a core of ICT champions, who then support and encourage educators in their local schools.
- Bringing communities of educators together helps to motivate and reward good practice and provide a sense of professional status and belonging to a collegial community.
- Online communities of practice and other distance learning collaboration techniques can be supported by punctuating them around key face-to-face events where relationships can be made more personal and include a social element.
- If the schedule of events includes events hosted in a range of locations around the country, as well as online events, this can help to distribute expertise and enthusiasm beyond the boundaries of urban centres that generally have more access to information and collegial support.
- Events provide a marketing opportunity to technology vendors and professional development providers. As such these organizations may have an interest in sponsoring events in exchange for brand and marketing exposure.

Challenges include:

- Events can be expensive to organize and host with participants' travel, accommodation and leave of absence from school requiring consideration.
- Enthusiasm generated through events may quickly wane when educators return to their local environments and face its daily challenges. As such mechanisms to harness and sustain the enthusiasm generated at the event need to be built into its planning and conceptualization.

## Summary

As the above analysis has demonstrated, there is a wide variety of options available to use as vehicles to deliver professional development in Guyana. Different options have different strengths and weaknesses, which suggests a need to choose from these options carefully according to the need and context of target audiences, as well as the purpose of a specific intervention. No single option can be considered 'better' than the others, and success will rather depend on ensuring that Guyana's ICT CFT is developed in such a way that it enables a

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<sup>94</sup> Office of Learning and Teaching, Department of Education, ICT Professional Learning Strategy 2005-2007, Victoria State, Australia [http://www.sofweb.vic.edu.au/ict/pdfs/ICT\\_pl\\_strategy\\_final.pdf](http://www.sofweb.vic.edu.au/ict/pdfs/ICT_pl_strategy_final.pdf)

<sup>95</sup> Office of Learning and Teaching, Department of Education, ICT Professional Learning Strategy 2005-2007, Victoria State, Australia [http://www.sofweb.vic.edu.au/ict/pdfs/ICT\\_pl\\_strategy\\_final.pdf](http://www.sofweb.vic.edu.au/ict/pdfs/ICT_pl_strategy_final.pdf)

broad spectrum of choices to become available to educators and decision-makers when implementing professional development to support the development of e-Education in Guyana.