



Information and Communication Technologies (ICT) Professional Development Strategy for Teachers in Guyana

— A CASE STUDY —



Microsoft





The ICT Professional Development Strategy for Teachers in Guyana could provide a quick and cost-effective way to enhance and overhaul existing teacher programmes in environments with few resources, including human resources.

ICT are currently integral to many educational changes throughout the world. They have dramatically changed the learning and teaching environment, and have opened up new opportunities and access to educational resources well beyond those traditionally available.

The ICT Professional Development Strategy for Teachers in Guyana was developed in 2011. It is based on the assumption that, if teacher training programmes embrace ICT, there will be improvements in learner performance, and it acknowledges the central role that education officials, teacher trainers, educators and learners play in the implementation and support of ICT in education. Although the strategy was originally devised in response to challenges — relating to education, migration and the economy, for example — in Guyana, it can be adapted to meet the needs of other countries in the developing world facing similar challenges. At the very least it could provide some potentially relevant lessons from which other countries contemplating the introduction of ICT could learn.

The Guyana Context

Guyana's population is predominantly rural; only 28 per cent of its 780,000 inhabitants live in urban areas. Life expectancy is good — over 62 years for males and 70 years for females. Expenditure on education in 2007 was 6.1 per cent of GDP, which ranks the country 28th in the world¹ but functional literacy has been a cause for concern. “Between 80 to 89 percent of the youth of the country are achieving at low to moderate levels of functional literacy. Indeed, it is estimated that the overall functional literacy rate in the country is in the lower 50s.”² Therefore, the government is actively addressing the quality of both primary and secondary education in Guyana.

Part of the problem lies in the low retention of qualified teachers and the subsequent employment of untrained and unqualified teachers. In 2007, of 9,303 teachers only 4,523 (48.6%) were fully trained.³ The Ministry of Education has therefore given priority to increasing the number of qualified teachers by providing opportunities for both pre- and in-service teachers to gain the relevant qualifications. When the Ministry learned about the potential benefits of ICT, especially when combined with concurrent development of teacher ICT competencies, it realised that they could be a

powerful agent of change in this process. Consequently, using ICT in teacher education and training is now at the forefront of efforts to tackle ineffective teaching and low-quality learning in classrooms. This is a challenge in a country where only 27 per cent of the population are Internet users.

The Ministry of Education developed an ICT Operational Plan that recognises that integrating ICT into education means addressing issues of content, access and competency, as well as the actual integration of ICT into the processes of teaching and learning, which requires both teachers and learners to be competent users of the available ICT. There was a significant gap in the plan regarding teacher development in ICT integration. Therefore, an ICT Professional Development Strategy for Teachers was developed in consultation with the Commonwealth Secretariat, the Commonwealth of Learning (COL), Microsoft and Neil Butcher & Associates in conjunction with the Guyana Ministry of Education, the National Centre for Educational Resource Development (NCERD), the Cyril Potter College of Education (CPCE) and the University of Guyana (UG). The strategy includes several initiatives required to implement it, and is essentially a comprehensive framework and learning pathway for managers, teacher educators, teachers, student teachers and administrators to become competent in using ICT to support high-quality teaching and learning.



The ICT Professional Development Strategy for Teachers

The Guyana ICT Professional Development Strategy for Teachers 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.

In the long term, it is hoped that this strategy will equip all Ministry of Education officials, teacher development management and staff, school principals and teachers with the skills to use ICT effectively to support high-quality teaching and learning in Guyanese schools. After training they will be expected to be able to integrate basic ICT tools into the standard school curriculum, pedagogy and classroom structures. They should also know how, where and when (as well as when not) to use ICT for classroom

activities and presentations, for management tasks and for developing additional subject matter and pedagogical knowledge for their own professional development. Further, a significant number will be expected to be able to use more sophisticated methodologies and ICT to address changes in the curriculum that will emphasise depth of understanding and application of school knowledge to real-world problems, and a new approach to pedagogy in which the teacher serves as a guide and manager of a learning environment where learners are engaged in extended, collaborative project-based learning activities that can go beyond the classroom and may involve local or global collaborations.⁴

The Guyana ICT Professional Development Strategy provides a comprehensive framework and learning pathway for key stakeholders to learn to use ICT effectively to support high-quality teaching and learning. It uses the UNESCO ICT Competency Framework for Teachers (CFT)⁵ as its guiding framework and seeks to develop core competencies as illustrated in Figure 1.

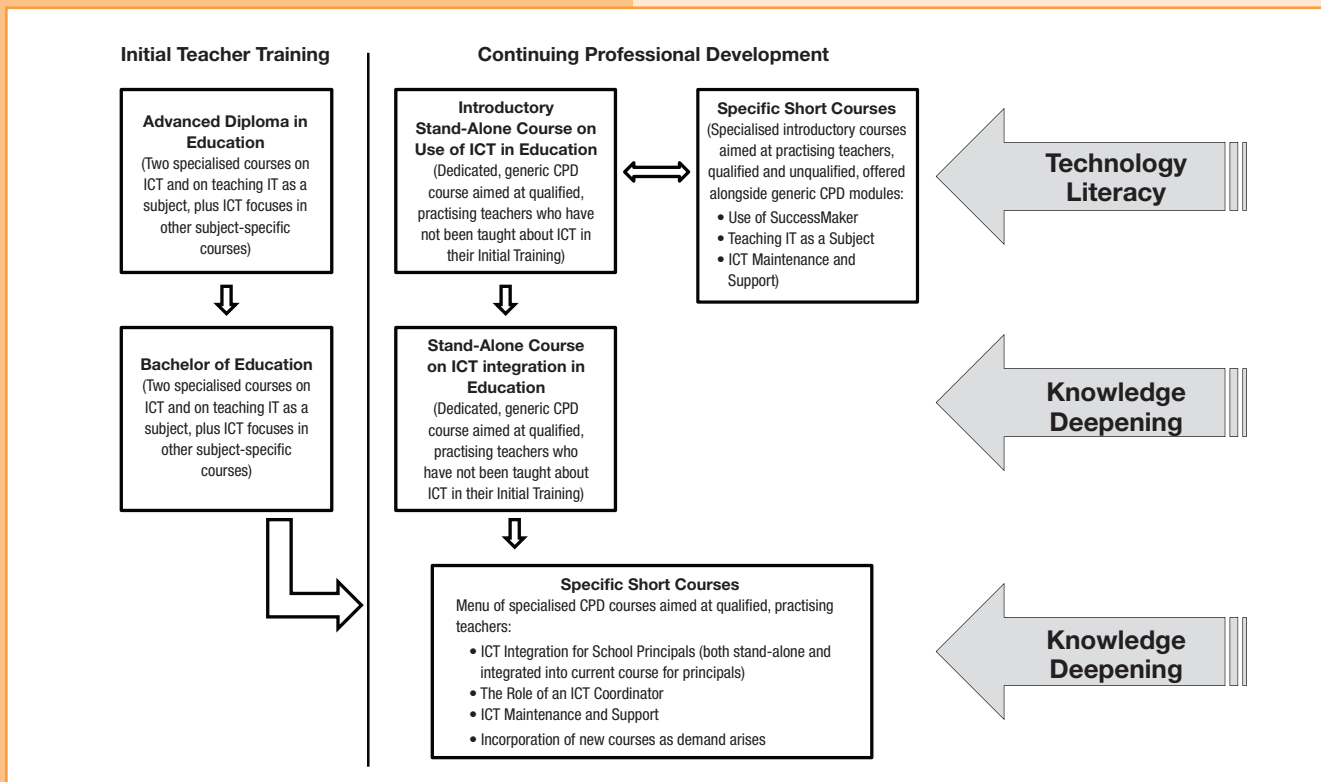


Figure 1: ICT Professional Development Framework for Guyana



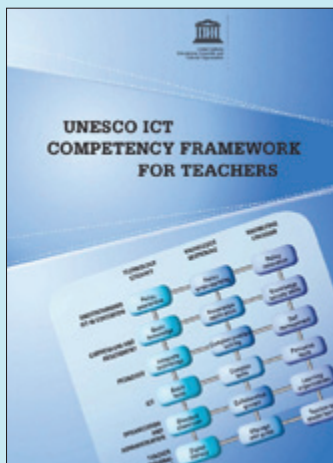
The Guyana ICT Professional Development Framework for Teachers currently incorporates the following professional development options:

- ICT components in the revised CPCE programme (which is planned to be a two-year programme leading to a two-year Associate Degree in Education):
 - Two compulsory courses. The first will introduce teachers to ICT — electronic and otherwise — and the second will involve studying in more detail ICT in education, equivalent to six semester credits (these courses focus on Technology Literacy, as defined in the UNESCO ICT CFT).
 - A dedicated focus on secondary subject options to enable teachers to specialise in teaching IT as a subject.
 - Subject-specific ICT integration specialisations (incorporated into subject-specific courses, not delivered as separate modules).
- ICT components in the revised UG programme (a further two years of study, leading to a BEd):
 - Two more compulsory courses on ICT integration in education, equivalent to six semester credits (anticipated to focus on Knowledge Deepening, as defined in the UNESCO ICT CFT).
 - A dedicated focus on secondary subject options to enable teachers to specialise in teaching IT as a subject.
 - Subject-specific ICT integration specialisations (incorporated into existing modules and not delivered as separate modules).

• NCERD plans the following:

- In the next five years, to create a dedicated module on ICT integration for school principals that will be integrated into a generic 18-month course for school principals. This module will need to be offered as a stand-alone course for principals 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.
- To repackage the four ICT Integration modules being designed for the new CPCE and UG Advanced Diploma in Education (ADE) and BEd programmes into two stand-alone courses for qualified teachers, and to design a stand-alone course for qualified teachers who are teaching IT as a subject but are not formally qualified to do so.
- To develop two versions of a stand-alone short course on using SuccessMaker⁶ in schools — one for teachers who are already ICT literate and one for teachers who are not.
- To develop a short course for ICT coordinators in schools.
- To develop a course for ICT maintenance and support personnel.

The strategy assumes transformation initiatives at a number of levels within the education sector: Ministerial, Government Agencies, Teacher Education Institutions and the schools themselves.



The UNESCO ICT Competency Framework for Teachers (CFT) was used as a conceptual framework for the Guyana initiative. The framework was used to analyse and assess the benefits of using ICT for educational management, teaching, learning and administration.

The following strategic initiatives are broken down according to stakeholder needs in Guyana.

The Ministry of Education

The strategy aims to:

1. **Spread awareness** by focusing on:

- the beneficial roles that ICT and OER (Open Education Resources) can play in meeting education needs;
- the potential impact of ICT on the quality and efficiency of education management and administration, enhancements to teaching and learning, and improved communication channels between all stakeholders; and
- a recognition of what is possible among managers and administrators.

2. **Create policies and plans.** The Guyana ICT Professional Development Strategy for Teachers sets out a three-year plan with the aim of delivering the following results:

- Existing policies reviewed and revised to support the new emphasis on using ICT.
- A professional development framework and detailed implementation plans to support the emphasis on ICT in the context of teacher education.
- The current curriculum reviewed and reworked.
- Stakeholder capacity-building initiatives for all education stakeholders developed and implemented.
- The existing school portal expanded to support all curricula.
- Monitoring system established to track implementation.

3. **Improve capacity.** Ministry officials require basic ICT skills. The efforts to transform education will only gain traction when the personnel who represent the nation's highest education authority embrace ICT in conducting their daily responsibilities. For example, if officials require digital data from schools to compile statistics for national planning, the schools will be obligated to capture their school records digitally.

4. **Coordinate a clear message.** The Ministry is putting a communication and advocacy strategy in place. The strategy will make clear the new direction that the Ministry wants to take and will identify new channels to improve communication among all education stakeholders. Such a strategy should clarify the key positions and messages of each stakeholder group, the audience and the related activities. The Ministry's Communication and Advocacy Strategy document was therefore designed to shape and unify advocacy messages.
5. **Consult local and external experts.** The strategy aims to encourage the development of a "think tank" or consultancy. An ICT Committee, composed of both local and international authorities on educational technology, aims to inform government of the latest developments and possibilities in a field that is constantly growing and changing.

In Guyana, the Ministerial ICT Steering Committee is responsible for monitoring and evaluating ICT in education activities.



We need initiatives that encourage a change in the mindsets of people at all levels.



Teacher Education Institutions

Teacher educators at CPCE and the Faculty of Education, UG, also require support to enhance and improve teacher education through the use of ICT. CPCE and the Faculty of Education, UG, are responsible for shaping the skills and values of new teachers and for designing professional development opportunities for in-service teachers. Government agencies or provincial/district offices that support professional development, curriculum reform and resource acquisitions also need to be targeted. Ideally, initiatives implemented by government agencies and teacher education institutions should do the following:

1. **Spread awareness.** Many teacher educators are unaware of the possibilities that ICT offer. However, once they are exposed to trends — things happening elsewhere in the world — that add value to the education process, many will be quick to adopt and adapt. Teacher educators in Guyana appreciated the exposure to new digital resources and tools that they experienced when working on the development of the new curriculum for ICT integration. The lecturers were also quick to see which combinations would work within their specific learning areas and levels.
2. **Improve capacity.** This stakeholder group also needs to use ICT tools in their daily work to ensure that student and teacher competencies mirror their own. Electronic communication, reporting and record keeping are simple yet valuable skills that should be integrated seamlessly into daily responsibilities. Ideally, this group's competence should develop beyond simple productivity skills so that they can champion the use of ICT in education to enhance teaching and learning.

3. **Develop curricula and teaching materials.** If ICT are to become part of the way in which teachers teach, learners learn and school managers operate, the teacher education curriculum should reflect the important roles that ICT might play in a typical school. Opportunities to study and investigate ICT in education should be reflected in the curricula of both pre- and in-service teachers. The curricula and associated materials should be designed to work within the national context and mirror the conditions that teachers will find on the ground. Student teachers should be required to study these curricula at different stages of their own development as teachers. While curriculum revision is often considered a time-consuming and expensive process, the creation of an ICT-friendly component for the teacher education curriculum in Guyana was achieved at a relatively low cost by using the UNESCO ICT CFT framework and repurposing OER. The innovative curriculum and materials development process used in Guyana is outlined below.
4. **Assess access to ICT and connectivity.** Because universal access to ICT infrastructure and reliable connectivity is not always possible, it is necessary to audit, and where necessary improve, teacher educators' access to ICT. This process, although undoubtedly beneficial, can be costly. Initiatives should improve access by building institutional pools of technology such as laboratories and/or by subsidising or negotiating on behalf of students and staff the acquisition of privately owned devices and Internet access. In Guyana, teachers receive a laptop when they graduate from their higher education programme thanks to the Ministry's Teacher Laptop Programme. It is hoped that, in the medium term, significant numbers of new teachers entering the system will be able to influence teaching practice due to their exposure to ICT Integration during their pre-service training.



Teachers and Schools

The “chalkface” is perhaps an obvious place to implement initiatives for improving teaching and learning through the use of ICT. However, the logistics of managing this consistently across all schools are very challenging. The Guyana ICT Professional Development Strategy for Teachers therefore incorporates the following types of initiatives to support teachers:

1. **Audit existing competencies.** An audit of ICT readiness needs to be conducted to identify appropriate interventions. Answers to questions such as “What existing ICT skills are prevalent (or not)?” “What access do teachers have to ICT and connectivity?” and “What is the current level of awareness?” will inform other interventions. The audit of ICT competencies should cover not only teachers but also Ministry officials, teacher trainers and district support officers in the field as they play a significant role in supporting professional development.

A set of questionnaires aimed at these stakeholders was developed and distributed. Using a rubric format, it surveyed aspects such as stakeholders’ access to ICT, usage patterns, familiarity with various software packages, confidence, previous training and opinions on the future role of ICT. The results were collected and collated into an information base that will be used in the planning of various training initiatives.

2. **Assess access to ICT and connectivity.** If the use of ICT is to be embraced by teachers, access to computers and connectivity is essential. Sponsored or subsidised laptops, school computer laboratories for classes and learners, and dedicated computers for administration purposes will be required if ICT is to play a real role in transforming teaching, learning and administration. In Guyana, the government has a number of ambitious ICT in Education projects designed to improve ICT access for the school community. The One Laptop per Family project aims to give families with school-going children access to computers, while the Computers for Schools Project is building small laboratories in both primary and secondary schools throughout the country. These laboratories have computers connected to a server containing educational software and printing facilities.

3. **Encourage capacity building.** Initiatives that encourage the learning of basic ICT skills, as well as the specific skills required for the meaningful use of ICT for education purposes (hopefully shaped by the curriculum mentioned earlier), are being encouraged. In Guyana, in-service teachers and school management have been targeted for this type of training. The thinking is that this ICT Integration training should include managing ICT in schools and other management-related topics. Due to the large numbers of teachers and managers requiring training, the strategy must be cost-effective. Where possible, face-to-face opportunities for instruction need to be balanced by content and skills mediated by the tools themselves. Materials and tasks are thus being distributed using CD-ROMs; in time, as connectivity becomes ubiquitous, they will be distributed over the Internet. Capacity building should not be seen as a single initiative as it requires a series of programmes and courses. Individuals develop over time, and so this process requires multiple opportunities for growth. These opportunities require different levels of proficiency and skill as a prerequisite for entry to particular courses. Also, a capacity-building programme should offer a different educational focus — ideally one that is informed by the ICT in the Teacher Education curriculum.

In Guyana, NCERD has appointed a team of mentors who visit schools regularly, partly to monitor usage of the computer systems and partly to train and support staff who use computer rooms. They are given training on the educational software that has been installed and on how best to manage class behaviour in the computer room. In addition, as has been noted, new professional development courses that embrace the above ideals are in the process of being developed. In-service teachers will shortly be able to complete ICT in Education courses modelled closely on the UNESCO ICT CFT and the resources collected for the pre-service teachers.

Monitoring and Evaluation

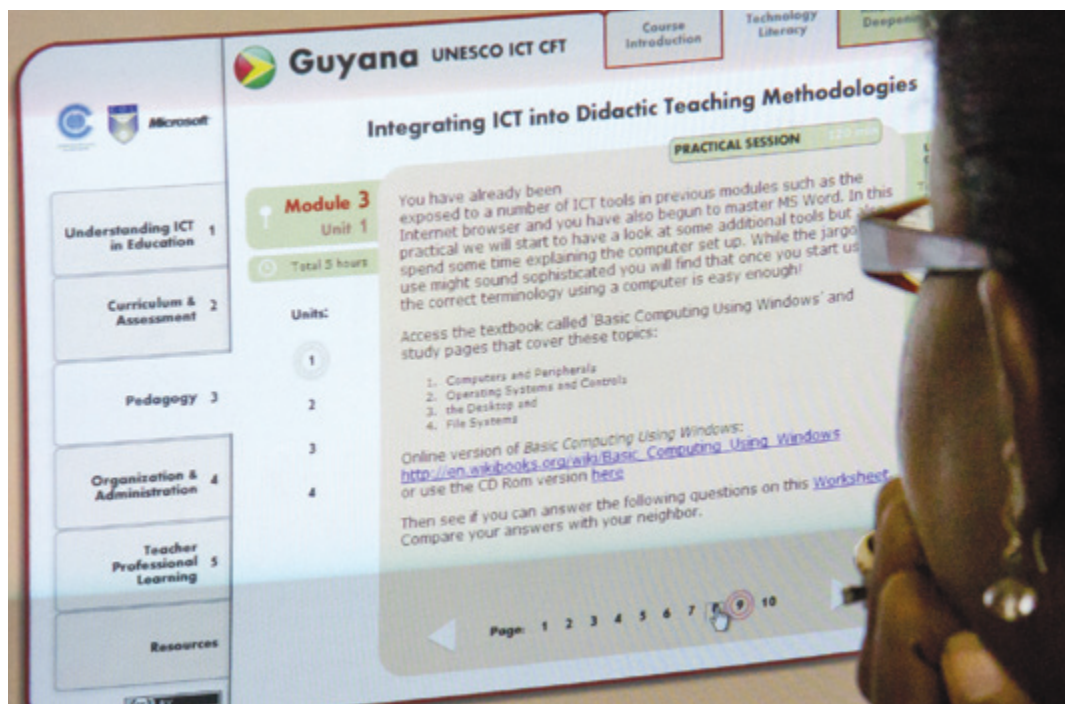
As with any multifaceted initiative, it is essential to monitor and evaluate progress to ensure that the stated objectives are being met. Ongoing feedback allows for refinement and improvement and the evaluation process will indicate the extent of success or failure. Monitoring and evaluation thus need to be incorporated as essential components of the strategy's design.

With this in mind, the Guyana Ministry of Education prepared a detailed monitoring and evaluation strategy that seeks to:

- track changes in ICT use over time;
- track participation in ICT courses/training;
- assess the effectiveness of the ICT courses/training offered;
- assess the extent to which each of the seven results specified in the strategy have been achieved;
- understand the conditions in which the anticipated results have and/or have not been achieved; and
- identify (as early as possible throughout the implementation process) changes and improvements needed to ensure that the strategy achieves its outcomes.



Curriculum Review and Improvement: The role of the UNESCO ICT CFT



Curriculum review can often be a lengthy and contentious process. Early attempts at developing an ICT in Education curriculum at both CPCE and UG resulted in disparate and uneven courses that lacked a uniform message. There was also no logical curriculum flow as student teachers moved from CPCE to UG to complete their education studies. The adoption of the UNESCO ICT CFT streamlined the curriculum review process in Guyana. The framework emphasises the role that ICT can play in supporting six major education areas:

- ICT in education policy and vision;
- curriculum and assessment issues;
- pedagogy;
- ICT;
- school organisation and administration; and
- teacher professional development.

It encourages an approach to teacher development that uses these areas to demonstrate directly the educational benefit that can be derived from ICT. Significantly, instead of presenting an ICT application approach (such as teaching

how to use MS Word), the UNESCO ICT CFT provides a solidly educational context for the development of ICT skills and competencies to integrate ICT into teaching and learning.

Another component of the UNESCO ICT CFT that was appropriate for Guyana is the cyclical nature of the competencies described. The framework encourages teachers to acquire general ICT competencies and then revisit the focus areas to develop them further. There are three approaches — Technology Literacy, Knowledge Deepening

and Knowledge Creation — each of which builds on the knowledge gained from the one before. As one progresses from one approach to another, the activities demand greater higher-order thinking skills. As teachers complete the activities, they move from acquiring a basic understanding of issues relating to ICT to reinterpreting an educator's responsibilities in a way that will help them use ICT tools in various ways. In the ICT Professional Development Strategy for Teachers, the learning pathway described for student teachers mirrors the UNESCO ICT CFT's cyclical path (see Figure 1). In-service courses reflect the proficiency levels of the Technology Literacy cycle, diploma- and bachelor-level courses are suitable for Knowledge Deepening, and advanced specific short courses are offered to experienced in-service teachers in alignment with the Knowledge Creation cycle.

Initially, the UNESCO ICT CFT was used to spread awareness of the potential role of ICT in education within the Ministry and among lecturers of student teachers. The framework was entrenched in the consciousness of Guyana policy advisors and administrators. Subsequently, it formed part of the curriculum review process and significantly shaped the materials development process.

Unlike many commercial programmes and courses, the UNESCO ICT CFT, while identifying competencies, is not prescriptive about how these competencies should be achieved. Originally, Guyana lecturers found the ICT in Education online courses — which used proprietary software, commercially available ICT texts and online materials — to be financially prohibitive. Also, most of the programmes and courses available from developed countries assumed Western standards of access and connectivity. The environment in which new CPCE and UG graduates are expected to work when they are appointed to a local school is quite different. The UNESCO ICT CFT not only provided a sound framework for teacher professional development but also freed Guyana courseware designers to exploit and adapt free high-quality OER rather than locking them into a costly proprietary environment.

“ICT here is poorly serviced by the national infrastructure. There is often a lack of electricity supply or technicians to maintain them, connectivity, etc. Also within schools there is not always the support by senior teachers.”

Marcia Thomas, National ICT Coordinator, NCERD, on the challenging environment in which student teachers can find themselves.



Guyana Materials Development Model

The Guyana approach to developing an ICT in Education programme harnesses existing OER and shapes them, with minimal repurposing, into a form that responds to the needs of a local environment. Developers therefore need basic ICT skills, familiarity with their particular subjects' requirements and knowledge of the needs and abilities of the target student audience. Most teachers and lecturers have these abilities.

The Model's Development Steps

The following steps explain the development cycle of the model (see Figure 2):

1. The proposed course or programme should be thoroughly mapped ahead of any development phases. The map should contain high-level objectives as well as any specific unit outcomes, proposed content and teaching methodology and even notional hours. This is necessary because the map will shape the development phases and will be used to assess to what extent various draft versions of the course satisfy the overall purpose and function of the course.
2. An Internet search for OER that support the teaching of the various course units is the next step. These resources are available free of charge and do not require permission to use, distribute and, in many instances, repurpose. They are copyrighted with an open licence — typically a Creative Commons licence. Several OER websites, in particular OER Commons (www.oercommons.org), make this search process easier than it sounds.
3. Beyond pinpointing OER that are closely aligned to the course direction identified by the curriculum map, a developer also needs to determine the quality and suitability of each OER found, as well as the amount of repurposing they require. Ideally you will be looking for resources that need as little repurposing as possible. Note, however, that the developer should assess how the OER would be used within the course plotted in the map. He/she must find ways to incorporate the OER into the course, which requires a certain level of creativity.

4. The developer constructs a number of user guides that identify a proposed learning pathway through the OER materials, ideally without any repurposing of the OER. In addition to identifying the sequence of learning events, the developer should also offer a suggested set of student activities. This is so that the learning process is not merely didactic in nature but calls on students to engage critically with the sourced OER. Also, if the developer is part of a team of teachers, it would be beneficial to develop some suggested teaching guidelines. Assessment opportunities could also be a component of the guides.
5. Much can be learned during the deployment phase. Students and teachers should work through the materials in an authentic setting to thoroughly test the assumptions of the developer.
6. There should be an opportunity to evaluate the course before it ends. Collect student and staff feedback on how best to improve the course.
7. A revision phase should follow so that the collected user feedback can inform changes to the course. Should some of the OER be jettisoned and replaced with new material? Perhaps some of the OER need to be reworked slightly? Or perhaps some of the activities need to be adapted? Feedback will help the developer answer these questions.



Figure 2: Materials Development Cycle

The model on the facing page informed the creation of an ICT in Education course designed to encourage teachers to integrate ICT into their teaching at CPCE and the Faculty of Education at UG (see <http://ccti.colfinder.org/education/guyana>). This process was supported by NCERD.

The issue that arose in Guyana was how to provide teacher education students with course materials that modelled effective integration of ICT into the teaching and learning process, and that were also cost-effective and sympathetic to the ICT constraints prevalent in Guyana schools.

The lecturers at CPCE and UG, guided by the advisors at NCERD, were in a restricted-access environment when they used the development model described above to devise a strategy to create a course that would work in a similar environment. It should be noted that the ICT facilities available to students at CPCE were modest. Students had access to a computer room with limited printing and Internet services. However, many of them had already identified ICT as a key tool to assist them in their studies and future employment and had acquired personal laptops. Conditions at UG are much better thanks to a state-of-the-art computer facility.

Mapping the Curriculum

The team's first step was to map the UNESCO ICT CFT and determine what treatment each competency identified by the framework would receive in practice. Lessons or units were proposed around a framework competency and issues such as content, methodology, treatment, notional hours and support materials were proposed. This process allowed writers to weight the different focus areas and to determine the number of hours a student should spend working on the materials. For example, it was decided to spend 60 notional hours on the Technology Literacy phase and 70-90 hours on Knowledge Deepening.

Simple spreadsheet software (Microsoft Excel) was used to do this mapping so that the map could be easily edited, updated and shared among the development team (see Figure 3). This was particularly important because the map provided guidance for the next stage of development: determining which OER might support the lessons.

TECHNOLOGY LITERACY										
Module & Unit Title	Objectives	Proposed Content	Teaching and Learning Strategies - With Proposed activities	National Hours					OER and free resources to be adapted	Suggested Unit Content & Activities
				Contact Session	Self	Independent Computer Practice	Lecture	Tutorials		
1 Understanding ICT in Education (Link ICT with National Policy)										
1 Internet Navigation	Pre-service teachers should be able to describe the Internet and the World Wide Web, elaborate on their uses, describe how a browser works and use a URL to access a website. (TL.4.e)	Basic Internet navigation using URL	Students practice opening the browser software, ensuring they are connected and then typing in various URLs. They also learn to analyse a URL for domain information.	0.5			1.166	0.5	http://www.pacti.org/gateway/Files/Legal_Research/Pacti1_Using_Internet.pdf http://www.newbie.org/Internet_explorer http://www.scribd.com/doc/3116372/Basic-Internet-Tutorial-1 http://en.wikipedia.org/wiki/Search_engines http://www.dartmouth.edu/library/biomed/guides/web-search/components.html https://ejimicrosoft.intuition.com	Unit 1
2 National ICT policy and its impact on education	Pre-service teachers should be able to identify key characteristics of classroom practices and specify how these characteristics serve to implement policies. (TL.1.a)	Policy familiarisation	Students navigate to http://www.ict4d.gov.gy/ and download a copy of the ICT4D Guyana National Strategy document. Review independently and then in tutorial groups brainstorm classroom practices that would support the documents directives.		1		1	1	http://www.ict4d.gov.gy/ictstrategy/ICT4D_Strategy_FinalDraft.pdf http://www.newbie.org/Internet_explorer http://www.basiccomputerinformation.ca/saving-downloads/ http://www.cdms.in/jesce/Koosma_Policy_Recommendations_for_India.asp	Unit 2
3 Report on Policy Impact	Pre-service teachers are able describe and demonstrate the basic tasks and uses of word processors, such as text entry, editing text, formatting text and printing (TL.4.b)	Basic use of a Word processor: Opening program, orientation and basic formatting.	Students need to write a short report on practical strategies that could fulfil some of the policy directives	0.5			1	2.5	http://wiki.answers.com/Q/What_is_the_purpose_of_a_word_processing_software http://www.baycongroup.com/w/lesson0.htm http://office.microsoft.com/en-us/word-help/ https://www.dlswb.rmit.edu.au/Pou/content/pdfs/2_assessmenttasks/super_report.pdf http://www.ict4d.gov.gy/ictstrategy/ICT4D_Strategy_FinalDraft.pdf http://www2.elc.polyu.edu.hk/CLL/reports.htm http://www.betterwritingskills.com/Report_Writing_Sample.pdf	Unit 3

Figure 3: Curriculum Map using spreadsheet software

Selection of OER and Other Free Resources

Guided by the curriculum map, the development team searched for potential resources to support the acquisition of the UNESCO ICT CFT competencies. Generally teacher education resources are well represented within the OER community but the development team found that few were created specifically with the UNESCO ICT CFT in mind.

The free but copyrighted Microsoft Educator Learning Journey (ELJ) series of pre- and in-service teacher ICT tutorials were especially useful as the units had been created using the

UNESCO ICT CFT. Unfortunately, while the content was good, the high-end Web design used multimedia, student tracking and integrated feedback and was too sophisticated to work in the limited connectivity environment prevalent in Guyana.

Another free resource that proved useful was the Commonwealth of Learning's Commonwealth Certificate on Teacher ICT Integration (CCTI) course. It was especially useful in providing materials that could be used in the Knowledge Deepening section as many of the activities called for more than simple comprehension. The URLs of potentially useful resources were recorded in the curriculum map (see Figure 3, Column L).

Determining Use of OER and Free Resources



When it came to creating a learning pathway to guide students and teaching staff, not all the identified resources proved useful. An analysis of the collected resources weeded out those whose connection to the competencies described in the curriculum map were either tentative or that required too much repurposing to make them useful. Some educators consider those who use OER to be lacking in both imagination and creativity, but the creation of a learning pathway that skilfully harnesses existing materials to achieve a specific set of outcomes is a highly creative and challenging process. All educators should acquire the skills of determining how a resource is to be used and conceiving a set of activities and tasks to elicit the desired competencies.

The resources' specific copyright licence limited how and to what extent each resource could be used. Some of the resources had rights prohibiting any repurposing. While the development principle was to limit repurposing as much as possible, there were still instances where the restrictions on a resource made it unusable. In the few instances where a copyrighted work was deemed indispensable, copyright permission was secured to reproduce the work. All copyright conditions were honoured for all licences and rights conditions.

Guide Writing

During this phase the three-person development team developed a set of simple guides to set out the suggested learning pathway through the selected resources. The team also developed a teaching methodology that called for students to be engaged in the learning process through a series of activities. These activities were organised around four teaching and learning interventions: the lecture, the tutorial, the computer practical and self-study sessions (see <http://ccti.colfinder.org>). The guides were constructed using a simple word processing programme, because they were only suggested routes and the developers appreciated that lecturers would most likely want to edit the documents to better suit their own teaching context.

In an effort to support the lecturers, the development team compiled facilitation notes that included guidelines on how best to organise the tutorials and practical computer sessions. They also assembled a list of further reading and references for the lecturers. Each of the course's 36 units had its own guide. Copious hyperlinks to the various resources were embedded into the electronic version of the guide's pages.



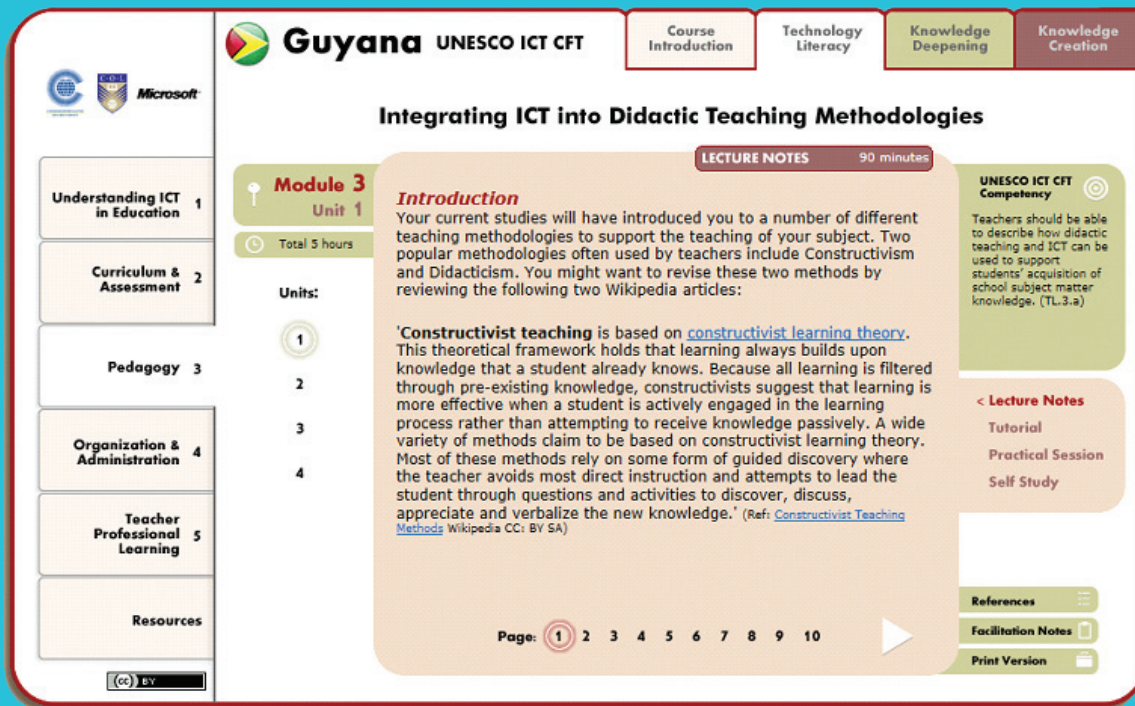


Figure 4: Screenshot of a page from Technology Literacy, Module 3 Unit 1 on CD-ROM.

Deployment, Evaluation and Revisions

Various units of the course were deployed at CPCE, where staff reported a mostly positive experience. Initial feedback from CPCE staff and comments and suggestions from UG staff were all collected and collated to inform revisions to the course materials. While the evaluation results identified many potential improvements, some were deemed significant enough to justify the following changes:

- The guides were organised to place less emphasis on the facilitation notes so that they could be handed out for students to work alone. They were aimed directly at the students rather than at the lecturing staff and hence became teaching materials rather than guides.
- The OER and free resources were downloaded onto a CD-ROM to eliminate the need for connectivity.

- Further reading lists were added to the facilitation guides as they were considered useful for new staff/lecturers, student tutors and facilitators.

An electronic version of the course was developed so that staff and students could choose between using the paper-based versions or the electronic (CD-ROM) version (see Figure 4). The electronic version of the course was built using a Web interface that spoke directly to the students and contained downloaded versions of most of the resources in a PDF format. The CD-ROM also contained the print versions of the units.

When the electronic version was tested out by CPCE and UG staff prior to redeployment, it sparked a chorus of suggestions for further functionality. Once staff had used the CD-ROM version they began to see opportunities for the use of multimedia, databases and other electronic user aids that had been impossible in the paper versions.



Lessons Learned during the Guyana Implementation

Several lessons emerged during the implementation of the Guyana ICT Professional Development Strategy for Teachers:

ICT Professional Development Strategy for Teachers Lessons:

- High-level support of the initiatives is key for success.
- There is a need for a committee to bring key interests and stakeholders together for successful implementation.
- The UNESCO ICT CFT provides an excellent point of reference for the development or refinement of development strategies.
- It cannot be assumed that teacher education providers have the necessary skills to develop, adapt and implement courses aligned with the UNESCO ICT CFT.
- An ICT infrastructure is necessary if a professional development initiative like this one is to succeed.
- Some seed funding is likely to be needed to initiate activities to support technical assistance and capacity building to integrate the strategy into existing processes.
- Communication, advocacy and a defined monitoring and evaluation strategy are important to support the process.

Materials Development Lessons:

- Engagement in the process and adoption of the course materials by the lecturers is enhanced if the product meets a real need or requirement.
- Despite current advances in e-learning that use ICT in increasingly sophisticated ways, the most appropriate use of ICT needs to be assessed in the context in which it will be used. When assessing the context, both infrastructural issues and human capacity need to be assessed. In this particular instance, the paper-based materials are possibly more useful than the electronic version because both access to ICT and familiarity with the tools are still limited for many students and teachers.
- OER can offer a cost-effective route to acquiring quality teaching and learning materials, especially in environments where resources are in short supply. It is not, however, a shortcut to the normal materials development process. Time, skill and creativity are required to rework the materials to satisfy a specific set of objectives identified by a curriculum committee or body.

- The real benefit of using OER is that once a master version has been fashioned from repurposed resources it can be legally shared and distributed among a large group at no additional cost. Localised repurposing by those who can and want to adapt it can also be legally endorsed.

Potential Impact

The Guyana ICT Professional Development Strategy for Teachers initiative has had many positive benefits, and those linked closely to the initiative can see even more benefits beyond its immediate scope.

For example, Marcia Thomas, the National ICT Coordinator at NCERD, identified an additional role that OER had played. She noted that the lecturers who had the opportunity to engage with the OER development process for the course used quality resources and were expected to vet their usage. This experience was very valuable in terms of their professional development. She noted that the dearth of quality resources is a serious hindrance to educators' professional growth throughout the country and commented,

This project helps in terms of developing educators to become better teachers by providing them with quality resources. There really is a dire need for quality resources. For example, hinterland teachers might know about traffic lights but are unaware of the colour sequence!

Mohammed Odeen, a subject specialist at NCERD, also identified benefits of the initiative beyond its immediate design. He commented that the project went some way towards achieving the ICT vision as articulated by the government by encouraging the next generation of teachers to improve ICT competencies by using ICT for educational purposes. He also pointed out that the different teaching approach of the course encouraged teachers to adopt new teaching strategies. He believed the course would create a demand for better access to ICTs and connectivity within the college and schools.

The director of NCERD, Mohandatt Goolsarran, envisaged an important role for OER in the future as he anticipated expanding the current focus of the initiative. He commented,

We need more OER and a strong platform for the dissemination of these resources. At the moment we use CD-ROMs. We would also like a subject focus for teaching with ICT — for example, Mathematics and also Science. We should focus on not only the “how-to-teach” but also the “what-to-teach” and any sequence required to do it well.

He added that an important component of the project was its focus on adapting OER to promote learner-centric learning. He believes that

The learning and teaching culture in Guyana will be shaken to its foundations by the incorporation of ICT and interventions like the COL/ComSec/Microsoft project. Consequently, many educators are scared because they will need to prepare learners to think critically and create, which is different from traditional methods that placed emphasis on memorising information and performances in tests and exams. It is crucial now to focus on critical creative thinking.

“In light of what I have seen (Gutenberg.org and Manybooks.net) it would be a good idea to pre-load the computers that are being distributed through the One Computer per Family project as well as the laptops that are being given to this and subsequent years’ student teacher graduates with free OER. Also the computers that are being distributed to the schools should also have a place where we could load these digital versions of the texts.”

Parikh Ram: Language Subject Specialist, NCERD, on a potential strategy to provide students with more opportunities to read.



While the potential benefits of using OER are commonly known, it is especially encouraging that many in Guyana are now seeing the freedom granted by open licensing as a mechanism to provide tools that will transform education. While exposure to quality materials is considered significant, the exposure to different learning strategies has made a number of individuals who are responsible for shaping education in Guyana optimistic that OER might be the catalyst for a change in how we teach and how learners learn.

Conclusion

The Guyana case study demonstrates that ICT can be used effectively as a catalyst for educational change. The potential benefits that can be derived from embracing ICT tools and content (in the form of OER) are significant and can enhance teaching and learning, administration and communication. The Guyana Ministry of Education was farsighted in its realisation that at the core of this transformation was not the technology itself but rather the people who would be expected to use it. These people can be found at all levels within the education sector: the Ministry of Education, agencies, teacher training institutions and the schools themselves. Consequently, Guyana has built a professional development strategy that meets the needs of all its education stakeholders.

In addition, the initiatives designed to build educators' capacity illustrate that digital resources such as the UNESCO ICT CFT and OER, as well as many of the ICT tools available, add value rather than simply adding to existing responsibilities. After an initial investment of time and resources, ICT will lead to improved productivity, enhanced teaching and learning, and more effective administration and communication channels. The Guyana ICT Professional Development Strategy for Teachers illustrates a potential pathway to achieving a transformation.

The partnership between the Ministry of Education, Commonwealth Secretariat, Commonwealth of Learning and Microsoft has been instrumental in the successful implementation of the UNESCO ICT CFT in Guyana to date. Each partner has provided resources and competencies that created a synergistic effect and mutually reinforced the interest of all parties — a critical ingredient for a successful and effective partnership. In Guyana, the Ministry of Education provided leadership and subject matter experts; UNESCO provided the framework; and the Commonwealth Secretariat was the lead partner and, with the Commonwealth of Learning, provided access to high-level officials and co-financed the project. Microsoft provided access to its Partners in Learning resources, including a worldwide network of education experts. The Commonwealth of Learning also provided a wealth of experience in ICT in education and access to a library of eContent. The partnership worked well because there was trust, honesty, openness, mutual understanding and respect, and, possibly most important, a shared vision to educate teachers on the use of ICT to create the next generation of workers that will be able to function effectively in the 21st century.

A question remains, however: is this experience replicable? In countries where resources and human capacity are at a premium, its transfer looks promising. Beyond the necessary infrastructural requirements, which are always a capital-intensive exercise, the training, curriculum review and materials development processes can be achieved cost-effectively. This is only possible because of the availability of quality free and open resources and ICT tools. However, the Guyana case study does illustrate that there needs to be a champion at the highest level within the Ministry to promote, mediate and also direct the various initiatives required.



Notes

- ¹ World Factbook. (2011). Guyana.
- ² Z. Jennings. (1998). *Nipped in the Bud: Young Guyanese adults and their functional literacy*. East Bank Demerara, Guyana: Educational and Development Services Inc., p. 18.
- ³ Ministry of Education's Strategic Plan 2008-2013, p. 32.
- ⁴ These statements are adapted from UNESCO's 2008 ICT Competency Standards for Teachers: Policy framework.
- ⁵ <http://unesdoc.unesco.org/images/0021/002134/213475E.pdf>
- ⁶ SuccessMaker is instructional software that helps elementary and middle school learners understand and practise essential reading and mathematics concepts.

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Web Resources

- UNESCO ICT CFT: www.unesco.org/new/en/unesco/themes/icts/teacher-education/unesco-ict-competency-framework-for-teachers/
- Guyana materials: <http://ccti.colfinder.org/education/guyana>
- Commonwealth Certificate for Teacher's ICT Integration (CCTI): www.schoolnet.org.za/CoL/ACE/



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