



**Commonwealth Educational  
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**Using UNESCO's ICT Competency  
Framework for Teachers in Guyana**



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# Using UNESCO's ICT Competency Framework for Teachers in Guyana

## Editor's Note

*The authors present a detailed description of the implementation of the UNESCO ICT Competency Framework as a model of teacher professional development in Guyana, and highlight the processes undertaken, lessons learnt, and cost-effectiveness of the use of OER in developing the learning materials. While the approach has been successful, readers are expected to critically analyse and review the suitability of such a practice in their own context, especially for the decision-makers to develop strategy to implement ICT integration in teacher training, and for teacher educators to rethink the use of UNESCO ICT CFT.*

## Introduction

The Commonwealth of Learning (COL), the Commonwealth Secretariat (ComSec), and Microsoft recently supported the creation of an ICT Professional Development Strategy for Teachers in Guyana, building on the UNESCO ICT Competence Framework for Teachers<sup>1</sup> (CFT). The ICT CFT intends to inform educational policy makers, teacher-educators, providers of professional learning and working teachers on the role of ICT in educational reform, as well as to assist countries in developing national ICT competency standards for teachers with an ICT in Education Master Plan approach.

In Guyana, the ICT Professional Development Strategy for Teachers is based on the assumption that, if teacher training programmes embrace ICT, there will be improvements in learner performance. It acknowledges the central role that education officials, teacher trainers, educators, and learners play in the implementation and support of ICT in education.

## The Guyana Context

Guyana, a sovereign state located on the northern coast of South America, has a predominantly rural population, with only 28 per cent of its 780,000 inhabitants living in urban areas. Expenditure on education between 2005 and 2010 was 6.1 per cent of GDP (United Nations

Statistics Division, 2013), which ranks the country 28th in the world (Central Intelligence Agency, 2013). However, functional literacy has been a cause for concern, and the government is thus actively addressing the quality of both primary and secondary education in Guyana. One of the challenges facing the education system in the country is the low retention of qualified teachers and subsequent employment of untrained and unqualified teachers. The Ministry of Education has therefore given priority to increasing the number of qualified teachers by providing opportunities to both pre- and in-service teachers to gain relevant qualifications. Additionally, using ICT in teacher education and training is 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 (Central Intelligence Agency, 2013).

The Ministry of Education has thus developed an ICT Operational Plan, which recognises that integrating ICT into education means tackling issues of content, access, and competency, as well as the actual integration of ICT into the processes of teaching and learning. This requires both teachers and learners to be competent users of the available technologies. However, there was a significant gap in the plan regarding teacher development in ICT integration. Therefore, the ICT Professional Development Strategy for Teachers was developed, whose long-term outcome is 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.

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<sup>1</sup> [www.unesco.org/new/en/unesco/themes/icts/teacher-education/unesco-ict-competency-framework-for-teachers](http://www.unesco.org/new/en/unesco/themes/icts/teacher-education/unesco-ict-competency-framework-for-teachers)

## A New ICT Professional Development Strategy for Teachers: Stakeholder Focus

The ICT Professional Development Strategy for Teachers 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. This learning pathway uses the UNESCO ICT CFT as its guiding framework. It considers ways of incorporating ICT into the teaching of all subjects, requiring both student teachers and in-service teachers across all disciplines to be trained in how best to exploit technology to teach their subject. One of the implications is that teacher trainers at the Cyril Potter College of Education (CPCE) and the Education Faculty at the University of Guyana (UG) would also need this set of knowledge and skills to support the training.

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The strategy considers international trends, as well as the local environment and ICT in education projects in Guyana. The typical school environment in this context is predominately rural, with limited access to computer infrastructure and Internet connectivity. The strategy therefore responds to these conditions, and considers a series of interventions resulting in a curriculum and set of teaching and learning materials which prepares new and in-service teachers to operate effectively in this environment. Consequently, the following components of the strategy were designed to achieve this end: curriculum review and improvement, development of teaching materials, testing, and deployment. Activities to support these strategy components also needed to be achieved in a relatively short period and with limited finances. The following outline describes how this was achieved.

## Curriculum Review and Improvement

### The Critical Role of the UNESCO ICT CFT

The UNESCO ICT CFT provides a framework around which a common core syllabus can be created. It can be used to develop learning materials sharable at a global level, provides a basic set of competencies that encourages teachers to integrate ICT into their teaching, and 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 ICT in teacher education. The UNESCO ICT CFT 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, the framework provides a solid educational context for the development of ICT skills and competencies to integrate ICT into teaching and learning.

*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.*

Another important component of the UNESCO ICT CFT is the cyclical nature of the competencies. 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.

## Mapping the ICT CFT Structure to the Guyana Teacher Training Environment

As highlighted, in the ICT Professional Development Strategy for Teachers the learning pathway described for student teachers mirrors the UNESCO ICT CFT's cyclical path. In Guyana, diploma and in-service professional development courses are relevant to the Technology Literacy approach, bachelor-level courses are suitable for the Knowledge Deepening approach, whilst advanced specific short courses offered to experienced in-service teachers are in alignment with the Knowledge Creation approach.

The UNESCO ICT CFT is not prescriptive in how the teacher ICT competencies are achieved and while it does suggest approaches, course designers are free to develop courses that respond to local conditions to produce students who have the desired ICT competencies. It not only provided a sound framework for teacher professional development but also freed Guyana courseware designers to exploit and adapt free high-quality open educational resources (OER) rather than locking them into a costly proprietary environment or a product that could not be repurposed.

## Guyana Materials Development Model

Given the capacity limits within the National Centre for Education Resource Development (NCERD), CPCE and UG, COL and ComSec contracted a consultant to develop draft teacher training materials. Part of the process involved creating a set of training modules for teachers to help them move through basic technology literacy to more advanced usage of technology. This was done in recognition that, if ICT is to become part of the way in which teachers teach, learners learn, and school managers operate, the teacher education curriculum (of both pre- and in-service teachers) should reflect the important roles that ICT might play in a typical school. Thus, at a series of meetings with the NCERD and staff of CPCE and UG, the consultants defined overall requirements for these modules. This can be summarised as follows:

1. A pre-assessment tool was required to assess whether participants had the basic ICT skills to participate in the first module. If not, students would be given a remedial training module to learn basic ICT skills (use of mouse, keyboard, etc).

2. The Technology Literacy module was expected to last approximately 60 to 90 hours, comprising a blend of face-to-face interaction and self-study. It drew on the module designs already prepared by NCERD and CPCE, but took into account the new course descriptions prepared for a revised teacher education programme in Guyana. Development of this module was based on the requirements of the UNESCO ICT CFT, and to the greatest extent possible incorporated existing materials to keep the course design cost-effective and globally relevant.
3. The Knowledge Deepening module, also based on the requirements of the UNESCO ICT CFT, would last approximately 90 hours and comprise a blend of face-to-face interaction and self-study.

The innovative curriculum and materials development process used in Guyana involved the following:

## Mapping Guyana Curriculum to ICT Opportunities

The first step was to review the existing curriculum, which involved examining the ICT in Education curriculum at CPCE and UG. The team recognised that the curriculum and associated materials should be designed to work within the national context and mirror the conditions that teachers would find on the ground.

The consultants, with input from CPCE and UG representatives, then mapped the UNESCO ICT CFT and determined what treatment each competency identified by the framework would receive in practice. They proposed lessons or units around a framework competency, and addressed issues such as content, methodology, treatment, notional hours and support materials. This process allowed the writers to weight the different focus areas and to determine the number of hours a student should spend working on the materials. This detail shaped the development phases and was used to assess to what extent various draft versions satisfied the course's overall purpose and function. It also provided guidance for the next stage of development: determining which OER might support the lessons.

## Selection of OER and Free Resources

Guided by the curriculum map, a four-person, part-time development team conducted an Internet search for potential resources relevant to the subject matter. In particular, OER were considered. 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.

In addition to identifying OER and free resources that were closely aligned to the course direction identified by the curriculum map, the developers also determined the quality and suitability of each resource found, as well as the amount of repurposing needed. Resources that required little repurposing were selected as far as possible.

## Determining Use of OER and Free Resources

The development team also needed to assess how OER would be used to achieve the outcomes plotted in the curriculum map. This required a level of creativity and subject familiarisation. The development team therefore analysed the collected resources and removed those whose connection to the competencies described in the curriculum map were either tentative or which required too much repurposing to make them useful. The resources' specific copyright licence limited how and to what extent each resource could be used. For example, some resources had a licence prohibiting any repurposing. While the development principle was to limit repurposing as much as possible, there were nevertheless 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, and all copyright conditions were honoured.

## Facilitation Guide Writing

The development team created a set of simple guides to map out the suggested learning pathway through the selected resources. In addition to identifying the sequence of learning events, the team also offered a set of suggested student activities so that the learning process was not merely didactic in nature but called on students to engage critically with the sourced OER. These activities were organised around four teaching and learning interventions: the lecture, the tutorial, the computer practical, and self-study sessions. The guides were constructed using a simple word-processing programme, because they were only suggested routes and the developers appreciated that lecturers may wish to edit the documents to better suit their own teaching context.

These guides also contained facilitation notes on how best to organise tutorials and practical computer sessions, with each of the course's 36 units having its own guide. In addition, they assembled a list of further reading and references for the lecturers. Numerous hyperlinks to the various resources were embedded into the electronic version of the guide's pages.

Additionally, assessment opportunities formed a component of the guides. The assessment strategy included a grade book, mock papers, memos and portfolio assignments.

## Deployment, Evaluation and Revisions

The content was piloted with stakeholders in Guyana to test the assumptions of the development team. Initial feedback from CPCE staff, as well as comments and suggestions from UG staff, were collected and collated to inform revisions to the course materials. A revision phase followed so that the collected user feedback informed changes to the course. This included, for example, less emphasis on the teacher facilitation notes so that they were aimed directly at the students rather than at the lecturing staff, and hence became teaching materials rather than guides. Additionally, the OER and free resources were downloaded onto a CD-ROM to eliminate the need for connectivity. 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. Further reading lists were also added to the facilitation guides as they were considered useful for new staff/lecturers, student tutors and facilitators.

## Exploiting the 'Release Early, Release Often' Model of Development

A quick and cheap development cycle was possible due to the available electronic materials, user friendly digital tools and OER. However, because these tools and resources are constantly evolving and changing, they also demand repeated evaluation and updating. Consequently, the course development model in this project came to approximate what some open source software designers use for the development of software: "Release Early, Release Often" (RERO) (Wikipedia, 2013). The rationale is that only once the product is deployed and developers receive user feedback can it truly be customised to suit user needs, and that more reviewers or user feedback makes it easier to eliminate problems. Regular cycles of testing and revision align the product quickly and cost-effectively with user needs.

With course design, there are additional advantages to this approach. Besides responding rapidly to user feedback and creating a course aligned with student expectations, this model also enables designers to quickly improve the course as new OER or open courseware become available. The digital nature of the materials allows for quick and

cost-effective changes to content. Course components can be replaced easily without affecting those components that are still required. Additionally, as new tools such as social networking, productivity or utility tools become available, these can be accommodated in the existing design with minimal disruption.

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Furthermore, as class sizes grow, students are increasingly expected to be participants in conducting courses in ways that cannot be anticipated during the “development” phase as articulated by traditional models. Class participants can nominate digital tools that they prefer when working with their peers, for reporting and discussing topics and issues. The digital nature of the tools, while not necessarily integrated directly into the course platform, can work in parallel. This model of course development allows for high levels of participant connectivity because it embraces a digital platform for course coordination, and also allows for frequent reflection and readjustment based on user feedback and developer evaluation.

## Progress Made to Date

There has been significant success in developing modules aligned to the UNESCO ICT CFT and delivering them through CPCE, UG, and NCERD. Two complete professional development modules were developed (one on ‘Technology Literacy’ and one on ‘Knowledge Deepening’). These were then re-versioned specifically for both pre-service and in-service teacher education, resulting in four modules.

In addition, initial professional development of selected staff in those institutions has been undertaken. For example, as part of the module development process, several workshops were conducted with staff from CPCE, UG, and

NCERD to develop the skills of lecturing staff to deploy the modules. These professional development activities were well received by participants, and established a basis for subsequent delivery of the modules.

The modules have been successfully integrated into pre-service teacher education programmes at CPCE and UG, as part of the wider Guyana Improving Teacher Education Project (GITEP).

1. At CPCE, the modules were deployed in 2011 and 2012, to groups of around 200 students in each year. It is expected that the first module will be delivered to approximately 350 students in 2013. In addition, CPCE is offering a Foundational ICT Literacy module for students with no prior exposure to ICT, teaching them the basics of using ICT.
2. At UG, the modules have been implemented through the Science and Technology subjects, and were delivered to approximately 125 students during 2012. Not all aspects of the modules have yet been implemented, as connectivity remains a problem, but the scope of delivery is expected to expand when connectivity is supplied. Encouragingly, approximately 25 students have also completed ICT Integration projects, demonstrating leadership as potential ICT champions within their schools.
3. At NCERD, the module on Technology Literacy has been delivered to in-service teachers during holiday workshops. These can only accommodate 75 students per session, so the modules have been delivered to 75 in-service teachers during 2011 and 2012.

As a result of the above activities, two resources have been created: a detailed case study on the Guyana experience<sup>2</sup> and an ICT in Education Professional Development Toolkit.<sup>3</sup>

## Lessons Learned During the Guyana Implementation

Many lessons were learned during implementation of the Guyana ICT Professional Development Strategy for Teachers and the materials development process. The most noteworthy lessons are highlighted below.

### Understanding the Context

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

<sup>2</sup> <http://www.col.org/resources/publications/Pages/detail.aspx?PID=409>

<sup>3</sup> <http://ccti.colfinder.org/toolkit/ict-toolkit/>

it will be used, in particular, taking consideration of infrastructural issues and human capacity. An ICT infrastructure is necessary if a professional development initiative like this one is to succeed. However, in this particular instance, the paper-based materials were regarded as 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.

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It is also important to consider the specific needs of a particular context as engagement in the process and adoption of the course materials by the lecturers is enhanced if the product meets a real need or requirement.

### Importance of Leadership Support

High-level support of the initiatives is key for success, while there is also merit in establishing a committee to bring key interests and stakeholders together for successful implementation. 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.

### Importance of an Inclusive Design Process

Simultaneously, consulting as many stakeholders as possible was valuable particularly in the design process. For example, the process of consultation around the evaluation of the materials and course design with representatives from CPCE and UG was particularly beneficial. The consultants encouraged the process of using OER by promoting discussions around interpretations of 'open' in lesson design, and stakeholders were encouraged to present derivatives of the lessons presented on the CD in order to facilitate deeper understandings of OER and the UNESCO ICT CFT competency being developed within the lesson. The consultants regard such approaches as empowering stakeholders to understand how OER works and to undertake similar steps in their own course design.

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. Whereas 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.

### Creating Development Strategies from Existing Frameworks

The UNESCO ICT CFT provides an excellent point of reference for the creation or refinement of course development strategies. However, it cannot be assumed that teacher education providers have the necessary skills to develop, adapt and implement courses aligned with the UNESCO ICT CFT. Thus, 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. Additionally, communication, advocacy, and a defined monitoring and evaluation strategy are important to support the process.

### Cost Benefits of Adopting OER

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. Nevertheless, a significant lesson learned during the Guyana Implementation is the cost benefit of adopting an open model. The overall cost of the development team is reflected in Table 1.

As noted above, the Technology Literacy module lasts approximately 70 hours, whilst the Knowledge Deepening module lasts approximately 90 hours. It took 76 days (or 608 hours) to produce 160 hours of learning (of which 80 are effectively text- or print-based and 80 are computer-based instruction). Table 2 compares Swift's (1996; cited in Butcher & Roberts, 2004) estimates of time to design one notional student hour of learning with the actual time taken to develop the Guyana materials.

However, as these are estimates for distance education course development and the Guyana courses are a blended learning design, it is possibly more useful to compare the costs with the notional estimates from Bryan Chapman (in Clark, 2010). The result is no less startling (See Table 3).

Table 1: Time and costs of developing the ICT Professional Development Strategy for Teachers in Guyana

Development team	Time (days)	Costs (US\$)
Educational consultant/ Instructional designer/ Graphic and Web designer/Editor	32	16,624
Instructional designer 2	17	6,684
Instructional designer 3	19	7,290
Graphic and Web designer	7	1,453
TOTAL	76	32,051

Table 2: Comparing Guyana design with Swift’s notional estimates

Media	Swift’s notional estimate of time required to produce material equivalent to one notional learning hour	Actual hours taken to develop one notional learning hour of material
Print	20–100 hours	3.8 hours
Computer-based instruction	200–300 hours	3.8 hours

Table 3: Comparing Guyana design with Chapman’s notional estimates

Media	Chapman’s notional estimate of time required to produce material equivalent to one notional learning hour	Actual hours taken to develop one notional learning hour of material
<b>Instructor-led training (ILT)</b> , including design, lesson plans, handouts, PowerPoint slides, etc.	34 hours	3.8 hours
<b>Standard eLearning</b> , including presentations, audio, some video, test questions, and 20% interactivity	22 hours	3.8 hours

These figures do not reveal an even greater cost saving, as the time reflected also includes the development of content based on international examples (i.e., not Guyana specific and containing more generic content). Thus, the outcomes of the project were eight versions of content:

- Guyana Pre-service Information Literacy module (print version and CD version)
- Guyana In-service Information Literacy module (print version and CD version)
- Guyana Pre-service Knowledge Deepening module (print version and CD version)
- Guyana In-service Knowledge Deepening module (print version and CD version)
- International Pre-service Information Literacy module (print version and CD version)
- International In-service Information Literacy module (print version and CD version)

- International Pre-service Knowledge Deepening module (print version and CD version)
- International In-service Knowledge Deepening module (print version and CD version)

As all of this content is being shared under an open licence, the potential for achieving economies of scale grows further as and where it is used by other institutions. Already, the material is being adapted for use in countries as diverse as Dominica and Indonesia, where it is being redeployed with marginal redevelopment time required to contextualise the materials effectively.

However, it is important to note that, in this case, a key contributor to cost reduction was that the leader of the team was multi-skilled and thus able to serve several functions. The education consultant in this instance served multiple roles: as an instructional designer,



graphic and Web designer, workshop facilitator, and general editor. Traditionally, such functions have tended to be spread across multiple people, raising costs. This kind of multitasking has been facilitated by the growing access to content development tools provided by ICT, but also suggests that effective economic use of OER for course design and development requires highly skilled designers.

## Conclusion

The Guyana ICT Professional Development Strategy for Teachers initiative has had many positive benefits. The creation of an ICT-friendly component for the teacher education curriculum in Guyana was achieved at a relatively low cost by using an existing curriculum framework (the UNESCO ICT CFT) and repurposing OER. Feedback from stakeholders indicated that the project went some way towards achieving the ICT vision articulated by the government by encouraging the next generation of teachers to improve ICT competencies by using ICT for educational purposes. It also encouraged teachers to adopt new teaching strategies, and has opened opportunities to consider the important role of adapting OER to promote learner centric learning in the future.

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.

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