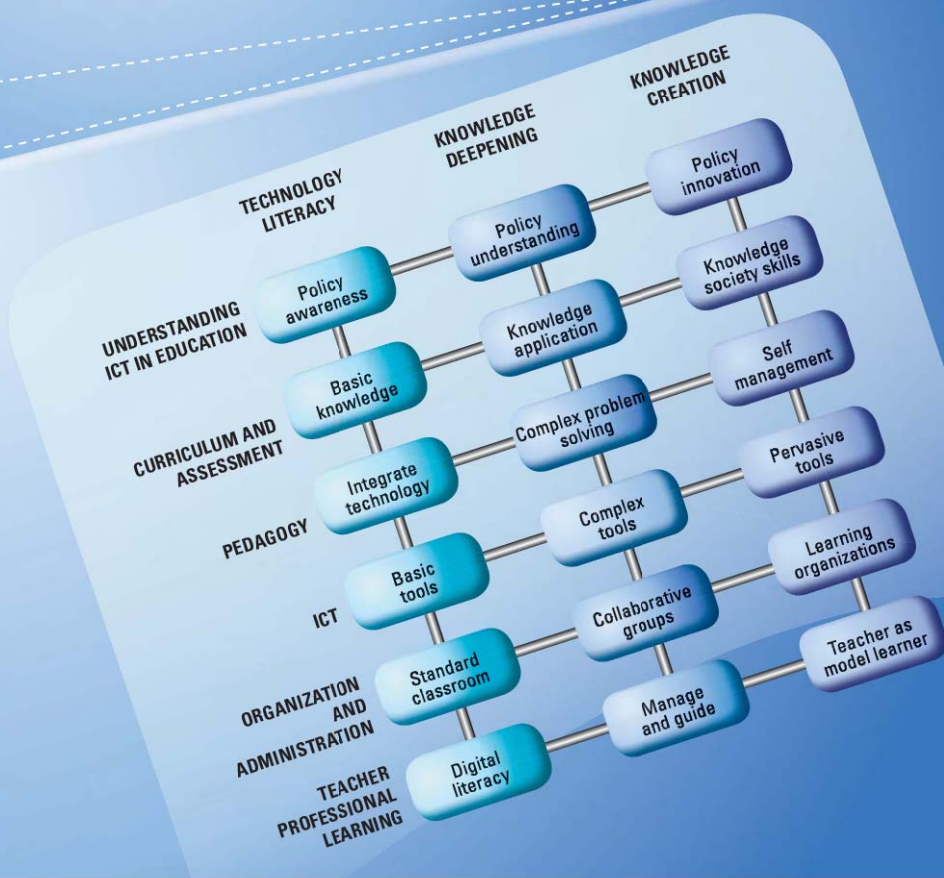




UNESCO ICT COMPETENCY FRAMEWORK FOR TEACHERS



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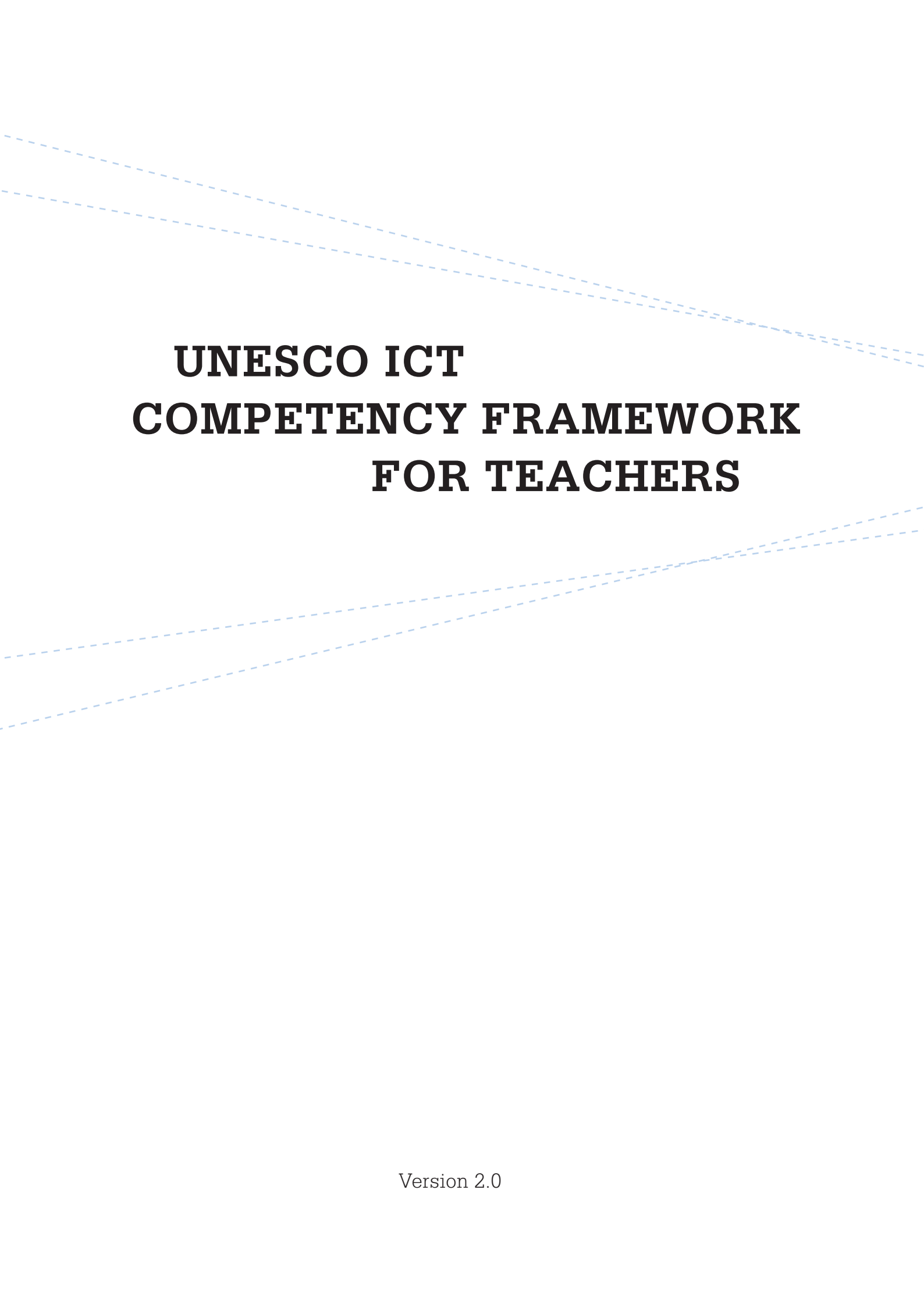
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UNESCO ICT COMPETENCY FRAMEWORK FOR TEACHERS

Version 2.0



CONTENTS

Foreword	1
Acknowledgements	2
Executive summary	3
1. Introduction	4
Using ICT effectively	4
The Framework project	4
2. The principles	6
The Policy context	6
Education reform	8
3. The modules	9
Technology literacy	9
Knowledge deepening	11
Knowledge creation	13
4. Implementation	16
Modular structure	16
Future improvements	16
Development paths	16
Appendix 1: UNESCO ICT Teacher Competency Framework modules	19
Technology literacy	20
Knowledge deepening	26
Knowledge creation	34
Appendix 2: Example syllabi and exam specifications	41
Technology literacy: An example of a syllabus	42
Technology literacy: Example syllabi and exam specifications	43
Knowledge deepening: An example of a syllabus	70
Knowledge deepening: Example syllabi and exam specifications	71
Glossary	90



FOREWORD

Two decades after the first mainstream rollout of computers in schools we have learned many significant lessons about ICT in Education and their potential transforming impact on national education systems. Yet, countries around the world face urgent challenges in this respect due to the rapid development of technologies, the required financial investments and the need to have a clear vision of the role that teachers have to play in harnessing the power of ICT in the classroom and beyond.

One key lesson is to acknowledge the many facets that ICT in Education policies have to tackle such as teacher competencies, learning materials, ICT equipment, student and teacher motivation, as well as the linkages to other areas of national policy and socio-economic development. Adopting a cross-sectoral approach through an ICT in Education Master Plan can help countries to successfully address all relevant dimensions.

In this context, the ICT Competency Framework for Teachers is aimed at helping countries to develop comprehensive national teacher ICT competency policies and standards, and should be seen as an important component of an overall ICT in Education Master Plan.

The current version of the ICT Competency Framework for Teachers is a 2011 update of the original version published in 2008, and is the result of the successful continued partnership between UNESCO and CISCO, INTEL, ISTE and Microsoft. In this version, the Framework has been enriched on the basis of feedback from subject matter experts and users worldwide, and enhanced with the inclusion of example syllabi and exam specifications for Technology Literacy and Knowledge Deepening. UNESCO and its partners aim to update this document on a regular basis, and we welcome feedback on the application of this ICT Competency Framework for Teachers at the email address: ICT-CFT@unesco.org.

We would like to acknowledge the multiple efforts by numerous staff members, partners and international experts which gave rise to this set of ICT Competencies for teachers. In particular, we would like to express appreciation to Ms. Martina Roth, Ms. Michelle Selinger, Mr. Tarek Shawki and Mr. Jim Wynn for initiating the idea behind the ICT-CFT. Evolution of the framework benefited from the expertise of Mr. Robert Kozma (Version 1) and Mr. Paul Hine (Version 2), together with expert inputs and reviews by many world-class educators and UNESCO staff members in the Education Sector as well as the Communication and Information Sector. We greatly appreciate the significant inputs by our partners in CISCO, Intel, ISTE and Microsoft towards making the ICT-CFT a reality.

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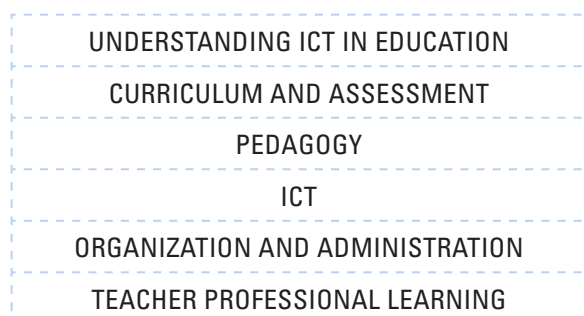
EXECUTIVE SUMMARY

Modern societies are increasingly based on information and knowledge. So they need to:

- build workforces which have ICT skills to handle information and are reflective, creative and adept at problem-solving in order to generate knowledge
- enable citizens to be knowledgeable and resourceful so they are able to manage their own lives effectively, and are able to lead full and satisfying lives
- encourage all citizens to participate fully in society and influence the decisions which affect their lives
- foster cross-cultural understanding and the peaceful resolution of conflict.

These social and economic goals are the focus of a country's education system. Teachers need to be equipped to achieve these goals, and UNESCO in partnership with industry leaders and global subject experts, has created an international benchmark which sets out the competencies required to teach effectively with ICT: UNESCO's ICT Competency Framework for Teachers.

UNESCO's Framework emphasizes that it is not enough for teachers to have ICT competencies and be able to teach them to their students. Teachers need to be able to help the students become collaborative, problem-solving, creative learners through using ICT so they will be effective citizens and members of the workforce. The Framework therefore addresses all aspects of a teacher's work:



The Framework is arranged in three different approaches to teaching (three successive stages of a teacher's development). The first is **Technology Literacy**, enabling students to use ICT in order to learn more efficiently. The second is **Knowledge Deepening**, enabling students to acquire in-depth knowledge of their school subjects and apply it to complex, real-world problems. The third is **Knowledge Creation**, enabling students, citizens and the workforce they become, to create the new knowledge required for more harmonious, fulfilling and prosperous societies.

THE UNESCO ICT COMPETENCY FRAMEWORK FOR TEACHERS			
	TECHNOLOGY LITERACY	KNOWLEDGE DEEPENING	KNOWLEDGE CREATION
UNDERSTANDING ICT IN EDUCATION	Policy awareness	Policy understanding	Policy innovation
CURRICULUM AND ASSESSMENT	Basic knowledge	Knowledge application	Knowledge society 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 LEARNING	Digital literacy	Manage and guide	Teacher as model learner

The details of each module are set out in Appendix 1. Examples of how these modules can be turned into syllabi and exam specifications are provided in Appendix 2.

The Framework is intended to inform educational policy makers, teacher-educators, providers of professional learning and working teachers on the role of ICT in educational reform.

1

INTRODUCTION

There is an emerging broad consensus worldwide about the benefits that can be brought to school education through the appropriate use of evolving information and communication technologies. The range of possible benefits covers practically all areas of activity in which knowledge and communication play a critical role: from improved teaching and learning processes to better student outcomes, from increased student engagement to seamless communication with parents, and from school networking and twinning to more efficient management and monitoring within the school. All in all, this is not surprising since the windows of opportunity that ICT offers for the development of knowledge economies and societies are open also for education.

Using ICT effectively

A number of issues may hinder schools and teachers in their efforts to fully benefit from these windows of opportunity. They may not be able to afford the equipment, they may lack access to the Internet, or suitable materials might not be available in their own language. However, a fundamental issue is whether teachers know how to use ICT effectively in their teaching.

Clearly, the way ICT is used will depend on the subject being taught, the learning objectives and the nature of the students. Nonetheless, it is important to set out the basic principles which should guide the use of ICT in teaching, and this is what the UNESCO ICT Competency Framework for Teachers (ICT-CFT) project does. The Framework project draws attention to the many ways in which ICT can transform education. ICT offers engaging and fast-evolving learning environments, blurs the boundaries between formal and informal education and prompts teachers to develop new ways of teaching and enabling students to learn. Ultimately, it requires education to re-think what skills and competencies students need to become active citizens and members of the workforce in a knowledge society.

The Framework project

In view of the importance of ICT for education, UNESCO, working closely with its partners, CISCO, Intel, ISTE and Microsoft, as well as world renowned subject matter experts, conducted an extensive consultation to identify the competencies that teachers should develop to use technology effectively in the classroom. This work resulted in the UNESCO ICT-Competency Framework for Teachers (ICT-CFT), which was first published in 2008 in three booklets, namely:

- **Policy Framework** which explained the rationale, structure and approach of the ICT-CFT project
- **Competency Framework Modules** which explained how three stages of educational development could be mapped against six aspects of a teacher's work to create a framework of 18 modules of teacher competencies
- **Implementation Guidelines** which provided detailed specifications for each module¹.

¹ These guidelines provided a framework in six skill sets: policy curriculum and assessment, pedagogy, the use of technology in the classroom, school organization and administration, and teacher professional learning. It is important to note that this document was intended to be a dynamically evolving set of guidelines which would be periodically updated to reflect evolving changes in ICT.

This Version 2 ICT-CFT reference document incorporates the above components which identify three approaches to teaching, namely “Technology Literacy”, “Knowledge Deepening”, and “Knowledge Creation”. Since 2009, UNESCO has been developing examples of syllabi and exam specifications, and these are now available for the first two approaches: Technology Literacy and Knowledge Deepening. They form appendices to this Framework reference document. A glossary of terms used in this document has also been added.

The Framework argues that teachers need to use teaching methods which are appropriate for evolving knowledge societies. Students need to be enabled not only to acquire an in-depth knowledge of their school subjects but also to understand how they themselves can generate new knowledge, using ICT as a tool. For some teachers, perhaps for many teachers, these will be novel and challenging ideas, and it will take time for teachers to understand these new approaches to teaching. It will also require strong leadership from the government, from those responsible for the education and professional learning of teachers, and from headteachers and school principals.

How to use this document

The module specifications and the examples of syllabi and exam specifications which form the detailed reference appendices of this document are intended to guide teachers in how to make the best use of the ICT available in their schools to improve students’ learning. These appendices can guide governments in shaping their education policies. They can serve as a reference source for providers of professional learning. For teacher-educators, these appendices can be used to develop full curricula for courses on ICT competencies. The appendices also provide the basis for qualifications certifying that a teacher had acquired the Framework competencies.

But above all this document should be read as an important statement by UNESCO on how teacher-education, particularly in developing countries, can increase the effectiveness of teachers and enable school students to become engaged and productive members of the knowledge society.

2

THE PRINCIPLES

The Policy context

UNESCO's education policies and projects

Education is a central function of any nation or community. UNESCO and the UN see education as having the following aims:

- inculcating the community's core values and passing on its cultural legacy
- supporting the personal development of children, young people and adults
- promoting democracy and increasing participation in society, particularly among women and minorities
- encouraging cross-cultural understanding and the peaceful resolution of conflict, improving health and well-being
- supporting economic development, reducing poverty and increasing widespread prosperity.

The ICT Competency Framework for Teachers project is part of a range of initiatives by the UN and its specialized agencies, including UNESCO, to promote educational reform and sustainable economic development. The Millennium Development Goals (MDG), Education for All (EFA), the UN Literacy Decade (UNLD), and the Decade of Education for Sustainable Development (DESD) all aim to reduce poverty and to improve health and the quality of life, and they view education as an important contribution to these goals.² They aim to promote the equality of women and men and advance the human rights of all citizens, particularly for minorities. These projects all view education as key to economic development, as a way of enabling people to fulfil their potential and take increasing control over decisions that affect them. They all see education as a right of all citizens. In addition, the EFA and DESD emphasize the quality of learning, both what is learnt and how it is learnt. UNLD and EFA focus on literacy as a key part of learning and education. EFA, DESD and UNLD emphasize the informal learning that takes place outside the school system, as well as learning in school. The UNESCO International Commission on Education for the 21st Century³ views learning throughout life and participation in the society of learning as the key to meeting the challenges posed by a rapidly changing world. The Commission emphasizes four pillars of learning: 'learning to live together', 'learning to know', 'learning to do', and 'learning to be'.

The Framework project: linking ICT, education and the economy

The ICT-CFT project embraces the goals of these education programmes and UNESCO's and the UN's aims of education. Like these programmes, the ICT-CFT emphasizes poverty reduction and improved quality of life. Like the EFA and DESD, it emphasizes improvements in the quality of education. It shares with several of the programmes a focus on literacy, and like the UNLD, it also argues for a broader definition of literacy. In keeping with the International Commission, it stresses life-long learning, new learning goals and participation in a learning society that is based on knowledge building and knowledge sharing.

However, the ICT-CFT project supports these programmes by building on the relationship between ICT use, education reform and economic growth. The ICT-CFT is based on the principle that systemic social and economic growth is the key to poverty reduction and increased prosperity. It is also based on the assumptions

² UNESCO. 2005. *Links between the Global Initiatives in Education*. Paris, UNESCO.

³ Delors, J., et al. 1999. *Learning: The Treasure Within*. Paris, UNESCO.

articulated in the UNESCO report *Education in and for the Information Society*⁴ that ICT can be a driver for growth and empowerment, with profound implications for improving education.

At the same time, the ICT-CFT project agrees with the International Commission that all-out economic growth is at odds with equity, respect for the human condition and wise management of the world's natural assets. Like the DESD, the ICT-CFT seeks to balance human well-being with sustainable economic development, and bring them into alignment through systemic education reform.

Three factors of economic growth

Traditional economic models associate growth in economic output with increases in input factors. A nation's companies purchase more equipment and employ more workers, which economists call capital accumulation. Early in its development, Singapore used this approach by providing inexpensive labour to assemble electronics components for multi-national companies. China is currently using this approach. However, as Singapore realized, this approach to growth is not sustainable; eventually, additional capital returns smaller and smaller gains in output.

Another way in which a nation's economic growth can occur is by increases in economic value generated by its citizens. 'New Growth' economic models emphasize the importance of new knowledge, innovation and the development of human capacity as the sources of sustainable economic growth. Education and human capacity development enable individuals to add value to the economy, contribute to the cultural legacy and participate in social discourse. Education enables them to improve the health of their family and the community and to conserve the natural environment. It is through access to high-quality education for all, regardless of gender, ethnicity, religion or language, that these personal contributions are multiplied and the benefits of growth can be equitably distributed and enjoyed.

Economists identify three factors that lead to growth which is based on increased human capacity:

- **capital deepening** - the ability of the workforce to use equipment that is more productive than earlier versions
- **higher quality labour** - a more knowledgeable workforce that is able to add value to economic output
- **technological innovation** - the ability of the workforce to create, distribute, share and use new knowledge.

Three approaches of the Framework

These three productivity factors serve as the basis for three complementary, somewhat overlapping, approaches that connect education policy with economic development.

- Increasing the extent to which new technology is used by students, citizens and the workforce by incorporating technology skills into the school curriculum — which might be termed the Technology Literacy approach.
- Increasing the ability of students, citizens, and the workforce to use knowledge to add value to society and the economy by applying it to solve complex, real-world problems — which could be called the Knowledge Deepening approach.
- Increasing the ability of students, citizens, and the workforce to innovate, produce new knowledge, and benefit from this new knowledge — the Knowledge Creation approach.

THE THREE APPROACHES OF THE FRAMEWORK

TECHNOLOGY LITERACY

KNOWLEDGE DEEPENING

KNOWLEDGE CREATION

⁴ Guttman, C. 2003. *Education in and for the Information Society*. Paris, UNESCO.

As pointed out in the UNESCO report, *Capacity Building of Teacher-Training Institutions in Sub-Saharan Africa*⁵ (TTISSA), UNESCO's aim is to bring teacher education into alignment with national development goals. These three approaches enable education to help develop a country's economy and society, from one which uses new technology, to one which also has a high-performance workforce, and finally to one which is a knowledge economy and information society. Through these approaches, a country's students, and ultimately its citizens

and workforce, acquire increasingly sophisticated skills needed to support economic, social, cultural and environmental development, as well as an improved standard of living.

THE SIX ASPECTS OF A TEACHER'S WORK

UNDERSTANDING ICT IN EDUCATION
CURRICULUM AND ASSESSMENT
PEDAGOGY
ICT
ORGANISATION AND ADMINISTRATION
TEACHER PROFESSIONAL LEARNING

The ICT-CFT focuses on teachers in primary and secondary schools. However, these approaches generally apply to all levels of education: primary, secondary, vocational and tertiary education, as well as to on-the-job learning and continuing education. They also have implications for different educational stakeholders: not just teachers but also students, principals, ICT co-ordinators, curriculum leaders, administrators, professional learning coaches and teacher-educators. Because the ICT-CFT is based on theories of economic growth, it may also inform policies and programmes in government ministries which deal with economic and social development.

Education reform

The use of new technologies in education implies new teacher roles, new pedagogies and new approaches to teacher education⁶. The successful integration of ICT into the classroom will depend on the ability of teachers to structure the learning environment in new ways, to merge new technology with a new pedagogy, to develop socially active classrooms, encouraging co-operative interaction, collaborative learning and group work. This requires a different set of classroom management skills. The teaching skills of the future will include the ability to develop innovative ways of using technology to enhance the learning environment, and to encourage technology literacy, knowledge deepening and knowledge creation. Teacher professional learning will be a crucial component of this educational improvement. However, professional learning has an impact only if it is focused on specific changes in teaching.

The Framework therefore specifies the competencies which teachers need in all aspects of their work.

⁵ UNESCO. 2005. *Capacity Building of Teacher-Training Institutions in Sub-Saharan Africa*. Paris, UNESCO.

⁶ Makrakis, V. 2005. Training teachers for new roles in the new era: experiences from the United Arab Emirates ICT programme. *Proceedings of the 3rd Pan-Hellenic Conference on Didactics of Informatics*. Korinthos, Greece.

3

THE MODULES

By crossing the three approaches to teaching based on human capacity development— technology literacy, knowledge deepening, and knowledge creation—with the six aspects of a teacher’s work— understanding ICT in education curriculum assesment, pedagogy, ICT, organization and administration and teacher professional learning—a framework of 18 modules is created.

THE FRAMEWORK

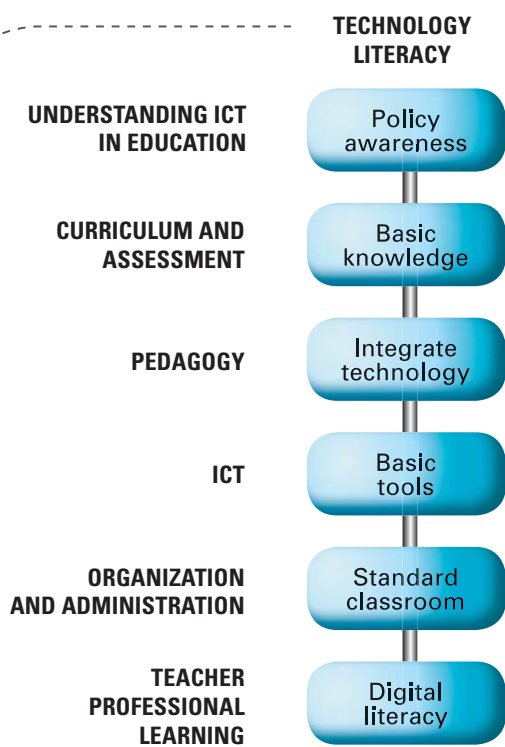
	TECHNOLOGY LITERACY	KNOWLEDGE DEEPENING	KNOWLEDGE CREATION
UNDERSTANDING ICT IN EDUCATION	1	1	1
CURRICULUM AND ASSESMENT	2	2	2
PEDAGOGY	3	3	3
ICT	4	4	4
ORGANIZATION AND ADMINISTRATION	5	5	5
TEACHER PROFESSIONAL LEARNING	6	6	6

The approaches represent different stages in the use of ICT in education. The approach which a country adopts will depend on the extent to which ICT is integrated into its society, economy and education system.

Technology literacy

The policy goal of the technology literacy approach is to enable learners, citizens and the workforce to use ICT to support social development and improve economic productivity. Related policy goals include increasing enrolments, making high-quality resources available to all, and improving literacy skills. Teachers should be aware of these goals and be able to identify the components of education reform programmes that correspond to these policy goals. Corresponding changes in the curriculum entailed by this approach might include improving basic literacy skills through technology and adding the development of ICT skills into relevant curriculum contexts.

This will involve setting aside time within the traditional curricula of other subjects for the incorporation of a range of relevant productivity tools and technology resources. Changes in pedagogical practice involve the use of various ICT tools and digital content as part of whole class, group and individual student activities. Changes in teacher practice involve knowing where and when (as well as when not) to use technology for classroom activities and presentations, for management



tasks, and for acquisition of additional subject matter and pedagogical knowledge in support of the teachers' own professional learning. Little change in social structure of the class occurs in this approach, other than perhaps the placement and integration of technology resources in the classroom or in labs to ensure equitable access. The technologies involved may include computers along with productivity software; drill and practice software, tutorials, and web content; and the use of networks for management purposes.

In the early stages of development, teacher competences related to the technology literacy approach include basic digital literacy skills and digital citizenship, along with the ability to select and use appropriate off-the-shelf educational tutorials, games, drill-and-practice software, and web content in computer laboratories or with limited classroom facilities to complement standard curriculum objectives, assessment approaches, unit plans, and didactic teaching methods. Teachers must also be able to use ICT to manage classroom data and support their own professional learning.

The example below shows what the technology literacy approach might look like in practice.

TECHNOLOGY LITERACY IN THE EVERYDAY WORK OF A TEACHER	
UNDERSTANDING ICT IN EDUCATION	A mother-tongue teacher understands the basic principles of using ICT in teaching, so he/she ⁷ considers how to make the best use of an interactive whiteboard recently installed in his/her ⁸ classroom. Until now, she has only used it as a projector screen.
CURRICULUM AND ASSESSMENT	The teacher realizes that using word processing on the interactive whiteboard would offer a new approach to one of the basic skills in the curriculum - how to improve the wording of sentences. Word processing allows words to be changed and moved around without having to endlessly re-write whole sentences on paper. Word processing can also be used for formative assessment. She composes a long, badly worded sentence which she will give all the students on their computers and ask them to see how many different improved versions they can produce within five minutes.
PEDAGOGY	Using the word processing application, the teacher displays on the interactive whiteboard some examples of poor writing. She demonstrates how, with a few changes in the choice of words and the word order, sentences can be made simpler and clearer. Then, by questioning the class, offering them suggestions and pointing out weaknesses in sentences, she gets them to improve some further examples of writing. She makes the changes on the interactive whiteboard as the students suggest them, so the whole class can see the process. Finally, she sits down to one side of the room and asks students to come to the interactive whiteboard and operate it themselves to show how they can improve sentences.
ICT	Initially, the teacher uses a word processing application on the interactive whiteboard while conducting a discussion with the class. In the next lesson, each student uses a laptop computer. Since the laptops and the teacher's computer are networked, the teacher can easily display on the interactive whiteboard interesting examples of re-worded sentences which the students have been able to devise in the five minute test. The whole class can then discuss and evaluate different wordings.
ORGANIZATION AND ADMINISTRATION	For the second lesson, the teacher uses the school's trolley of laptop computers so that each student is able to carry out word processing on their own. She devises the two lessons in such a way that students will know exactly what to do in the second lesson, without the need for questions or discussion. This ensures the students make the fullest use of the laptops while they are available to them. Using the school's computer network, the teacher records her students' grades on a central file which other teachers and the school administration can also access.
TEACHER PROFESSIONAL LEARNING	The teacher searches various websites for mother-tongue teachers to find teaching resources on writing skills, including exercises and writing assignments, stimulus material and ideas for lessons.

7 'he' and 'she' should be understood to be 'he/she' hereafter.

8 'his' and 'her' should be understood to be 'his/her' hereafter.

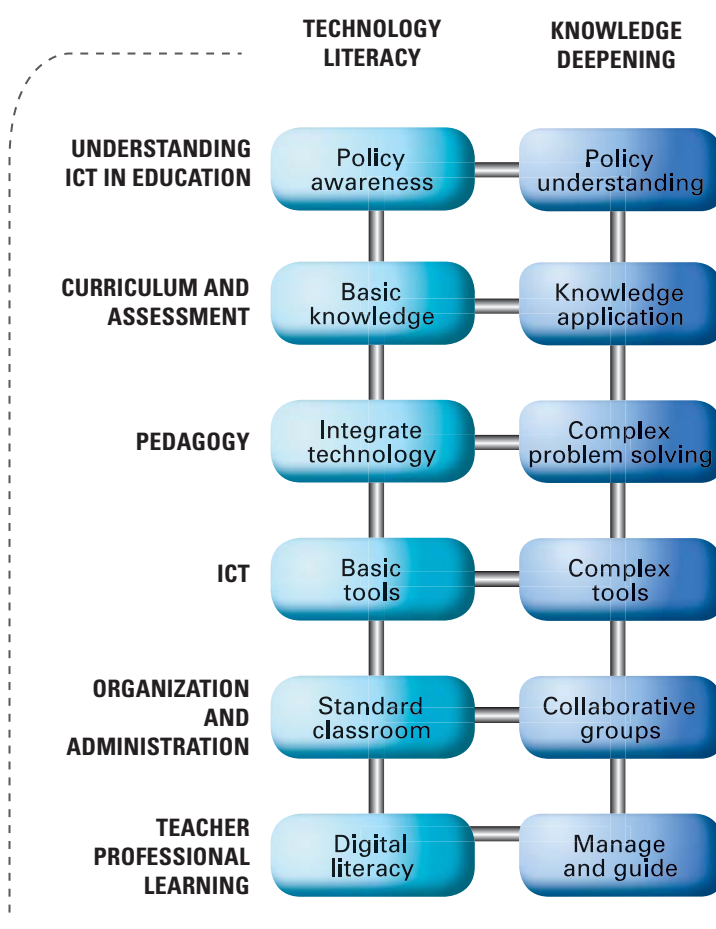
Knowledge deepening

The aim of the knowledge deepening approach is to increase the ability of students, citizens, and the workforce to add value to society and to the economy by applying the knowledge gained in school subjects to solve complex, high-priority problems encountered in real world situations of work, society and in life generally. Such problems might relate to the environment, food security, health, and conflict resolution. With this approach, teachers should understand policy goals and social priorities and be able to identify, design and use specific classroom activities that address these goals and priorities. This approach often requires changes in the curriculum that emphasize depth of understanding over coverage of content and assessments that emphasize the application of understanding to real-world problems. Assessment focuses on complex problem-solving and incorporating assessments into learning activities. The pedagogy associated with this approach includes collaborative problem- and project-based learning in which students explore a subject deeply and bring their knowledge to bear on complex, every-day questions, issues, and problems.

Teaching is student-centred and the teacher's role is to structure tasks, guide student understanding and to support students as they tackle collaborative projects. Teachers help students create, implement and monitor project plans and solutions. Lessons and classroom structure are more dynamic, with students working in groups for extended periods of time. In guiding students' understanding of key concepts, teachers will employ open-ended ICT tools that are specific to their subject area, such as visualizations in science, data analysis tools in mathematics and role play simulations in social studies.

Teacher competencies related to the knowledge deepening approach include the ability to manage information, structure problem tasks, and integrate open-ended software tools and subject-specific applications with student-centred teaching methods and collaborative projects in support of students' in-depth understanding of key concepts and their application to complex, real-world problems. To support collaborative projects, teachers should use networked and web-based resources to help students collaborate, access information, and communicate with external experts to analyze and solve their selected problems. Teachers should also be able to use ICT to create and monitor individual and group student project plans, as well as to access information and experts and collaborate with other teachers to support their own professional learning.

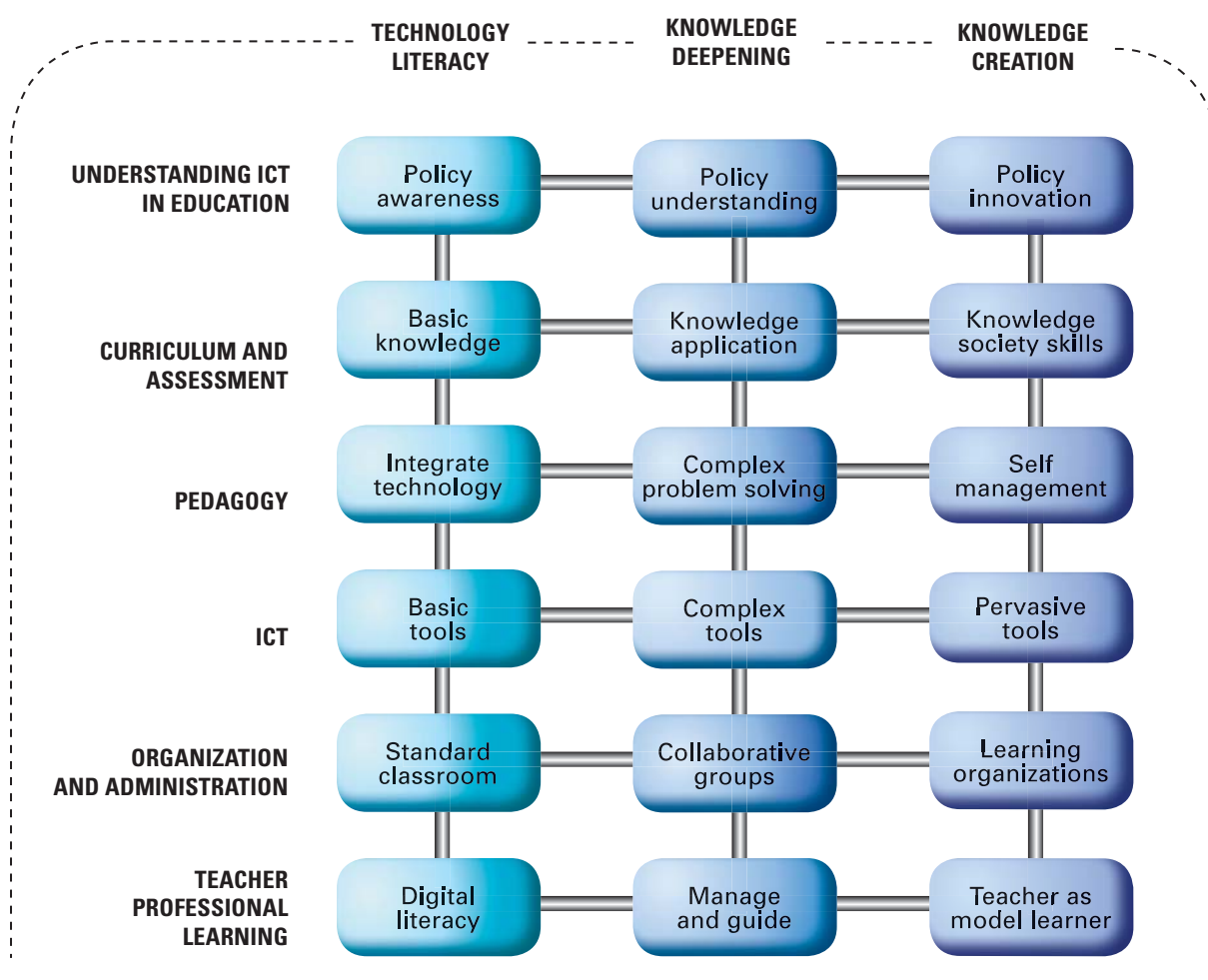
The following example shows what the Knowledge Deepening approach might look like in practice.



KNOWLEDGE DEEPENING IN THE EVERYDAY WORK OF A TEACHER	
UNDERSTANDING ICT IN EDUCATION	A PE (physical education) teacher is frustrated that many of his students are not interested in physical exercise and do not understand the importance of physical fitness as part of a healthy lifestyle. He thinks he can use ICT to change their attitudes and help them become fitter, so he writes a detailed financial bid to the school administration, explaining in detail why the ICT would improve the PE lessons and help students learn.
CURRICULUM AND ASSESSMENT	The PE teacher uses the ICT to focus on issues of health which he had not been able to make vivid and engaging before. Now he is also able to include in the curriculum information about human physiology. These topics had previously been too abstract and theoretical to explain easily, but now he is able to show them computer simulations (videos and animations) of the physiological processes which make them easy to understand. In these ways, the students achieve a deeper knowledge of PE. He is also able to carry out formative assessment much more efficiently because he can now record students' performance in the gym with a digital video camera. He shows these video recordings to the students to help them understand how to they need to move their limbs differently. Students who previously could not understand what they were doing wrong in certain motions can now see instantly what they need to do.
PEDAGOGY	Previously, he had only been able to talk to the students about the health benefits, which the students did not find very interesting, but now he is able to show them dramatic clips from films, sporting events and music and dance videos which feature athletic celebrities and make fitness look very attractive. He then organizes the students into collaborative groups so they can devise their own fitness assessments, such as seeing how quickly their heart rates return to normal after exercise. They analyse their assessments and each student comes up with recommendations for a fitness program for one of the others in the group. They set up a collaborative spreadsheet to track their progress over the next month. As they go through their fitness programmes, they comment and support each other on a social networking site.
ICT	The teacher obtains: ▪ a laptop computer and a data projector so that everyone in the class can see computer display ▪ video clips from the Internet ▪ PE and human physiology simulations and animations ▪ simple data capture devices such as heart-rate sensors which record data directly to the computer ▪ spreadsheet software for students to record their fitness assessments each week ▪ a digital video camera to record students' movements and use of the fitness equipment in the gym. The students also use other computers at school and at home to access the shared spreadsheet and the social networking site. Some students use their mobile phones to post their daily fitness programme achievements on the networking site.
ORGANIZATION AND ADMINISTRATION	The PE teacher only has his own laptop and a data projector in the gym for showing video material, but by getting the students to help with the videoing in the gym and by playing back the video clips on both the camera screen and the computer screen he is able to arrange PE activities in such a way that all the students are able to see a video clip of themselves in the gym at least once in each lesson or to record the results of their weekly fitness assessment. The teacher uses his laptop to monitor the students' entries on their collaborative spreadsheet, and to post on the social networking site encouraging comments and extra information on fitness programmes.
TEACHER PROFESSIONAL LEARNING	The teacher regularly visits an Internet discussion forum hosted by the professional association for PE teachers. The forum is a useful source of new ideas on how to get students more interested in PE and exercise. He, for example, posts a question asking for technical advice on an aspect of a new fitness programme the students want to try out.

Knowledge creation

The aim of the knowledge creation approach is to increase productivity by creating students, citizens, and a workforce that is continually engaged in, and benefits from, knowledge creation, innovation and life-long learning. Teachers, in this approach, should not only be able to design classroom activities that advance these policy goals but also participate in the development of programmes within their school that advance these goals. With this approach the curriculum goes beyond a focus on knowledge of school subjects to explicitly include the knowledge society skills that are needed to create new knowledge. These are skills such as problem solving, communication, collaboration, experimentation, critical thinking and creative expression. These skills become curricular goals in themselves and the objects of new assessment methods. Perhaps the most significant aim is for students to be able to create their own learning goals and plans—to establish what they already know, assess their strengths and weaknesses, design a learning plan, stay on-task, track their own progress, build on successes and adjust to failures. These are skills that can be used throughout a lifetime to participate in a learning society. The role for teachers is to overtly model these processes, structure situations in which students apply these skills, and assist students in their skill acquisition. Teachers build a learning community in the classroom in which students are continuously engaged in developing their own and each others' learning skills. Indeed, schools are transformed into learning organizations in which all its members are involved in learning. Teachers can then be seen as model learners and knowledge producers who are constantly engaged in educational experimentation and innovation in collaboration with their colleagues and outside experts to produce new knowledge about learning and teaching practice. A variety of networked devices, digital resources, and electronic environments are used to create and support this community in its production of knowledge and anytime, anywhere collaborative learning.



Teachers who are competent in the knowledge creation approach will be able to design ICT-based learning resources and environments; use ICT to support the development of knowledge creation and the critical thinking skills of students; support students' continuous, reflective learning; and create knowledge communities for students and colleagues. They will also be able to play a leading role with colleagues in creating and implementing a vision of their school as a community based on innovation and continuous learning, enriched by ICT.

The example below shows what the Knowledge Creation approach might look like in practice.

KNOWLEDGE CREATION IN THE EVERYDAY WORK OF A TEACHER	
UNDERSTANDING ICT IN EDUCATION	A geography teacher takes a leading role in organising an ICT-based project for students in collaboration with the history teacher and the maths teacher. The project is about the recent arrival in the local community of numerous immigrants from a nearby country which is experiencing political and economic turmoil. The project involves investigating the reasons for the immigration, and understanding the everyday conditions and issues which the immigrants face.
CURRICULUM AND ASSESSMENT	The project addresses parts of the curriculum in three subjects: in geography (understanding growth and change in communities), history (the recent history of their own country and its relations with nearby countries) and maths (the use of graphs and charts to analyze and display complex statistical information). The students suggest further aspects that could be considered, for example the impact of the recent immigration on the local community. The students, reflecting on the aims and purposes of the project, devise assessment rubrics which they will use throughout the project to assess their own and each other's work, in collaboration with their teachers. Students create knowledge in at least three ways. ▪ They create new historical and geographical knowledge about this local instance of immigration (for example, the facts, figures, interviews, life-stories and other findings and conclusions which would be of value to a local history museum). ▪ They discover that the immigrants have great difficulty in obtaining some of their traditional foods. This commercial knowledge of a new market demand is passed to local shopkeepers. ▪ The students discover that much local prejudice towards the immigrants is founded on myths and misinformation. For example an immigrant school cleaner who was assumed to be from a poorly educated background is in fact a civil engineer. Local knowledge and understanding is thereby increased, and the potential for conflict between the communities is reduced.
PEDAGOGY	The teachers act as monitors and coaches to the students, ensuring the students have the skills and knowledge they need, advising them of methods they could use, ensuring the students stay focused on their tasks and meet the deadlines they have agreed.
ICT	The students use: ▪ the Internet to obtain detailed background information about the conditions in their country, including email contact with students at a school in the immigrants' country. ▪ spreadsheet programs to analyze and display statistics about emigration and immigration flows, and related economic conditions. ▪ graphics applications to create posters put up in local centres asking for volunteers from the immigrant community to be interviewed for the project. ▪ digital cameras and audio recorders to make video or audio recordings of interviews with immigrants about their personal histories and their experiences in the host country. ▪ word-processing software to make notes, write up their findings and evaluate their work. ▪ presentation software to create presentations, including video clips and still images, to present their findings to others.

KNOWLEDGE CREATION IN THE EVERYDAY WORK OF A TEACHER

ORGANIZATION AND ADMINISTRATION	The teacher creates environments on the school's learning management system (the school's computer network) which allow students to store, share and develop their work collaboratively. This includes areas for shared files, wikis and a discussion forum.
TEACHER PROFESSIONAL LEARNING	The geography teacher regularly shows other teachers how the project uses ICT to enable students to generate knowledge while studying their school subjects. She also explains to colleagues how the project, and her own role in it, has developed and improved in the light of experience and experimentation. In this way, she acts as a model learner to both her students and her colleagues.

4

IMPLEMENTATION

Countries wanting to use the UNESCO Framework may wish to start by conducting a baseline study of the current ICT competency levels of teachers, for example through an examination or questionnaire based on the examples of syllabi and exam specifications provided in Appendix 2. Such a study would help to indicate which of the three ICT-CFT approaches would be the most relevant and would identify priorities for providers of teacher education and professional learning.

Modular structure

The ICT-CFT is meant to be used in a modular fashion. Teacher-education institutions and providers of professional learning do not need to address all the modules and competencies in any particular course or learning activity. Rather, they can design offerings that address only certain modules but are nonetheless consistent with the overall goals and rationale of the Framework. This means that courses and professional learning activities should not consist of a small number of disconnected competencies. There should be a clear rationale for the modules selected. The selection might be based on a rationale of breadth, in which all of the modules for one approach are addressed. A rationale of depth could select the same module, for example Pedagogy, in each of the three approaches. A role rationale could select those modules which were particularly relevant for certain roles, such as technology coordinators, curriculum coordinators, or principals. Other types of rationale and patterns are also possible.

Future improvements

While the current set of competencies is meant to be comprehensive, the ICT-CFT is intended to be an evolving framework. It will be periodically reviewed as ICT evolves and as new knowledge develops about educational processes and structures. Professional learning providers and teacher-educators are encouraged to offer suggestions to UNESCO on how the content, structure and review process of the Framework might develop.

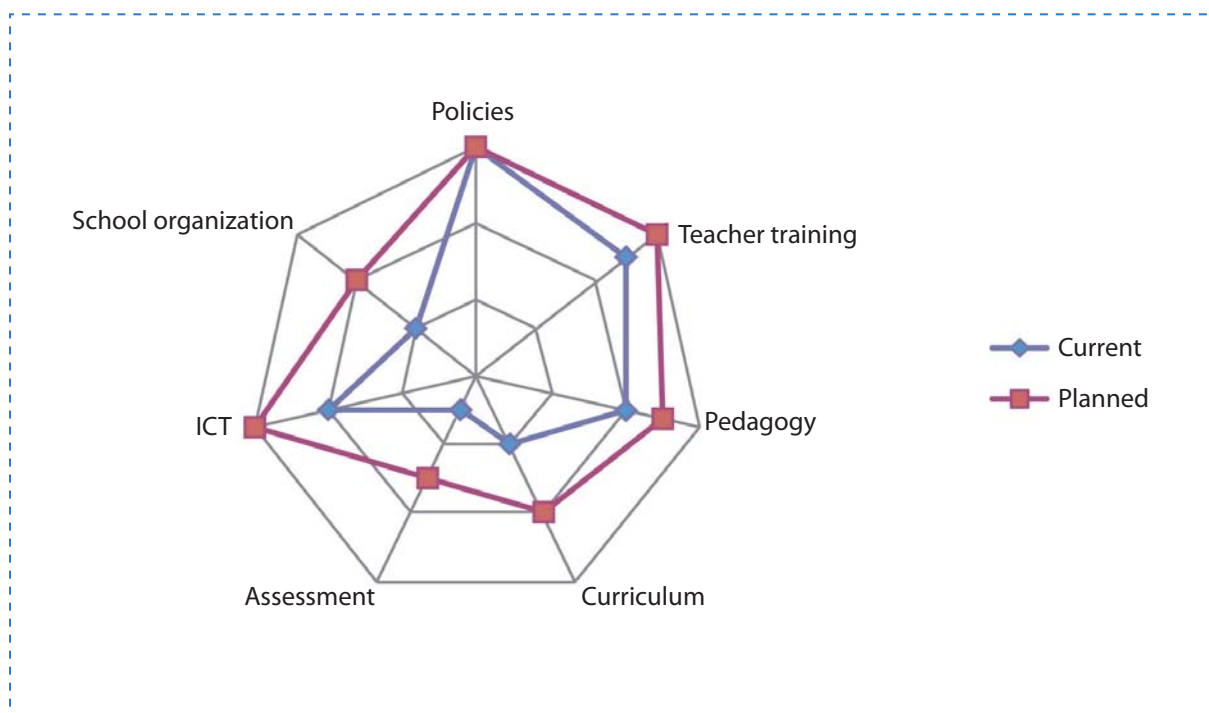
Development paths

The TTISSA report⁹ points out that teacher education programmes are often out of phase with development goals. The intent of the ICT-CFT is to provide education policymakers with policy objectives in the form of new approaches to teaching. These policy objectives can be used to reform teacher-education and professional learning to advance economic and social development.

9 See p. 8

However, countries differ in their social and economic situations and their development goals. Advanced economies are in distinctly different positions from middle-income countries, and even more so from low-income countries. Yet the aim of the ICT-CFT is to provide a common education improvement framework applicable to multiple situations and multiple development paths.

Accordingly, the Framework suggests three different competency-based approaches. Countries with different growth strategies will find different parts of the framework useful. Countries with dissimilar social and economic conditions may share similar goals but take different paths to achieve these goals. For example, many advanced countries aim to become knowledge societies through competency and productivity based on knowledge creation, while middle- and low-income countries may not have all the requisite economic components in place for such a policy. Consequently, a country may need to identify a long-term route by which it moves from one approach to another in pursuit of more advanced economic and social goals. The Framework facilitates such a strategy. Countries may also differ considerably in terms of their educational infrastructure, the quality of their teachers, the substance of their curriculum, and their assessment approach. The key to moving toward knowledge creation is to use current strengths as a lever to push forward other components of the system. Technological infrastructure may be a strength in one country while in another there may already be efforts in place to change pedagogical practices. The framework can be used to identify complementary competencies that can build on initial strengths and reform efforts to improve other components in the system so as to maximize the impact that educational change will have on economic and social development. In this way, the framework can be used to localize or tailor a teacher competency programme to a particular country, its policies, and its current educational conditions, as illustrated in the diagram below. In this example, a country may use current strengths in teacher education and pedagogy to advance curriculum, assessment and school organization.



APPENDIX 1

UNESCO ICT TEACHER COMPETENCY FRAMEWORK MODULES

Technology Literacy

The policy goal of this approach is to enable learners, citizens and the workforce to use ICT to support social development and improve economic productivity. Related educational goals include increasing school enrolments, making high-quality resources available to all, and improving basic literacy skills, including technology literacy.

	CURRICULAR GOALS	TEACHER COMPETENCIES
MODULE 1 UNDERSTANDING ICT IN EDUCATION	Policy Awareness With this approach, programmes make direct connections between policy and classroom practices.	Teachers must be aware of policies and be able to articulate in consciously skilled ways how their classroom practices correspond to and support policy.
MODULE 2 CURRICULUM AND ASSESSMENT	Basic Knowledge Changes in the curriculum entailed by this approach often include improving basic literacy skills through technology and adding the development of ICT skills in different contexts, which will involve incorporating in other subjects a range of relevant ICT resources and productivity tools.	Teachers must have an excellent knowledge of the curriculum standards for their subject, as well as knowledge of standard assessment strategies. In addition, teachers must be able to integrate the use of technology into the curriculum.
MODULE 3 PEDAGOGY	Integrate Technology Changes in pedagogical practice involve the integration of various technologies, tools, and digital content as part of whole class, group, and individual student activities to support didactic instruction.	Teachers must know where, with whom, when (as well as when not) and how to use ICT for classroom activities and presentations.

OBJECTIVES TEACHERS SHOULD BE ABLE TO	EXAMPLE METHODS (FOR TEACHER EDUCATION OR PROFESSIONAL LEARNING)
TL.1.a. Identify key characteristics of classroom practices and specify how these characteristics serve to implement policies.	Engage participants in a discussion of both national policies and common classroom practices. Identify the characteristics of practices that support policy. Have participants identify and analyze their own classroom practices in terms of policy.
TL.2.a. Match specific curriculum standards to particular software packages and computer applications and describe how these standards are supported by these applications.	Select a range of software packages in a specific subject area; have participants identify specific curriculum standards that are associated with these packages and discuss how these are supported by the applications.
TL.3.a. Describe how didactic teaching and ICT can be used to support students' acquisition of school subject matter knowledge.	Describe how the use of ICT and specific types of software can support students' acquisition of school subject matter knowledge and demonstrate ways in which the use of this technology can supplement didactic classroom teaching (i.e., lecture and demonstration teaching).
TL.3.b. Incorporate appropriate ICT activities into lesson plans so as to support students' acquisition of school subject matter knowledge.	Have participants design lesson plans that incorporate tutorial and drill and practices software, and digital resources. Have participants share these plans and receive recommendations from peers.
TL.3.c. Use presentation software and digital resources to support instruction.	Demonstrate the use of presentation software and other digital media to supplement a lecture; provide a variety of examples of instructional presentations; have participants create a lesson plan that includes the use of presentation software; have participants use presentation software to design a presentation.

Technology Literacy

	CURRICULAR GOALS	TEACHER COMPETENCIES
MODULE 4 ICT	Basic Tools The technologies involved in this approach include the use of computers along with productivity software; drill and practice software, tutorials, and web content; and the use of networks for management purposes	Teachers must know basic hardware and software operations, as well as productivity applications software, a web browser, communications software, presentation software, and management applications.

Technology Literacy

OBJECTIVES TEACHERS SHOULD BE ABLE TO	EXAMPLE METHODS (FOR TEACHER EDUCATION OR PROFESSIONAL LEARNING)
TL.4.a. Describe and demonstrate the use of common hardware.	Discuss and demonstrate the basic operation of various types of hardware, such as desktop computers, laptops, printers, scanners and hand-held devices.
TL.4.b. Describe and demonstrate the basic tasks and uses of word processors, such as text entry, editing text, formatting text and printing.	Discuss and demonstrate the basic tasks of word processors, demonstrate how they are used in instruction. Have participants create a text document in which they carry out these basic word processing tasks to generate a text document.
TL.4.c. Describe and demonstrate the purpose and basic features of presentation software and other digital resources.	Discuss the purpose of presentation software and demonstrate its general features and functions. Have participants create a presentation on a topic of their choice using digital resources.
TL.4.d. Describe the purpose and basic function of graphics software and use a graphics software package to create a simple graphic display.	Discuss the purpose of graphics software and demonstrate the creation of a graphics display. Have participants create and share a graphic display.
TL.4.e. 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.	Discuss the purpose and structure of the Internet and the World Wide Web and participants' experiences of them. Demonstrate the use of a browser; have participants use a browser to access popular websites.
TL.4.f. Use a search engine.	Demonstrate the use of a search engine; discuss and demonstrate simple keyword searches; have participants search for websites on their favourite topics and discuss the keyword strategies they used with the group for discussion.
TL.4.g. Create an email account and use it for a sustained series of email correspondence.	Demonstrate the creation and use of an email account; have participants create an email account and create and send a series of email messages.
TL.4.h. Describe the function and purpose of tutorial and drill and practice software and how it supports students' acquisition of knowledge of school subjects.	Demonstrate a variety of tutorial and drill and practice packages in the subjects which the participants teach and describe how such packages support the acquisition of subject matter knowledge. Have participants analyze specific packages in their subject area and describe how they support the acquisition of specific subject matter knowledge.
TL.4.i. Locate off-the-shelf educational software packages and web resources, evaluate them for their accuracy and alignment with curriculum standards, and match them to the needs of specific students.	Have participants search websites and catalogues to identify appropriate software for specified learning objectives or standards and analyze these packages for accuracy and curriculum alignment. Have participants discuss the criteria they used for analyzing and evaluating the software.

Technology Literacy

	CURRICULAR GOALS	TEACHER COMPETENCIES
MODULE 4 ICT continued...		
MODULE 5 ORGANIZATION AND ADMINISTRATION	Standard Classroom Little change in social structure of the class occurs in this approach other than, perhaps, the spatial placement and integration into the lesson of technology resources in the classroom or in labs.	Teachers must be able to use technology with the whole class, small groups, and individual activities and ensure equitable access is provided to all students.
MODULE 6 TEACHER PROFESSIONAL LEARNING	Digital Literacy The implications of this approach for teacher education focus on the development of digital literacy and the use of ICT for professional improvement.	Teachers must have the technological skill and knowledge of web resources necessary to use technology to acquire additional subject matter and pedagogical knowledge in support of their own professional learning.

Technology Literacy

OBJECTIVES TEACHERS SHOULD BE ABLE TO	EXAMPLE METHODS (FOR TEACHER EDUCATION OR PROFESSIONAL LEARNING)
TL.4.j. Use networked record keeping software to take attendance, submit grades, and maintain student records.	Discuss the purposes and advantages of a networked recording keeping system, demonstrate the use of such a system, and have participants enter record keeping data for their class.
TL.4.k. Use common communication and collaboration technologies, such as text messaging, video conferencing, and web-based collaboration and social environments.	Discuss the purposes and advantages of various communication and collaboration technologies; and have participants use these technologies to communicate and collaborate with others in the group.
TL.5.a. Integrate the use of a computer laboratory into ongoing teaching activities.	Discuss and give examples of different ways that computer laboratories (or a set of classroom laptops) can be used to supplement classroom teaching; have participants create lesson plans that include the use of computer laboratory activities
TL.5.b. Manage the use of supplemental ICT resources with individuals and small groups of students in the regular classroom so as not to disrupt other instructional activities in the class.	Discuss and give examples of different ways that limited classroom ICT resources can be use by individual students, pairs, or small groups to supplement teaching; have participants create lesson plans that include the use of ICT to supplement classroom teaching.
TL.5.c. Identify the appropriate and inappropriate social arrangements for using various technologies.	Identify different hardware and software technologies and discuss corresponding social arrangements appropriate for their instructional use, such individuals, pairs, small groups, and large groups.
TL.6.a. Use ICT resources to enhance their productivity.	Discuss different tasks that occupy participants' time during the work day; discuss how ICT resources can be used to help with these tasks and enhance productivity; have participants use desktop computers, laptops, hand-held devices, and software, such as a word processor, blogs, wikis, or other productivity and communication tools to help with one of the identified tasks.
TL.6.b. Use ICT resources to support their own acquisition of subject matter and pedagogical knowledge.	Discuss different ICT resources that participants can use to increase their subject matter and pedagogical knowledge; have participants identify a personal professional learning goal and create a plan for the use of various ICT tools to accomplish this goal, such as web browsers and communication technologies.
TL.6.c. Identify and manage Internet safety issues.	Discuss cyber bullying; appropriate information to post; predators; communication forums; privacy and piracy issues; viruses; scams; spam; cookies; pop-ups; intellectual property rights, copyright, inappropriate content; digital citizenship; email etiquette; ethics; legal requirements; confidentiality of personal data; password issues. Have participants develop appropriate strategies and procedures to deal with these issues.

Knowledge Deepening

The policy goal of this approach is to increase the ability of the workforce to add value to economic output by applying the knowledge of school subjects to solve complex problems encountered in real world situations at work and in life generally.

	CURRICULAR GOALS	TEACHER COMPETENCIES
MODULE 1 UNDERSTANDING ICT IN EDUCATION	Policy Understanding. This approach often requires teachers to understand policies so they can design lesson plans to implement national policies and address high-priority problems.	Teachers must have an in-depth knowledge of national policies and social priorities, and be able to design, modify, and implement classroom practices that support these policies.
MODULE 2 CURRICULUM AND ASSESSMENT	Knowledge Application. This approach often requires changes in the curriculum that emphasize depth of understanding over coverage of content, and assessments that emphasize the application of understanding to real-world problems and social priorities. Assessment change focuses on complex problem-solving and embeds assessments into the ongoing activities of the class.	Teachers must have a deep knowledge of their subject and the ability to apply it flexibly in a variety of situations. They must also be able to create complex problems whose solutions measure students' understanding.
MODULE 3 PEDAGOGY	Complex Problem Solving. Classroom pedagogy associated with this approach includes collaborative problem- and project-based learning in which students explore a subject deeply and bring their knowledge to bear on complex, every-day questions, issues, and problems.	Teaching is student-centred in this approach and the teacher's role is to provide direct instruction in consciously skilled ways and to structure problem tasks, guide student understanding, and support student collaborative projects. In this role teachers must have the skills to help students create, implement, and monitor project plans and solutions. In addition teachers need to use assessment for learning as a basic principle guiding their practice.

OBJECTIVES TEACHERS SHOULD BE ABLE TO	EXAMPLE METHODS (FOR TEACHER EDUCATION OR PROFESSIONAL LEARNING)
KD.1.a. Explain and analyze the principles of using ICT in education. Describe how these principles can be put into practice in their own teaching. Analyse what issues arise in implementing these principles and how those issues can be addressed.	Consider what issues arise in implementing the ICT CFT principles in a school. Identify opportunities for implementation and potential obstacles. Analyze the advantages and disadvantages of different approaches to implementing ICT policy objectives.
KD.2.a. Identify key concepts and processes in the subject area, describe the function and purpose of subject-specific tools and how they support students' understanding of these key concepts and processes and their application to the world outside the classroom.	Demonstrate a variety of software packages in the subject area (such visualizations in science, data analysis packages in mathematics, role-play simulations in social studies, and references resources in language). Engage with an expert online, visit an online museum, or run a web based simulation, and describe how these support student understanding of key concepts in the subject and their application to solve complex problems. Have participants analyze specific packages in their subject area and describe how they support concepts and complex problem solving in a learner-centred environment.
KD.2.b. Develop and apply knowledge- and performance-based rubrics that allow teachers to assess students' understanding of key subject matter concepts, skills, and processes.	Discuss characteristics of student responses and products of different levels of quality. Develop rubrics that convey these characteristics and examine examples of such assessment rubrics. Have participants generate and apply rubrics to sample products, such as student reports of results of a chemistry experiment.
KD.3.a. Describe how collaborative, project-based learning and ICT can support student thinking and social interaction, as students come to understand key concepts, processes, and skills in the subject matter and use them to solve real-world problems.	Describe how the use of ICT and specific types of software can support students' understanding and application of subject matter knowledge and ways in which the use of this technology can support project-based learning. Generate and discuss different examples, such as: ▪ student teams' becoming marine biologists or oceanographers using the web and applying concepts to identify ways of protecting ecological systems ▪ student teams in social studies using presentation software and applying concepts of government to advocate a position with the local council Include collaboration via online dialogues or real time communication with experts.

Knowledge Deepening

	CURRICULAR GOALS	TEACHER COMPETENCIES
MODULE 3 PEDAGOGY continued...		
MODULE 4 ICT	Complex Tools. To understand key concepts, students employ open-ended technology tools that are specific to their subject area, such as visualizations in science, data analysis tools in mathematics or role play simulations in social studies.	Teachers must be knowledgeable about a variety of subject-specific tools and applications and be able to flexibly use these in a variety of problem-based and project-based situations. Teachers should be able to use network resources to help students collaborate, access information and communicate with external experts in order to analyze and solve their selected problems. Teachers should also be able to use ICT to create and monitor individual and group student project plans.

Knowledge Deepening

OBJECTIVES TEACHERS SHOULD BE ABLE TO	EXAMPLE METHODS (FOR TEACHER EDUCATION OR PROFESSIONAL LEARNING)
KD.3.b. Identify or design complex, real-world problems and structure them in a way that incorporates key subject matter concepts and serves as the basis for student projects.	Discuss characteristics of authentic world problems that incorporate key concepts; examine examples of such problems; have participants generate examples, such as the need to improve crop productivity or to market a product.
KD.3.c. Design online materials that support students' deep understanding of key concepts and their application to real world problems.	Analyze online materials to identify key features of the materials that support deep understanding. Have participants work in groups to design an online unit that supports the understanding of key concepts and the development of related skills in the subject area.
KD.3.d. Design unit plans and classroom activities so that students engage in reasoning with, talking about, and using key subject matter concepts while they collaborate to understand, represent, and solve complex real-world problems, as well as to reflect on and communicate solutions.	Discuss characteristics of activities that engage students in project-based learning; examine examples of such activities; have participants generate units and activities in their subject areas, such as the use of physics concepts to strengthen homes against earthquakes or the use of fractions to create an equitable distribution of resources.
KD.3.e. Structure unit plans and classroom activities so that open-ended tools and subject-specific applications will support students in their reasoning with, talking about, and use of key subject matter concepts and processes while they collaborate to solve complex problems.	Discuss characteristics of activities that employ open-ended digital tools and applications to engage students in project-based learning; examine examples of such activities, tools and applications; have participants generate and demonstrate units in their subject area, such as the use of a computer simulation and social studies concepts to understand the factors and dynamics involved in the expansion of a settlement or the use of a graphics package to illustrate ideas expressed in a poem.
KD.3.f. Implement collaborative, project-based unit plans and classroom activities, while providing guidance to students towards the successful completion of their projects and attainment of deep understanding of key concepts.	Discuss the role of teachers and the strategies they use during the implementation of collaborative, project-based units. Have participants demonstrate the use of strategies and digital resources to support the implementation of their units.
KD.4.a. Operate various open-ended software packages appropriate to their subject matter area, such as visualization, data analysis, role-play simulations, and online references.	Demonstrate the use of a variety of software packages in a subject domain; have participants explore and demonstrate these packages.

Knowledge Deepening

	CURRICULAR GOALS	TEACHER COMPETENCIES
MODULE 4 ICT continued...		
MODULE 5 ORGANIZATION AND ADMINISTRATION	Collaborative Groups Class periods and classroom structure are more dynamic, with students working in groups for extended periods of time.	Teachers must be able to create flexible classroom learning environments. Within these environments, teachers must be able to integrate student-centred activities and flexibly apply technology to support collaboration.

Knowledge Deepening

OBJECTIVES TEACHERS SHOULD BE ABLE TO	EXAMPLE METHODS (FOR TEACHER EDUCATION OR PROFESSIONAL LEARNING)
KD.4.b. Evaluate the accuracy and usefulness of web resources in support of project-based learning in a subject area.	Have participants search websites and catalogues to identify appropriate software for project-based learning in their subject field. Have participants develop evaluation criteria and rubrics and justify their selections based on effectiveness for the intended purpose.
KD.4.c. Use an authoring environment or tools to design online materials.	Demonstrate the use of an authoring environment or tools. Have participants work in groups to design an online unit of a course of study.
KD.4.d. Use a network and appropriate software to manage, monitor, and assess progress of various student projects.	Demonstrate the use of networked project software that allows the teacher to manage, monitor, and assess student project work; have participants enter project data for their students' work.
KD.4.e. Use ICT to communicate and collaborate with students, peers, parents and the larger community in order to nurture student learning	Discuss the use of online communication and collaboration environments by teachers to support student learning; have participants keep a log, share printouts, and demonstrate examples of their online interactions, in this regard.
KD.4.f. Use the network to support student collaboration within and beyond the classroom.	Discuss the use of online communication and collaboration environments by students to support their collaborative project work and learning; have participants keep a log, share printouts, and demonstrate examples of student online interactions.
KD.4.g. Use search engines, online databases, and email to find people and resources for collaborative projects.	Discuss the use of search engines, online databases, and email to find people and resources for collaborative projects; have participants conduct searches related to a project for their course; engage in an online collaborative project; have participants reflect on their experiences, share them with others and discuss them.
KD.5.a. Place and organize computers and other digital resources within the classroom so as to support and reinforce learning activities and social interactions.	Examine and discuss different classroom arrangements of computers and other digital resources in terms of the ways these configurations support or inhibit student participation and interaction; have participants design arrangements of classroom resources and discuss the rationale for their designs.
KD.5.b. Manage student project-based learning activities in a technology-enhanced environment.	Discuss ways to manage student technology-based classroom activities during project work; have participants discuss their unit plans in terms of classroom management with a focus on the advantages and disadvantages of various configurations.

Knowledge Deepening

	CURRICULAR GOALS	TEACHER COMPETENCIES
MODULE 6 TEACHER PROFESSIONAL LEARNING	Manage and Guide. The implications of this approach for teacher professional learning focus on the use of ICT to guide students through complex problems and manage dynamic learning environments.	Teachers must have the skills and knowledge to create and manage complex projects, collaborate with other teachers, and make use of networks to access information, colleagues and outside experts in supporting their own professional learning.

Knowledge Deepening

OBJECTIVES TEACHERS SHOULD BE ABLE TO	EXAMPLE METHODS (FOR TEACHER EDUCATION OR PROFESSIONAL LEARNING)
KD.6.a. Use ICT to access and share resources to support their activities and their own professional learning.	Discuss the various sources of online information and other resources that can be used to support professional learning; have participants conduct online searches for materials that support their professional learning goals; have them share and discuss the results of these searches and plans for implementation.
KD.6.b. Use ICT to access outside experts and learning communities to support their activities and their own professional learning.	Discuss the various sources of online experts and communities that can support professional learning; have participants conduct online searches for such experts and communities; have them communicate with experts and participate in communities and then share and discuss the results of these activities.
KD.6.c. Use ICT to search for, manage, analyze, integrate and evaluate information that can be used to support their professional learning.	Discuss the importance of developing knowledge management skills related to the analysis of online resources, integrating them into practice, and evaluating their quality; have participants describe, discuss, and demonstrate examples of their practices in this regard.

Knowledge Creation

The policy goal of this approach is to increase productivity by creating a workforce that is continually engaged in, and benefits from, knowledge creation, social development and cultural development.

	CURRICULAR GOALS	TEACHER COMPETENCIES
MODULE 1 UNDERSTANDING ICT IN EDUCATION	Policy Innovation. With this approach, teachers and school staff are active participants in the continuous evolution of education reform policy.	Teachers must understand the intentions of national policies and be able to contribute to the discussion of education reform policies and participate in the design, implementation, and revision of programmes intended to implement these policies.
MODULE 2 CURRICULUM AND ASSESSMENT	Knowledge Society Skills. With this approach the curriculum goes beyond a focus on knowledge of school subjects to explicitly include the Knowledge Society skills such as problem solving, communication, collaboration, and critical thinking. Students will also need to be able to determine their own learning goals and plans. Assessment is itself a part of this process; students must be able to assess the quality of their own and each others' products.	Teachers must know about complex human development, such as cognitive, emotional and physical development. They must know how, and under which conditions, students learn best, and teachers must anticipate and be able to effectively respond to the difficulties students encounter. Teachers must have the skills required to support these complex processes.

OBJECTIVES TEACHERS SHOULD BE ABLE TO	EXAMPLE METHODS (FOR TEACHER EDUCATION OR PROFESSIONAL LEARNING)
KC.1.a. Design, implement, and modify school-level education reform programmes that implement key elements of national education reform policies.	Discuss the intentions of national education reform policies and ways that they could be implemented in school level programmes. Have participants work in teams to design a school level programme that would implement a component of national reform policy. Have participants implement an initial phase of this programme, evaluate progress, and share challenges and strategies for overcoming challenges.
KC.2.a. Identify and discuss how students learn and demonstrate complex cognitive skills, such as information management, problem solving, collaboration and critical thinking.	Discuss the characteristics of complex cognitive thought processes and how students acquire and demonstrate these. Have participants identify the use of these skills in their own work. Have participants explicitly incorporate the acquisition and demonstration of one or more of these skills in a lesson plan. Have participants reflect on implementing the lesson plan and offer suggestions for improvement.
KC.2.b. Help students to use ICT to acquire the skills of searching for, managing, analyzing, evaluating and using information.	Discuss characteristics of effective information-search and information-management skills, and how ICT-based learning activities can support the development and demonstration of these skills; have participants generate examples of such activities.
KC.2.c. Design units of study and classroom activities that integrate a range of ICT tools and devices to help students acquire the skills of reasoning, planning, reflective learning, knowledge building and communication.	Discuss characteristics of reasoning, planning and knowledge building skills and discuss how ICT-based learning activities can support these skills; have participants generate and share examples of such activities. Have participants critique units of study and offer suggestions for additional resources.
KC.2.d. Help students to use ICT to develop communications and collaboration skills.	Discuss characteristics of communication and collaboration skills and how technology-based learning activities can support these skills; have participants generate examples of such activities. Have participants model effective communication and collaboration through participation in virtual professional learning communities.
KC.2.e. Help students develop both knowledge- and performance-based rubrics and apply them to assess their own understanding of key subject matter and ICT skills. Help students to use these rubrics to assess other students' work.	Discuss characteristics of self- and peer-assessment and of the knowledge- and performance-based rubrics used to reflectively assess one's own learning and that of others; have participants generate and evaluate examples of such activities and rubrics. Have participants develop knowledge- and performance-based rubrics that increase expectations for extending and expanding learning of key subject matter and ICT skills and concepts through the integration of emerging technologies.

Knowledge Creation

	CURRICULAR GOALS	TEACHER COMPETENCIES
MODULE 3 PEDAGOGY	Self Management. Students work in a learning community in which they are continuously engaged in creating knowledge products and building upon their own and each other's knowledge and skills.	The role of teachers in this approach is to explicitly model the learning processes and create situations in which students apply their developmental skills.
MODULE 4 ICT	Pervasive Technology. Various networked devices, digital resources and electronic environments are used to create the production of knowledge and 'anytime-anywhere' collaborative learning.	Teachers must be able to design ICT-based knowledge communities and use ICT to support the development of students' knowledge creation skills and their continuous, reflective learning.

Knowledge Creation

OBJECTIVES TEACHERS SHOULD BE ABLE TO	EXAMPLE METHODS (FOR TEACHER EDUCATION OR PROFESSIONAL LEARNING)
KC.3.a. Explicitly model their own reasoning, problem solving and knowledge-creation while teaching students.	Have participants build on the discussion of their own cognitive skills to externalize and overtly demonstrate the use of these skills to solve problems in their subject area. Have participants share their strategies and processes for solving problems and creating new knowledge with peers.
KC.3.b. Design online materials and activities that engage students in collaborative problem-solving, research or creating art.	Discuss characteristics of online materials that support students in the design and planning of their own learning activities; have participants work in teams to generate and evaluate online materials. Have participants model online collaborative problem-solving, research, or art in a professional learning community.
KC.3.c. Help students design project plans and activities that engage them in collaborative problem-solving, research, or artistic creation.	Discuss characteristics of teacher activities that support students in the design and planning of their own learning activities; have participants generate and demonstrate examples of such activities.
KC.3.d. Help students incorporate multimedia production, web production and publishing technologies into their projects in ways that support their ongoing knowledge production and communication with other audiences.	Discuss characteristics of teacher activities that support students in the use of various production technologies in their own learning activities; have participants generate examples of such activities; have participants demonstrate examples of multimedia production, web production, and publishing technologies to support student publishing in online professional learning communities.
KC.3.e. Help students reflect on their own learning.	Discuss characteristics of teacher activities that support students' reflective learning; have participants generate examples, share their reflections, and critique other's work in a professional learning community.
KC.4.a. Describe the function and purpose of ICT production tools and resources (multimedia recording and production equipment, editing tools, publication software, web design tools) and use them to support students' innovation and knowledge creation.	Demonstrate a variety of software packages and digital production resources and describe how they support and advance students' innovation and knowledge creation practices. Have participants analyze specific examples of use of these resources in their subject area and describe how they support student innovation and knowledge creation. Have participants use and evaluate these tools in a unit that they design.

Knowledge Creation

	CURRICULAR GOALS	TEACHER COMPETENCIES
MODULE 5 ORGANIZATION AND ADMINISTRATION	Learning Organizations. Schools are transformed into learning organizations in which all actors are involved in the learning process.	Teachers should be able to play a leadership role in training and providing follow-up support to colleagues and in creating and implementing a vision of their school as a community based on innovation and continuous learning enriched by ICT.
MODULE 6 TEACHER PROFESSIONAL LEARNING	Teacher as Model Learner. From this perspective, teachers are themselves master learners and knowledge producers who are constantly engaged in educational experimentation and innovation to produce new knowledge about learning and teaching practice.	Teachers, too, must have the ability, motivation, inclination, encouragement and support to experiment, continuously learn and use ICT to build professional learning communities working toward creating knowledge.

Knowledge Creation

OBJECTIVES TEACHERS SHOULD BE ABLE TO	EXAMPLE METHODS (FOR TEACHER EDUCATION OR PROFESSIONAL LEARNING)
KC.5.a. Describe the function and purpose of virtual environments and knowledge-building environments, and use them to increase knowledge and understanding of subjects in the curriculum and to develop online and face-to-face learning communities.	Demonstrate a variety of virtual and knowledge-building environments and describe how they support student learning communities. Have participants analyze how specific examples of these resources are used in their subject area. Have participants describe how these environments support student learning communities. Have participants use and demonstrate the effectiveness of these environments in a unit of study which they design.
KC.5.b. Describe the function and purpose of planning and thinking tools and use them to support students' creation and planning of their own learning activities and their continuous reflective thinking and learning.	Demonstrate a variety of planning and thinking tools and describe how they support students' creation and planning of their own learning activities. Have participants analyze specific examples of using these resources in their subject area and describe how they support the development of students' self-regulated learning. Have participants use and evaluate these tools in a unit of study which they design.
KC.6.a. Play a leading role in creating a vision of what their school might be like with ICT integrated into the curriculum and classroom practices.	Discuss various ways in which schools can integrate ICT into the curriculum and classroom for educational improvement; have participants design and share action plans in which they will play a key role in working with colleagues and administrators to incorporate ICT into their school. Have participants consider how such developments could be implemented, what challenges should be anticipated and how they might be overcome.
KC.6.b. Play a leading role in supporting innovation in their school and promoting continuous learning among their colleagues.	Discuss the types of social support that are needed by teaching professionals to engage in and sustain innovation in schools; have participants design and share action plans in which they work with administrators and colleagues to create a supportive environment for innovation. Have participants provide strategies for implementing innovative tools and resources in their schools.
KC.6.c. Continually evaluate and reflect on professional practice to promote innovation and improvement.	Discuss professional practices that support ongoing innovation and improvement; have participants give examples from their own experience.
KC.6.d. Use ICT resources to participate in professional communities; share and discuss best practice in teaching.	Discuss how ICT resources can be used to support ongoing innovation and improvement through professional learning communities; have participants give examples of these ICT based practices from their own experience.

APPENDIX 2

EXAMPLE SYLLABI AND EXAM SPECIFICATIONS

TECHNOLOGY LITERACY: AN EXAMPLE OF A SYLLABUS

HOW TO USE THIS SYLLABUS DOCUMENT

This document sets out the professional learning tasks for each module in the UNESCO ICT-Competency Framework for Teachers. Although these are tasks carried out in professional learning programmes, they clearly relate to tasks which teachers would undertake in their work as teachers. The descriptions of the task therefore refer flexibly to both professional learning programmes and teaching.

So, for example, the Best Practice section in task 5.3 “Run the planned activity with a colleague to verify appropriateness” can refer to a professional learning programme or to teaching. The programme provider decides whether the programme should include running the activity with a colleague or whether the programme would simply draw attention to the value of consulting teaching colleagues when undertaking this type of activity in everyday teaching.

The Task Frequency, Importance, Difficulty and Occurrence section always refers to the teaching task - how frequently the teacher would perform the task in their work, how important it would be in their work, and so on - in order to indicate how much emphasis might need to be given to the task in a professional learning programme.

Further information about the task descriptions is provided in the Notes at the end of this Technology Literacy syllabus document.

MODULE 1**UNDERSTANDING
ICT IN EDUCATION**

Demonstrate awareness of the Technology Literacy goals promoted by the ICT-CFT

NOTE: The assumption is that the ICT-CFT is a national policy goal.

1.1 IDENTIFY THE POLICY GOALS SUPPORTED BY THE ICT-CFT FRAMEWORK

SCOPING STATEMENT

To support the country's economic and social development goals by creating citizens who are:

- able to use ICT tools to handle information and generate knowledge
- creative, reflective, collaborative and problem-solving (which is required to generate knowledge)
- productive and able to participate fully in society and influence the decisions which affect their lives
- knowledgeable and resourceful, so they manage their own lives effectively and are able to lead full and satisfying lives
- foster cross-cultural understanding and the peaceful resolution of conflict
- contribute effectively to the economy of the country so it can compete on an international level

TASK COMPONENTS

Identify the economic and social issues and theories, ideas and benefits of incorporating ICT into education.

Be aware of how the ICT-CFT addresses these economic and social goals.

Be aware of general features of the ICT-CFT framework, for example that it has three approaches, of which this is the first stage.

OUT OF SCOPE

National or local policy goals not related to ICT-CFT or ICT

Industry/employer ICT training policy goals
Curriculum development policies

TASK FREQUENCY, IMPORTANCE, DIFFICULTY AND OCCURRENCE

Monthly, critical, not difficult and this task is scheduled or planned for.

TASK TRIGGER

The desire to be an effective and responsible teacher who supports their country's policy goals by incorporating ICT-CFT methods into their teaching.

A government desire to improve teacher effectiveness by adopting the ICT-CFT policy.

TOOLS USED

ICT-CFT publications, particularly the social and economic argument set out in the Principles section ICT-CFT Version 2 reference publication.

BEST PRACTICE

Open-mindedness; a willingness to embrace new ideas.

OBSTACLES

Fear of change.

ICT-CFT publications not available in local languages.

Lack of awareness of country's support for ICT-CFT.

Local opposition or lack of support for ICT-CFT.

Budget restrictions.

CRITICAL MISTAKE

Failure to understand that ICT-CFT is about teaching not just how to use computers.

1.2 IDENTIFY ICT-CFT FRAMEWORK PURPOSE AND APPROACHES

NOTE: This objective is teacher-centred. It demonstrates how the ICT-CFT affects and benefits educators in their work by showing how them how to make the classroom more alive and how to introduce students to the immense resources of the Internet and digital tools. This will help to open the minds of the students and enable them to become collaborative problem-solving learners engaging with real-world issues.

SCOPING STATEMENT

Understanding that:

- This is the first of three approaches in the ICT-CFT: Technology Literacy as the prerequisite to deepening knowledge (approach 2) and eventually creating knowledge (approach 3).
- There are six components in each approach of the ICT-CFT.

TASK COMPONENTS

Recognize and accept that the ICT-CFT will require initiative and willingness to reflectively examine and explore the possibly unfamiliar ideas and approaches of the framework. It requires active engagement and commitment to professional learning about ICT-CFT, not merely a passive attendance at a ICT-CFT professional learning event.

List the uses and benefits of CFT in the classroom.

Visualize application to particular classroom situations.

Recognize that adoption and application of the ICT-CFT framework is an ongoing process, not a one-time event.

OUT OF SCOPE

Other ICT frameworks for educators.

TASK FREQUENCY, IMPORTANCE, DIFFICULTY AND OCCURRENCE

Daily, critical, somewhat difficult and this task is scheduled or planned for.

TOOLS USED

ICT-CFT documents and any related resources.

OBSTACLES

Fear of change.

ICT-CFT publications not available in local languages.

Lack of awareness of the country's support for ICT-CFT.

Local opposition or lack of support for ICT-CFT.

Budget restrictions.

COMMON MISTAKE

Being over-ambitious in attempted changes to teaching; attempting too much too quickly can be counter-productive.

1.3 IDENTIFY THE TARGET STUDENT OUTCOMES THAT RESULT FROM IMPLEMENTING AN ICT-CFT-SUPPORTED LEARNING EXPERIENCE

SCOPING STATEMENT

This is the first stage of the three-stage ICT-CFT, so students take first steps towards becoming: better-informed, more motivated, investigative, aware of new sources of information, exposed to different perspectives, able to use ICT and have experience of using computer peripherals, collaborative with each other, reflective and able to solve problems, more open-minded etc. Generally setting the groundwork for the next two stages.

NOTE: This objective is student-centred.

TASK COMPONENTS

Recognize the benefits for student outcomes of using the Technology Literacy approach (listing, analyzing, discussing the benefits).

Visualize how ICT-CFT could be implemented in their own teaching environment and the benefits that would result.

Develop student ownership of their ICT use to promote student reflection and interest in expanding student's own ICT use.

TASK FREQUENCY, IMPORTANCE, DIFFICULTY AND OCCURRENCE

Daily, critical, difficult and this task is scheduled or planned for.

TASK TOOLS

ICT-CFT documents and any related resources.

OBSTACLES

Lack of creativity in being able to visualize student benefits.

Fear of change.

ICT-CFT publications not available in local languages.

Lack of awareness of country's support for ICT-CFT.

Local opposition/lack of support for ICT-CFT.

Budget restrictions.

1.4 UNDERSTAND THE RELEVANCE OF THE ICT-CFT FRAMEWORK IN A GIVEN SCENARIO

SCOPING STATEMENT

Applying the Technology Literacy approach to a particular classroom situation, specified in detail and realistically, with the aim of helping the teacher understand and apply the ICT-CFT approach.

The scenario should reflect the conditions of the country in which the professional learning takes place, considering how principles covered in 1.1-1.3 can be applied to the actual conditions in the teacher's own country. So professional learning in a developing country would consider a scenario typical of a developing country. (Professional learning should be related to a particular country in a way that the exam cannot be).

TASK COMPONENTS

Essentially, to analyze the scenario, work out a proposed solution and get feedback from others on how well the proposed solution might work. In more detail:

1. Understanding and analysis of the given scenario (the available hardware, software, student situation at school and at home, social and economic conditions affecting their learning, curriculum objectives, classroom situation etc.).
2. Matching digital tools and resources with learning objectives.
3. Identifying limitations and how they might be overcome (e.g., downloading a video overnight onto the teacher's computer for use the next day in class in order to deal with the problem of a slow Internet connection).
4. Sharing ideas and proposed methods with colleagues so they can help to identify strengths and weaknesses of the proposed approach to the scenario and suggest alternative approaches.

TASK FREQUENCY, IMPORTANCE, DIFFICULTY AND OCCURRENCE

Yearly, important, somewhat difficult and this task is scheduled or planned for.

TASK TRIGGER

Completion of 1.2-1.3 (the theoretical consideration of the ICT-CFT approach) and are now ready to consider the practical application of these ideas.

TOOLS USED

Widest possible use of whatever digital tools can help to show scenario and application of ICT-CFT approach (video clips, presentation software, audio clips of students talking, photos etc.).

OBSTACLES

Insufficient information about the scenario. Lack of teachers' experience in considering scenarios and ICT-CFT application to them.

COMMON MISTAKES

Scenario is not sufficiently detailed or realistic.

Failure to exploit digital tools and resources fully or appropriately.

CRITICAL MISTAKES

Oversimplifying real-world conditions and problems in teaching. Scenario and approaches to it must look convincing and plausible to teachers.

BEST PRACTICES

Producing a genuinely creative and imaginative approach to the scenario.

RELATED DECISIONS

Selecting a particular scenario from a range of offered scenarios.

MODULE 2

CURRICULUM AND ASSESSMENT

Demonstrate basic knowledge of how ICT resources support curriculum

Out of scope recommendation: "Help students acquire ICT skills within the context of their courses" may be out of scope because teachers cannot always be expected to teach basic computer skills. For example, typing or using a mouse should be assumed.

2.1 GIVEN A CURRICULUM GOAL, IDENTIFY APPROPRIATE ICT RESOURCES AND THE SKILLS REQUIRED TO USE THE RESOURCES

SCOPING STATEMENT

Find content-specific tools, i.e., subject-specific software packages online (shareware, freeware) and in retail stores, and reviews of such software. Find subject-specific websites (e.g., for teachers of the subject, or the History Channel), teaching resources websites, journal websites (e.g., "Teaching History" journal), and relevant non-subject websites (e.g., Discovery Channel, Learning Channel, news reports etc.); find appropriate open-ended software (e.g., spreadsheets for teaching math).

TASK COMPONENTS

Determine lesson objectives.
Determine learning activities.
Research, using the Internet for example, what ways exist to teach the objective (perhaps by looking at available resources).
Adapting and developing existing resources and approaches.
Learning any new software before teaching with it.

TASK FREQUENCY, IMPORTANCE, DIFFICULTY AND OCCURRENCE

Daily, critical, difficult and this task is scheduled or planned for.

OBSTACLES

Lack of suitable or desirable tools, connectivity problems, licensing restrictions, software unavailable in language of instruction.

PREREQUISITE KNOWLEDGE

Awareness of curriculum standards, expected educational outcomes, syllabuses.
Tasks 4.2, 4.3
Lesson objectives.

BEST PRACTICES

Exploiting the potential of digital resources to bring teaching alive.
Taking ownership of professional development: learning from colleagues and others how best to use digital resources, upgrading technical skills, and maintaining ongoing awareness of pedagogical and software innovations.

COMMON MISTAKES

Inappropriate software or resource selection.
Mismatch between lesson objectives and software/resources.
Copyright violation.

CRITICAL MISTAKES

Abdicating professional responsibility to devise appropriate teaching/learning activities (looking for ready-made lessons rather than devising activities).
Mismatch between hardware, resources and available software/data resources.

TASK RESULT

Compelling lesson; stimulated students who learn.

2.2 GIVEN A SCENARIO, EVALUATE AND SELECT AN ICT INSTRUCTIONAL RESOURCE

SCOPING STATEMENT

Predict potential learning outcomes; validity, purpose, scope, cost considerations, licenses and copyright issues, classroom dynamics, group structure, pedagogical approaches/ model. (Note: The emphasis in this task is on how to analyze a scenario to decide how ICT can best play a role. An example of a scenario is how to teach Boyle's Law to a large class of 12 year-old girls in a classroom with only one computer with high-speed Internet, with no projector but with a printer and a camera.); predict potential learning outcomes; validity, purpose, scope, cost considerations, licenses and copyright issues, classroom dynamics, group structure, pedagogical approaches/ model.

TASK COMPONENTS

Analyzing the scenario (available technology in classroom, age and level of students, language of instruction, student disabilities, particular topic) so teacher can see what the technology needs to do.

Evaluating credibility, age-level, appropriateness, accessibility of resources, and feasibility for classroom use. (See also 4.2 Task Components).

Matching resource to scenario (e.g., consider how portable hardware may be, devise different ways of using resource/tool to explore possibilities of resources or tools.

Decide exactly how to best employ selected resources or tools.

OUT OF SCOPE

Exhaustive evaluation of resources or of curriculum objectives.

TASK FREQUENCY, IMPORTANCE, DIFFICULTY AND OCCURRENCE

Daily, very important, difficult and this task is scheduled or planned for.

TASK TRIGGER

Need to teach a specific objective in a particular context and learning environment.

OBSTACLES

Lack of suitable or desirable tools, connectivity problems, licensing restrictions, software unavailable in language of instruction.

PREREQUISITE KNOWLEDGE

Knowledge of how students learn this particular curriculum objective, for example what they find difficult to understand in Boyle's Law; what concepts and understanding the students need to grasp. A knowledge of how, in principle, to match specific curriculum standards to particular computer applications or resources.

COMMON MISTAKES

Over-ambitious plans which do not work in the lesson, for example video-conferencing planned despite inadequate band width. Inappropriate software or resource selection. Mismatch between lesson objectives and software or resources. Over-reliance on technology, especially seductively attractive resources or heavily marketed resources, tools and games. Copyright violation.

CRITICAL MISTAKES

Abdicating professional responsibility to devise appropriate teaching and learning activities (looking for ready-made lessons rather than devising activities). Mismatch between hardware, resources and available software or data resources.

BEST PRACTICES

Awareness of different student needs and differentiation of student task. Piloting approaches to using digital resources or tools for this scenario. Investigating how other teachers incorporate digital resources or tools in this particular scenario.

2.3 GIVEN A SCENARIO, EVALUATE AND SELECT AN ICT ASSESSMENT RESOURCE

SCOPING STATEMENT

Scope, cost considerations, classroom dynamics; formative vs. summative approaches; includes formative and summative assessment, such as:

- an online exam
- students demonstrating what they have learnt (e.g. putting together a video or creating a spreadsheet, making a presentation to the class)
- evaluating the teaching (students clicking their answers to a question displayed on a presentation software screen).

TASK COMPONENTS

Analyze the scenario to determine what needs to be assessed and the available resources or tools.

Determine what type of assessment is needed, for example summative or formative assessments, and including assessments in which students do something practical rather than taking a written test.

Identify and evaluate ICT assessment resources, for example Survey Monkey.

Match ICT resources to assessment.

Consider different types of online assessment (multiple choice, filling the blanks, matching, drag and drop etc.).

OUT OF SCOPE

Test theory. Attendance records, classroom management issues (they belong in section 5).

TASK FREQUENCY, IMPORTANCE, DIFFICULTY AND OCCURRENCE

Weekly, very important, difficult and this task is scheduled or planned for.

PREREQUISITE KNOWLEDGE

Basic knowledge of assessment methods in teaching.

Awareness of advantages of ICT-based assessment, for example that it can provide instant feedback, automated scoring, automated data-collection and item analysis.

BEST PRACTICES

Exploiting the potential of ICT to provide more frequent, accurate, and detailed information than can be achieved with conventional assessment.

OBSTACLES

Lack of resources, for example only one computer so class cannot do an online test.

COMMON MISTAKES

Over-reliance on statistical data, which becomes more readily available using ICT but extra data and statistics do not necessarily constitute extra information.

Assumption that ICT-based assessment means an online test, rather than, say, making a video to demonstrate what you have learnt.

Spending a disproportionate amount of time creating an ICT form of assessment when a simpler form would be satisfactory.

CRITICAL MISTAKES

Allowing ICT to distort assessment methods or aims.

SUCCESS CRITERIA

Know how to proceed with the teaching (whether to move on or re-teach), how to advise students, how to amend teaching, revise an activity or resources.

2.4 SELECT AN APPROPRIATE COMPUTER-BASED TOOL TO MONITOR AND SHARE STUDENT PERFORMANCE DATA.

SCOPING STATEMENT

Using ICT to record, manage and report on student performance data (grades, portfolios of student work, recognition of student achievement, reports to students, parents and administration).

TASK COMPONENTS

Setting up a personal assessment record-keeping system (e.g., a spreadsheet to keep record of grades).

Learning how to use a school-wide system for assessment record-keeping (or other large-scale system involving numerous teachers).

Entering data through various possible means (swipe cards, keyboard entry).

Generating assessment reports.

Interpreting results.

Distributing assessment data appropriately to different audiences (students, parents, administrators etc.).

OUT OF SCOPE

Managing students' work through ICT (issuing tasks and assignments via email, having students submit their work on an intranet).

In-depth data analysis (e.g., statistical analysis).

TASK FREQUENCY, IMPORTANCE, DIFFICULTY AND OCCURRENCE

Daily, critical, very difficult and this task is scheduled or planned for.

PREREQUISITE KNOWLEDGE

Understanding confidentiality laws and best practices for keeping personal data secure.

Awareness of the advantages and disadvantages of using online systems, for example the merits of using ICT to automate processes which require professional judgment such as writing reports to parents and understanding the issues which arise, such as the pros and cons of using item banks to produce reports to parents.

Knowledge of password security issues.

TOOLS USED

At least spreadsheets and grade-book software. Potentially data warehouses, student information system, web-based portals.

BEST PRACTICES

Creating a culture of data-quality.

Keeping up-to-date with data-entry.

Using data from a wide variety of sources to monitor performance: use different types of assessment, comparisons with other students, teachers or schools.

Using ICT-based systems to improve parent involvement through better information flow to them.

Making use of the improved information which ICT-based systems can provide, for example early indicators of a failing student or teacher revealed by timely and detailed ICT records of grades.

OBSTACLES

Lack of hardware, software resources and financial resources.

Lack of culture of accountability.

COMMON MISTAKES

Incorrect data entry (including incomplete data).

Poor data management skills.

Not keeping passwords secure.

Incorrect formulae to calculate results.

CRITICAL MISTAKES

Not keeping confidential information secure.

Allowing vulnerability to hackers.

Incorrect conclusions from inaccurate data.

Inaction in the face of available data (failing to use the information provided by ICT-based system because such information did not previously exist).

MODULE 3

PEDAGOGY

Integrate technology and pedagogy

3.1 INTEGRATE ICT INTO DIDACTIC KNOWLEDGE ACQUISITION AND LEARNING THEORY MODELS

SCOPING STATEMENT

Use of presentation software, video, animations, models displayed to whole class during teacher exposition.

Students listening to teacher; discussion and question and answer sessions led by teacher.

TASK COMPONENTS

Consider full range of digital tools and resources which could potentially be used in didactic teaching, considering what tools might be used for communication, presentation and investigation in didactic teaching. For example, students could use digital clickers to communicate to teacher whether they have understood something. Consider different ways in which digital tools and resources could be used.

For a given classroom scenario, think of possible digital tools or resources which would enhance didactic teaching.

Analyze the effectiveness and suitability of selected tools or resources for a given learning objective.

Anticipate possible problems and prepare a contingency plan to deal with the problem (e.g., a projector not working; or there being no electricity on the day of the lesson).

The teacher must ensure that they are completely competent to operate software and hardware before the lesson starts, rather than discovering half-way through the lesson that they cannot remember how to do something.

When appropriate, ensure that students are competent using necessary hardware, software or tools.

OUT OF SCOPE

Students working on their own with computers.

TASK FREQUENCY, IMPORTANCE, DIFFICULTY AND OCCURRENCE

Hourly, critical, difficult and this task is scheduled or planned for.

PREREQUISITE KNOWLEDGE

Knowing the advantages and disadvantages of using ICT for didactic teaching.

BEST PRACTICES

Cater to different learning styles in using ICT in didactic teaching, for example varying text or images or music according to the student's preferred learning style, and use facilities to respond to specific learning needs such as audio aids for hearing-impaired students.

COMMON MISTAKES

Not recognizing the full range of hardware and software which can be used for didactic teaching (which is more than just presentation software).

CRITICAL MISTAKES

Over-reliance on technology to do the teaching, for example just showing a video instead of teaching the class.

Selecting an inappropriate tool or resource, for example something readily available or enjoyable, but not relevant to teaching objective.

3.2 CREATE LEARNING ACTIVITIES THAT USE ICT RESOURCES TO SUPPORT SPECIFIC EDUCATIONAL OUTCOMES

SCOPING STATEMENT

Lesson plans or activities covering student learning activities which are based on didactic teaching, including:

- student work in lesson (individually and in groups)
- homework
- short-term and long-term project work
- students' self-initiated study
- e-learning
- tests and assessment.

TASK COMPONENTS

Clearly identify teaching objective.

Design learning activity.

Consider the full range of potential digital resources and tools to support activity.

Choose appropriate digital resources and tools which best match the teaching objective and the students' learning styles.

Evaluating effectiveness of digital support.

OUT OF SCOPE

Supporting didactic teaching.

TASK FREQUENCY, IMPORTANCE, DIFFICULTY AND OCCURRENCE

Hourly, very important, difficult and this task is scheduled or planned for.

COMMON MISTAKES

Not anticipating problems with hardware or software and having a contingency plan in place.

Choosing an activity which takes longer than the lesson's duration.

ICT tool or resources not appropriate for age or ability level of student.

ICT tool or resources which are not interesting or engaging for students.

CRITICAL MISTAKES

Students are distracted by the tools and do not learn the objective, for example students end up playing with the computer rather than actually learning what the teacher intended.

3.3 APPLY ICT TO "JUST IN TIME" AND "SPONTANEOUS" LEARNING INTERACTIONS

SCOPING STATEMENT

Unplanned/unstructured learning interactions, arising in lessons or in students' own time (in project work or homework) where students become interested in finding out more about a topic than the teacher has planned to teach. This might include current events in the news which relate to the lesson, or the latest scientific developments, or unanticipated lines of enquiry.

TASK COMPONENTS

Welcome the unexpected enquiry provided it is relevant, in order to encourage students to be curious and proactive.

Exploit the opportunity to see how digital resources and tools can assist learning and show students how to use ICT in this type of situation.

Use digital resources or tools to obtain information, e.g., conduct an Internet search, or use a spreadsheet to calculate, for example,

median, average, mode etc. of student grades, or to show trends on a graph and make comparisons with past performance.

Help students to extend their knowledge and understanding of the original learning objective through having considered this new dimension to the topic.

Help students to see that digital resources are valuable in all aspects of life, not just in education, for obtaining information and extending knowledge.

OUT OF SCOPE

Insufficiently planned lessons or inadequate preparation for teaching.

TASK FREQUENCY, IMPORTANCE, DIFFICULTY AND OCCURRENCE

Daily, very important, somewhat difficult and this task occurs as the result of an unplanned event.

TASK TRIGGER

Classroom discussions, spontaneous extension of planned learning activities or wide range of other possible circumstances which prompt student curiosity.

PREREQUISITE KNOWLEDGE

Task 4.3 and
Standard office productivity tools.

TOOLS USED

Any suitable digital tools, but particularly the Internet, or, for example using a spreadsheet to calculate information.

BEST PRACTICES

Manage the new line of enquiry so that it is productive and related to the purpose of the lesson.

Show students how ICT tools can be used on an everyday basis and for everyday tasks.
Demonstrate effective search strategies.

OBSTACLES

Teacher's unwillingness to pursue unplanned lines of enquiry or unexpected topics.
Unavailable ICT resources.

COMMON MISTAKES

Students and teacher becoming distracted from original objective of lesson, for example pursuing more and more web links.

CRITICAL MISTAKES

Stumbling on inappropriate web sites, for example sites with adult content.

3.4 DESIGN PRESENTATIONS THAT APPROPRIATELY INCORPORATE ICT RESOURCES

SCOPING STATEMENT

Structure, timing, how different from a lecture, identify how computers and technology can support instruction; includes any digital tools and resources, not just presentation software, which are displayed on a screen for all students to see.

TASK COMPONENTS

Clearly identify the teaching objective.
Decide what ICT resource (hardware and software and data) would be most suitable and is available (not necessarily presentation software – it might be spreadsheet or word processing or video software). Consider that graphs and charts can only be shown in a static form in presentation software but can be dynamic and modified in spreadsheet software.
Organize the structure of presentation and its relationship to rest of lesson.
Consider the full range of potential digital resources.
Choose appropriate digital resources and tools which best match the teaching objective and the students' learning styles.
Prepare presentation using good visual design, logical progression and avoiding excessive bullet points in a single screen and other common mistakes.

Apply good presentation techniques (providing opportunities for interaction, questions, comment, etc.).
Assess the effectiveness of the presentation.
Use 'builds' (gradual release of information) to coincide with narration, to maximize student interest and add interactivity.

OUT OF SCOPE

Highly specialized software, such as that used in industry environments or subject-specific software (because the ICT-CFT exam is not subject-specific).

TASK FREQUENCY, IMPORTANCE, DIFFICULTY AND OCCURRENCE

Daily, very important, difficult, and this task is scheduled or planned for.

CRITICAL MISTAKES

Poor visual design (colour, font sizes, colours, spacing)
Reading from the screen
Presenting too much information
Lecturing to students without permitting their interaction

MODULE 4

ICT

Select and apply basic tools

4.1 GIVEN A SPECIFIC LEARNING ACTIVITY, IDENTIFY THE REQUIRED HARDWARE AND DEVICES

SCOPING STATEMENT

Computer (desktop or mobile), peripherals, memory and storage, monitors, white boards, cell phones, projectors, digital cameras, printers, simple troubleshooting as required, strengths/weaknesses of the devices/peripherals for educational purposes, cost considerations for different devices.

TASK COMPONENTS

Identify the educational need.

Identify the device, or devices, that meet the educational need.

Evaluate the cost.

Test the activity using the device.

Verify that the device will be available at the required location and time.

For future occasions, re-evaluate the effectiveness of the device for the given educational need.

OUT OF SCOPE

Setting up the selected peripherals/devices; detailed technical knowledge of how to use the device/peripheral (e.g., how to use a camera to take a picture but not how technically the image is stored).

TASK FREQUENCY, IMPORTANCE, DIFFICULTY AND OCCURRENCE

Daily, critical, somewhat difficult and this task is scheduled or planned for.

TASK TRIGGER

A new hardware device arrives at the school.

A need to digitally document an experience (e.g., capture a video of a field trip).

A need to reduce paper waste.

BEST PRACTICE

Select the device for the purpose and not vice versa.

OBSTACLES

Underestimating required skills to use the device/lack of preparation/lack of confidence.

Cost or availability of device.

Technical difficulties or lack of IT support.

CRITICAL MISTAKES

Device not tested prior to use.

4.2 USE THE INTERNET AND BROWSERS TO SUPPORT LEARNING ACTIVITIES

SCOPING STATEMENT

Understand and use a URL to access a Web site; assess credibility of a given site; plug-ins; downloading files/media; assess the relevance of the content; what is a browser; types of browsers; understand the influence the Internet connection speed has on possible educational activities.

TASK COMPONENTS

Identify the relevance of the Internet for the learning activity.

Navigate websites in a browser.

Evaluate the credibility of the site.

Evaluate the accuracy of the site.

Evaluate the website against relevant policies and intellectual property rights.

Evaluate the usefulness of the content on the site for the learning activity or outcome.

Determine whether any additional software is required, e.g., plug-ins.

Incorporate the content into the learning activity or outcome.

Bookmark or reference the website.

OUT OF SCOPE

How the Internet works; history of the Internet; setting up Internet connectivity; troubleshooting Internet connectivity.

TASK FREQUENCY, IMPORTANCE, DIFFICULTY AND OCCURRENCE

Daily, critical, somewhat difficult and this task is scheduled or planned for.

TASK TRIGGER

Need to find additional or up-to-date information from different perspectives

Need to find a broader range of resources, for example images or videos in addition to text.

Need to create interactive activities

Need to communicate/collaborate

Need to incorporate real life learning

BEST PRACTICES

To verify accuracy and credibility of the web site consider whether the site is referenced, whether the author is credible and who is funding the site.

Check the school policy before installing any plug-in software.

Test and follow the links on the site to assess that the links work and to verify that content is appropriate for students.

Verify that the site is accessible in the environment it will be used in.

Evaluate the risks in using this site.

Bookmark web sites as needed.

Have a backup plan in case of technology failure.

TASK OBSTACLES

Slow or unreliable Internet connection

Community perception that the Internet is unsafe

Lack of required peripherals

PREREQUISITE KNOWLEDGE

Task 6.3 - Identify Internet safety issues

Understanding of Internet bandwidths

Acceptable use policies

What a browser is, and the different types that exist

Components of a URL

What the Internet is.

How to browse the Internet.

How to make a web site component available offline.

Types of services available on the Internet.

How to evaluate the credibility and accuracy of a web site.

CRITICAL MISTAKE

Inaccurate typing of URL, which may lead to unintended and inappropriate content.

RELATED DECISIONS

Do I need other ICT resources to use this web site in the classroom?

Can I use the web site offline or must I use it online in the classroom?

Is the web site appropriate for the student audience?

What do I want my students to gain from this activity?

Is the Internet the best or only option?

4.3 USE A SEARCH ENGINE TO PERFORM A KEYWORD SEARCH

SCOPING STATEMENT

How to tailor a search, natural language search, assess search results; understand the ranking of search results; what is a search engine; types of search engines and their strengths/weaknesses; using keywords; use of inverted commas in search; searching for specific resource types (e.g., images/media); evaluating the safety of the search results; accessing search results; saving/bookmarking/printing search results; managing favourites/history; navigate search results; use of language tools for search results (translators).

TASK COMPONENTS

Identify what you want to search for, and in what format (e.g., image, text, and video).
Select the appropriate keywords to search for information on a given topic.
Navigate between the search results.
Revise or refine search terms as necessary to generate a reasonable number of appropriate search responses.
Evaluate and compare results from keywords searched on different search engines.

Choose the most suitable search result for a given information need.

Open, access, and bookmark a website.

TASK FREQUENCY, IMPORTANCE, DIFFICULTY AND OCCURRENCE

Weekly, very important, low difficulty and this task is scheduled or planned for.

TASK TRIGGER

The need for just-in-time resources/information.

The need to broaden knowledge/resources.

The need to find authentic information to enhance learning experiences (including finding real-life examples).

The need to include virtual experiences as part of learning.

PREREQUISITE KNOWLEDGE

Tasks 4.2 and 6.3.

Copyrights principles.

Search engines appropriate for mobile devices and the cost implications.

4.4 CREATE AND USE A WEB-BASED E-MAIL ACCOUNT

SCOPING STATEMENT

Email address components; What is a good password; steps to set up an email account (account de-activation and re-activation); email concepts; saving and sending attachments (including size); etiquette of email; address book; email providers; privacy considerations; security (related to spam, virus, scams, identity theft etc.); managing email account (including setting up folders); junk mail filters; mention the option of email on mobile; troubleshooting simple email errors; log out of email session; understand the difference between Web-based email and client-based email.

TASK COMPONENTS

Create an email account.
Create and send an email.
Send to one or many; cc/bcc.
Reply to an email.

Send/receive/save attachments.

Manage the email account.

Create/organize folders.

Delete messages to stay within storage limit (including sent folder and trash folder).

Move messages to folders.

Check spam folder periodically.

Manage address book and address book functions (including groups).

OUT OF SCOPE

How the Internet works; history of the Internet; setting up Internet connectivity; troubleshooting Internet connectivity; email server management; enterprise email.

TASK FREQUENCY, IMPORTANCE, DIFFICULTY AND OCCURRENCE

Daily, critical, somewhat difficult and this task is scheduled or planned for.

TASK TRIGGER

The need to communicate with parents, administrators, peers, students wherever they are located.

The need to track a thread of communication.

The need to assign tasks to students.

The need to share digital media/documents (1:1 or 1 to many).

The need to reduce costs and paper usage.

The need to communicate with a person who uses a different language.

PREREQUISITE KNOWLEDGE

Etiquette considerations.

Advantages of email over snail-mail.

Understanding how email (asynchronous communication) is different from synchronous communication.

Understanding the characteristics and advantages of remote storage of data.

Understanding the difference between texting and email.

Tasks 4.2 and 6.3.

OBSTACLES

Slow or unreliable Internet connection.

Firewall blocks web-mail or attachments in email.

Misspelled email address.

Attachment size exceeds limits or prevents email from going through.

COMMON MISTAKES

Lack of understanding of common error messages.

Poor email etiquette, for example replying to all when single reply is more appropriate or using capitals.

Sending an email without reviewing it.

Subject line issues, which do not indicate email content or cause email to go into spam folder.

Failing to attach intended attachments.

Failing to check emails and do housekeeping of email account on a regular basis.

CRITICAL MISTAKES

Misspelled email address (sent to wrong individual or inexistent email address).

Forgetting the permanence of an email.

Not safeguarding email password.

4.5 DEMONSTRATE THE USE OF THE SELECTED SOFTWARE APPLICATION TO MEET AN EDUCATIONAL NEED

SCOPING STATEMENT

Use word processing software, graphic software, presentation software; match software to the learning need/learning styles/age appropriateness; application of basic skills to meet the educational purpose.

TASK COMPONENTS

Identify the learning outcome to be achieved or the task to be performed.

Identify the available possibilities in the software to meet the learning outcome.

Compare/evaluate the possibilities (e.g., report writing, mix/match activity etc.).

Identify the features to use in the software.

Demonstrate the skill required to carry out the chosen activity.

Evaluate the implications of using the activity in the future.

OUT OF SCOPE

Installing the software, classroom management/implementation.

TASK FREQUENCY, IMPORTANCE, DIFFICULTY AND OCCURRENCE

Weekly, very important, difficult, and this task is scheduled or planned for.

TASK TRIGGER

A need to teach in a more effective manner, for example to use a multi-media visualisation rather than a textbook explanation.

OBSTACLES

Cost of licensing.

Unavailability of software.

Software not available in required language
Content/examples in software not localized

CRITICAL MISTAKES

Choosing the tool and then finding an educational activity to match it.

RELATED DECISIONS

Is this software practical in the classroom environment?

Are other ICT resources needed to use this software in the classroom?

4.6 USE SOFTWARE TO MANAGE STUDENT AND CLASSROOM DATA

SCOPING STATEMENT

Includes use of standalone and networked software; use of spreadsheets; use of school management system (for the purposes of attendance, record keeping, grades, student enrolment, time tables etc.).

TASK COMPONENTS

Plan what data to gather.

Gather data.

Enter data into application.

Analyze the data.

Create and share reports.

Act upon the information, as appropriate.

OUT OF SCOPE

Design of database/management system; management/networking of the record keeping system.

TASK FREQUENCY, IMPORTANCE, DIFFICULTY AND OCCURRENCE

Weekly, critical, somewhat difficult and this task is scheduled or planned for.

TASK TRIGGER

A need to analyze data and create reports

Institutional or government requirements.

PREREQUISITE KNOWLEDGE

Understanding the advantages of digital record keeping.

An overview of the different types of record management systems.

The types of data that can be captured and the purpose of capturing the data.

Understanding the types of reports that can be generated.

Understanding digital security and privacy issues (Task 6.3).

Understanding how the application would work on a stand-alone computer as well as on a network.

OBSTACLES

Lack of professional learning.

Lack of confidence in using the application.

Lack of network or an unreliable network.

Unreliable support for the software/application.

Time required to digitize records.

Related roles.

IT support.

Software support (for the selected software).

School administration.

COMMON MISTAKES

"Garbage in garbage out".

Not verifying the captured data.

Incorrect formulae or analysis (for example, selecting the wrong type of graph for a report).

CRITICAL MISTAKE

Not having backups of the data.

RELATED DECISIONS

Who should have access to the data.

How frequently the data should be captured.

4.7 USE COMMON COMMUNICATION AND COLLABORATION TECHNOLOGIES

SCOPING STATEMENT

Text messaging, audio conferencing (VOIP), video conferencing, virtual classroom/

meeting technologies, Web-based. collaboration (e.g., instant messaging, blogs, wikis, sharing resources, etc. include emerging

technologies as appropriate e.g., web2.0 and beyond), social networking, idea of digital citizenship and netiquette, email, 1 collaborate using local resources (lab/school LAN only vs. over the Internet).

TASK COMPONENTS

Identify the collaboration opportunity that adds value to learning.

Select the appropriate tool for collaboration.

Plan the collaboration (e.g., time required, logistics etc).

Test collaboration setup.

Collaborate.

For future occasions, evaluate the effectiveness of the collaboration for the given educational need.

OUT OF SCOPE

Setting up/managing the hardware/ associated software; administering the network/learning management system

TASK FREQUENCY, IMPORTANCE, DIFFICULTY AND OCCURRENCE

Monthly, very important, difficult and this task is scheduled or planned for.

TASK TRIGGER

The opportunity to participate in contests.

The opportunity to be part of a wider community.

The need access to expert/specialist advice.

PREREQUISITE KNOWLEDGE

Tasks 4.4 and 6.3.

Understanding what collaborative activity involves, or should involve.

Awareness of what ICT tools are available for collaboration.

BEST PRACTICES

Start with simple collaboration activities, such as local rather than international collaboration.

Plan collaboratively for the collaboration activity.

Ensure that the collaboration meets the curriculum goals.

OBSTACLES

Underestimating the time required.

Lack of confidence in using the collaboration tool.

Time zone, language and cultural differences, and logistics.

COMMON MISTAKES

Not being aware of cultural differences.

Not having a shared purpose and understanding with the other party involved in the collaboration.

Not keeping up to date with new developments in collaboration technologies.

CRITICAL MISTAKES

Underestimating the logistical challenges of collaboration.

RELATED ROLES

IT support.

RELATED DECISIONS

Requirements for related tools, for example a webcam for video conferences.

What the students should gain from the activity.

Considering whether the Internet the best or only option for the collaboration.

MODULE 5

ORGANIZATION AND ADMINISTRATION

Organize and manage a standard classroom

5.1 INTEGRATE LEARNING ACTIVITIES INTO A COMPUTER LABORATORY ENVIRONMENT

SCOPING STATEMENT

Computer lab environment - discuss and provide examples of how computers can be used for accomplishing a learning activity; creation of lesson plan that use lab environment; advantages and disadvantages of working in a networked lab environment lab based; classroom management techniques.

TASK COMPONENTS

Identify the learning opportunity into which lab use can be integrated.

Plan the logistics (e.g., booking lab time, plan for making files available for students, access - passwords).

Verify that the lab environment supports the selected need (e.g., number of students vs. number of computers).

Test the activity in the lab.

Verify that the students have the skills to perform the activity.

Develop a task sheet that outlines the activity.

OUT OF SCOPE

Administration of lab, planning the layout of the lab, network administration, environments outside lab (e.g., library/ classroom).

TASK FREQUENCY, IMPORTANCE, DIFFICULTY AND OCCURRENCE

Monthly, important, somewhat difficult and this task is scheduled or planned for.

TASK TRIGGER

A requirement, or the opportunity, to use ICT in teaching.

A need to provide individualized learning.

PREREQUISITE KNOWLEDGE

Tasks 4.1, 4.5, 5.3 and 6.3.

Appropriate ICT tools (hardware, software and peripherals) for the activity are identified.

Students are equipped to deal with issues which arise in online learning activities, including issues of intellectual property rights, plagiarism and personal safety.

Students are familiar with lab use policy.

Different ways of managing a group of students in a lab environment.

COMMON MISTAKES

Underestimating the time needed for the activity.

Under-estimating, or over-estimating, the skill level of the students.

CRITICAL MISTAKES

Assuming everything will work, and not having a contingency plan.

SUCCESS CRITERIA

More involved and motivated students.

An increased commitment to learning on the part of the students.

RELATED JOB ROLES

IT support.

Lab administrators.

5.2 MANAGE THE USE OF ICT RESOURCES WITH INDIVIDUALS, SMALL GROUPS, AND WHOLE GROUPS IN VARIED ENVIRONMENTS

SCOPING STATEMENT

Use a range of ICT resources; awareness of capabilities/limitations of the ICT resources; manage of different classroom strategies for individuals, pairs, small groups; classroom environment with ICT resources - discuss and provide examples of how computers can be used for accomplishing a learning activity; creation of lesson plan that use ICT resources in the classroom environment.

TASK COMPONENTS

Identify the learning opportunity into which ICT resources can be integrated.
Plan the logistics (e.g., availability of resources and support).
Plan the strategy (including grouping of students) for the activity.
Test the activity.
Verify that the students have the skills to perform the activity.
Provide necessary outlines to guide students in the activity.
Review the success of the activity, for future reference.
Have a backup plan in case the technology does not work.

OUT OF SCOPE

Lab environment, in-depth knowledge of the ICT resource/tool.

TASK FREQUENCY, IMPORTANCE, DIFFICULTY AND OCCURRENCE

Weekly, very important, somewhat difficult and this task is scheduled or planned for.

TASK TRIGGER

The possibility of incorporating a just-in-time or real-life learning experiences.
The possibility of enriching the teaching program by using ICT to include more interactive and differentiated learning.
A requirement, or the opportunity, to use ICT in teaching.
A need to provide individualized learning.

PREREQUISITE KNOWLEDGE

Tasks 4.1, 4.5, 5.3 and 6.3.
Students are equipped to deal with issues which arise in online learning activities, including issues of intellectual property rights, plagiarism and personal safety.
The teacher is aware of that classroom management is more complex when activities that use ICT resources are included in a lesson.

BEST PRACTICES

Ensure IT support is available.
Estimate the required time for the activity including time required to debrief after the activity.
Encourage students to solve their own problems.

OBSTACLES

Physical classroom environment is not conducive to using the ICT resource or not flexible enough to accommodate different social groups using the ICT resource.
Students' resistance to unfamiliar arrangements.
Lack of confidence in using the ICT resource.

COMMON MISTAKES

Choosing a group size that jeopardizes the success of the activity.
Not adapting the activity while it is in progress if the group size is found to be inappropriate.
Underestimating the time needed for the activity.
Under-estimating, or over-estimating, the skill level of the students.

CRITICAL MISTAKE

Assuming everything will work, and not having a contingency plan.

SUCCESS CRITERIA

More involved and motivated students.
An increased commitment to learning on the part of the students.
A learning activity that uses ICT without disrupting other instructional activities in the class.

5.3 IDENTIFY THE APPROPRIATE AND INAPPROPRIATE SOCIAL ARRANGEMENTS TO USE WITH VARIOUS ICT RESOURCES

SCOPING STATEMENT

A range of ICT resources (e.g., mobile phones); awareness of the appropriateness of the ICT resources in relation to a variety of social arrangements; the value of different social arrangements for learning; identify the different classroom strategies for the different ICT resources for individuals, pairs, small groups.

TASK COMPONENTS

Identify the different hardware and software technologies that are available.
Consider potential social arrangements for instructional use (including appropriateness).
For different purposes, match different ICT resources to different social arrangements.

OUT OF SCOPE

Lab environment, in-depth knowledge of the ICT resource/tool, lesson planning.

TASK FREQUENCY, IMPORTANCE, DIFFICULTY AND OCCURRENCE

Monthly, very important, low difficulty and this task is scheduled or planned for.

TASK TRIGGER

A need to increase collaboration between students.
A need to incorporate 21st century learning into teaching strategies.
The possibility of enhancing the teaching program by using ICT, for example to include more interactive or differentiated learning experiences.
Limited availability of ICT resources.

PREREQUISITE KNOWLEDGE

Tasks 4.1, 4.5 and 5.2.
The advantages and disadvantages of using ICT resources in the class, including potential disruptions, challenges.
An awareness of the added complexity to classroom management when including activities that use ICT resources.
Understanding what type of activity is possible given the amount of ICT resource available to each student.
Understanding the educational and social benefits of the different social arrangements.

BEST PRACTICES

Run the planned activity with a colleague to verify appropriateness.

OBSTACLES

Physical classroom environment is not flexible enough to accommodate different social groups using the ICT resource.
Students resist unfamiliar arrangements.

COMMON MISTAKES

Choosing a group size that disrupts the success of the activity.
Not adapting the activity (while in progress) if the group size is found to be inappropriate.

TASK RESULT

The optimal ICT resource identified in relation to social arrangement in the class.

RELATED ROLES

Support staff, occupational therapists.

RELATED DECISIONS

How flexible is the physical classroom?
What is the learning intention?

MODULE 6

PROFESSIONAL LEARNING

Use digital literacy tools to enhance professional performance

6.1 USE ICT RESOURCES TO ENHANCE TEACHER PRODUCTIVITY

SCOPING STATEMENT

Optimize capacity, productivity, and communication (for example, use a spreadsheet to manage grades); move from analog to digital; list of key activities that teachers need to perform as part of their job; use of ICT resources (e.g., hardware: desktop, laptop, handheld; software: word processing, blogs, wikis, and other communication tools).

TASK COMPONENTS

Identify the tasks that need to be performed.

Choose a task that could be performed more efficiently using ICT.

Identify peers, support staff or other individuals (including students) who can serve as resources, mentors or collaborators in the use of ICT.

Identify the most appropriate ICT tool for the task.

Identify any changes to the traditional way the task is performed to get additional benefit.

Perform the tasks using the ICT tool identified.

TASK FREQUENCY, IMPORTANCE, DIFFICULTY AND OCCURRENCE

Weekly, very important, somewhat difficult and this task is scheduled or planned for.

TASK TRIGGER

Inefficient existing practice for performing a task.

A requirement to use ICT.

A new ICT resource arrives at the school.

A need to reduce paper waste.

A need to expand skills.

PREREQUISITE KNOWLEDGE

Understanding the productivity benefits of using ICT resource.

Understanding the process to be improved.

Awareness of the capabilities, strengths and weaknesses of the ICT resource for productivity purposes.

Cost or licensing implications.

Knowing the time, skills and preparation required to use the ICT resource.

Task 4.4.

BEST PRACTICES

Start with simple tasks and build ICT into the daily routine.

Practice to hone skills and recognize that it will take time to become skilled.

TASK OBSTACLES

Lack of confidence or skill in using ICT tools

Lack of the most appropriate ICT resource for the task.

COMMON MISTAKES

Trying to use all the available tools.

Using ICT for a critical task when beginning to learn how to use ICT.

Not persevering despite initial mistakes.

RELATED DECISIONS

Does the investment of time and money in using ICT increase productivity?

Is the ICT resource practical in the school environment?

Is the selected ICT resource the best or only option?

6.2 USE ICT RESOURCES TO SUPPORT TEACHER PROFESSIONAL LEARNING

SCOPING STATEMENT

Use technology to work with colleagues across boundaries; distance and virtual learning; research teaching resources; increasing subject and pedagogical knowledge; use of ICT resources that can contribute to increasing professional development.

TASK COMPONENTS

Find various ICT resources that can be used to increase subject matter knowledge and pedagogical knowledge.

Identify personal professional development goals.

Create a plan to achieve the goal using ICT tools.

Identify peers, support staff or other individuals who can serve as resources, mentors or collaborators in the use of ICT.

TASK FREQUENCY, IMPORTANCE, DIFFICULTY AND OCCURRENCE

Quarterly, very important, somewhat difficult and this task is scheduled or planned for.

TASK TRIGGER

A desire to improve employment opportunities.

Changes in the curriculum.

A need to stay up to date in subject area.

A need to expand skills.

PREREQUISITE KNOWLEDGE

Tasks 4.2, 4.3, 4.4 and 4.7.

Knowing how to use the Internet and communicate online.

Understanding the benefits of using ICT resources for expanding knowledge and staying up to date.

Awareness of the capabilities, strengths and weaknesses of the ICT resource for professional development.

BEST PRACTICES

Start with simple tasks and be flexible and realistic about how much can be achieved initially.

Adhere to the personal professional development plan.

Verify the credibility and quality of the ICT resources.

Set aside planned time for professional development.

OBSTACLES

Lack of dedicated time to invest in professional development.

Difficulty in identifying credible resources.

Cost of resources.

Lack of skill or confidence in using ICT tools and resources.

RELATED ROLES

Peers, subject matter experts and pedagogical experts in the education world.

COMMON MISTAKES

Underestimate the time required.

Not verifying the credibility of the resources.

Not persevering despite initial lack of success.

CRITICAL MISTAKE

Not having a personal and realistic plan for professional development.

SUCCESS CRITERIA

The use of ICT expands the potential expert input to professional development.

The ability to engage with communities of practice, for example online discussions between teachers about pedagogy.

RELATED DECISIONS

Is this a worthwhile investment of time and money in using ICT for professional development.

Is the selected ICT resource the best or only option?

Does the teacher have the skills to use the ICT resource?

Is the selected ICT resource the best or only option?

6.3 MANAGE SAFETY ISSUES IN DIGITAL ENVIRONMENTS

SCOPING STATEMENT

Cyber bullying; appropriate information to post; predators; communication forums; privacy and piracy issues; viruses; scams; spam; cookies; pop-ups; intellectual property rights, copyright, inappropriate content; digital citizenship; email etiquette; ethics; legal requirements; confidentiality of personal data; password issues.

TASK COMPONENTS

Take preventive action against viruses, spam, malware, cookies etc.

Be aware of the school policy on the use of digital devices, and implement policy's requirements.

Act as a role model of good digital citizenship.

Ensure security of data (confidentiality of personal data).

Respect copyright and intellectual property rights.

Teach students about risks of Internet and safe use of the Internet (cyber bullying; appropriate information to post; predators; communication forums) and appropriate email procedures and netiquette.

In teaching students, balance the dangers of Internet use with the benefits.

Observe the acceptable use policy, and encourage others to observe it.

OUT OF SCOPE

Psychological well-being of students, addiction (to games etc.), in-depth knowledge of legal requirements.

TASK FREQUENCY, IMPORTANCE, DIFFICULTY AND OCCURRENCE

Hourly, critical, very difficult and this task occurs as the result of an unplanned event.

TASK TRIGGER

Students using Internet.

Teachers accessing or maintaining records.

Teachers making reports to others, such as parents, administrators or exam boards.

TOOLS USED

Browsers and databases particularly, but in principle any digital tool or data.

BEST PRACTICES

Taking all possible precautions to avoid dangers (of spam, scams, predators etc) and to maintain data security (e.g., through passwords) and to avoid improper divulgence of confidential data.

OBSTACLES

Ignorance of dangers.

Absence of anti-virus software. Naivety.

COMMON MISTAKES

Complacency.

Failing to recognize the extent of students' awareness of safety issues and the actions needed.

Creating excessive fear of Internet use and risks.

RELATED ROLES

Students, teachers, parents, IT support and administration.

RELATED DECISIONS

How to present the dangers according to the age of the students.

Whether to involve parents in addressing the issues.



SYLLABUS CANDIDATES

Candidates for the ICT-CFT Technology Literacy syllabus are education professionals, including teachers in teacher-education, who are interested in developing skills to use ICT effectively in education.

PREREQUISITES

- Skills
 - Basic digital literacy skills including familiarity or exposure to office productivity tools, for example word processing, spreadsheets and presentations.
 - File management.
 - Basic computer operation skills (including keyboard/mouse skills).
 - Familiarity with Internet use.
- Access to ICT

Access at school for teachers as well as students will be beneficial for successful completion of this syllabus.

NOTES

References to **Task Frequency** are on a six-point scale: Hourly, Daily, Weekly, Monthly, Quarterly, Yearly.

References to **Task Importance** are on a five-point scale: Very Difficult, Difficult, Somewhat Difficult, Low Difficulty, Not Difficult.

References to **Task Difficulty** are on a five-point scale: Very Difficult, Difficult, Somewhat Difficult, Low Difficulty, Not Difficult.

Under the **Obstacles** heading for each task, it should be assumed that obstacles include a lack of resources, time and creativity.

Technology Literacy: Exam Specifications

ICT-CFT MODULES	ICT-CFT OBJECTIVES (TEACHERS SHOULD BE ABLE TO ...)	EXAM FUNCTIONAL GROUP
MODULE 1 UNDERSTANDING ICT IN EDUCATION	TL.1.a. Identify key characteristics of classroom practices and specify how these characteristics serve to implement policies.	Demonstrate understanding of the Technology Literacy goals described in the ICT-CFT framework.
MODULE 2 CURRICULUM AND ASSESSMENT	TL.2.a. Match specific curriculum standards to particular software packages and computer applications and describe how these standards are supported by these applications. TL.2.b. Help students acquire ICT skills within the context of their courses. TL.2.c. Use ICT to assess students' acquisition of school subject matter knowledge and to provide students with feedback on their progress using both formative and summative assessments.	Demonstrate basic knowledge of how ICT resources can support curriculum outcomes.
MODULE 3 PEDAGOGY	TL.3.a. Describe how didactic teaching and ICT, can be used to support students' acquisition of school subject matter knowledge. TL.3.b. Incorporate appropriate ICT activities into lesson plans so as to support students' acquisition of school subject matter knowledge. TL.3.c. Use presentation software and digital resources to support instruction.	Integrate technology and pedagogy.

EXAM OBJECTIVES

1. Identify the policy goals supported by the ICT-CFT framework.
2. Identify ICT-CFT framework and approaches.
3. Identify the target student outcomes that result from implementing a ICT-CFT-supported learning experience.

Note: We cannot test knowledge of specific local and national policies.

Assumption: These objectives are based on the assumption that ICT-CFT is a national policy goal.

1. Given a curriculum goal or standard, incorporate ICT instructional and assessment resources.
2. Select an appropriate computer-based tool to monitor and share student performance data

Item Ideas:

Note: The consensus of the workshop of subject matter experts who produced this exam specification is that testing whether teachers can help students acquire basic computer skills, such as typing and using a mouse, are out of scope for this exam.

1. Integrate ICT into didactic knowledge acquisition and learning theory models.
2. Create learning activities that use ICT resources to support a specific educational outcome.
3. Apply ICT resources to “just in time” and spontaneous learning interactions.
4. Design presentations that appropriately incorporate ICT resources.

ICT-CFT MODULES	ICT-CFT OBJECTIVES (TEACHERS SHOULD BE ABLE TO ...)	EXAM FUNCTIONAL GROUP
MODULE 4 ICT	TL.4.a. Describe and demonstrate the use of common hardware technologies. TL.4.b. Describe and demonstrate the basic tasks and uses of word processors, such as text entry, editing text, formatting text, and printing. TL.4.c. Describe and demonstrate the purpose and basic features of presentation software and other digital resources. TL.4.d. Describe the purpose and basic function of graphic software and use a graphic software package to create a simple graphic display. TL.4.e. Describe the Internet and the World Wide Web, elaborate on their uses, and describe how a browser works and use a URL to access a website. TL.4.f. Use a search engine to do a keyword search. TL.4.g. Create an email account and use it for a sustained series of email correspondence. TL.4.h. Describe the function and purpose of tutorial and drill and practice software and how they support students' acquisition of knowledge of school subjects. TL.4.i. Locate off-the-shelf educational software packages and Web resources and evaluate them for their accuracy and alignment with curriculum standards and match them to the needs of specific students. TL.4.j. Use networked record keeping software to take attendance, submit grades, and maintain student records. TL.4.k. Use common communication and collaboration technologies, such as text messaging, video conferencing, and web-based collaboration and social environments.	Use basic tools to Support Learning Activities.
MODULE 5 ORGANIZATION AND ADMINISTRATION	TL.5.a. Integrate the use of a computer laboratory into ongoing teaching activities. TL.5.b. Manage the use of supplemental ICT resources with individuals and small groups of students in the regular classroom so as not to disrupt other instructional activities in the class. TL.5.c. Identify the appropriate and inappropriate social arrangements to use with various technologies.	Organize and manage a standard classroom.
MODULE 6 TEACHER PROFESSIONAL LEARNING	TL.6.a. Use ICT resources to enhance their productivity. TL.6.b. Use ICT resources to support their own acquisition of subject matter and pedagogical knowledge. TL.6.c. Identify and manage Internet safety issues.	Use digital literacy tools to enhance professional performance.

EXAM OBJECTIVES

1. Given a specific learning activity, identify the hardware requirements and devices necessary to support the activity.
2. Use the Internet to support learning activities.
3. Use a search engine and search strategies to support learning activities.
4. Create and use a Web-based email account.
5. Given a scenario, select the most appropriate type of software application.
6. Use software to manage and share student and classroom data.
7. Use common communication and collaboration technologies to support learning activities.

1. Integrate learning activities into a computer laboratory environment.
2. Manage the use of ICT resources with individuals, small, groups, and whole groups in varied environments.
3. Manage logistics and social interactions around ICT resources.

1. Use ICT resources to enhance teacher productivity.
2. Use ICT resources to support teacher professional learning.
3. Identify and manage Internet safety issues.

KNOWLEDGE DEEPENING: AN EXAMPLE OF A SYLLABUS

Each module describes the tasks which teachers need to carry out in their everyday work if they are to integrate ICT effectively into their teaching. These tasks indicate what might need to be learnt in a professional learning programme.

See Notes at the end of this syllabus document for further information about the module descriptions.

MODULE 1**UNDERSTANDING
ICT IN EDUCATION****Understanding education policies about ICT in teaching**

This module is about teachers' developing an in-depth understanding of the aims and principles of the ICT-CFT, and its relationship to national education policy. The teacher carries out the following tasks.

1.1 UNDERSTAND ICT POLICY

Examine available resources (documents, videos, press articles, textbooks, national education policies, school policies, ICT-CFT publications) which explain the aims and principles of the ICT Competency Framework for Teachers and related national and local educational policies.

Analyze how ICT can be used to develop problem-solving, collaborative, creative learners who achieve a deep knowledge of their school subjects and the application of the subjects to issues in the real world. Reflect on how ICT might contribute to all aspects of the teacher's work.

Search for examples and demonstrations of the ICT Competency Framework for Teachers principles in action. Such examples might include DVDs and video, press articles, online materials, documented case studies, visiting speakers, the observation of colleagues' lessons in the teacher's own school or in other schools.

Discuss with colleagues the policy aims, benefits and uses of ICT in education both for the teacher and the students.

TASK FREQUENCY, IMPORTANCE, DIFFICULTY

Daily, critically important and difficult.

TASK TRIGGER

Recognizing that traditional methods of education are not appropriate for the needs of society and the economy in the contemporary world.

Changes in school aims, or national policy.

PREREQUISITE KNOWLEDGE

Basic knowledge of project-based learning practices.

Knowledge of current social, political, economic issues nationally, locally and within the school community.

Familiarity with developments in ICT, for example the growth of social networks or cell phone usage.

Knowledge of how children and young people engage with ICT, for example the "digital natives" concept.

OBSTACLES

The personal prejudices, views, opinions, perspectives, and outlook of the teacher.

Reluctance or inability to consider new ideas.

Ready access to key resources such as national or local policy statements.

Absence of professional learning programs, or poor-quality programs.

Ineffective national and local leadership of education policy and its dissemination.

Opposition to policy objectives from social, political, religious, community or parent groups, or business interests. Such groups may significantly influence a teacher's perception of policy issues, and teachers may need to engage with such groups and seek to influence them, if the teacher is to be able to implement the policy aims successfully.

COMMON MISTAKES

Assuming sufficient knowledge of the policy without examining it.

Dismissing the policy as merely a passing fad, or political whim; not realizing that policy issues are important for the work of the teacher.

Failing to recognize that the policy is about teaching practice, not simply being able to use the terminology.

CRITICAL MISTAKES

Assuming that the policy implementation is only the responsibility of one person in the school, such as the "ICT Coordinator", rather than the responsibility of every teacher.

MODULE 2

CURRICULUM AND ASSESSMENT

Achieving curriculum and assessment goals through ICT

This module is about how the use of ICT affects the curriculum and assessment. The teacher:

- identifies in the curriculum the key concepts and processes which can best be taught through using ICT; this refers not only to knowledge and understanding, but also to skills, procedures, values and attitudes.
- decides how to use ICT in assessing students.

These two tasks are described in detail below.

2.1 IDENTIFY KEY CONCEPTS AND PROCESSES IN THE CURRICULUM WHICH CAN BE BEST TAUGHT BY USING ICT.

Identify key knowledge and concepts in the subject, or subjects, to be taught in reference to official guidelines, requirements, curriculum statements, syllabi, and official textbooks, and according to the teacher's understanding of the subject matter, and decide which knowledge and concepts can best be taught by using ICT.

Identify key skills and processes which can be developed through the curriculum by use of ICT. These are skills and processes such as creativity, innovation, communication and collaboration, research, critical thinking and problem-solving applied to real-world problems.

Select ICT tools and resources which are the most appropriate for achieving curriculum goals and the skills to be promoted in the students, but without neglecting possible non-ICT resources.

Identify how ICT could be used to meet the learning needs of all students, from least able to most able and those with particular needs, for example ICT applications for students with learning difficulties, or for gifted or dyslexic, or visually challenged students.

TASK FREQUENCY, IMPORTANCE, DIFFICULTY

At least monthly, critically important, and somewhat difficult.

BEST PRACTICES

Discussion with professional colleagues including curriculum coordinators and school leaders.

OBSTACLES

Teachers' lack of confidence in subject matter or in themselves to permit challenging questions from students.

Cultural, family or religious opposition to certain concepts and knowledge.

COMMON MISTAKES

Focusing on skills and ignoring key concepts
Introducing personal prejudice.s

Failing to distinguish between fundamental and non-fundamental concepts.

Excessive emphasis on particular concepts and knowledge.

Failing to think critically and independently

Creating rigid rules of thought for students about what is fundamental to the subject matter.

2.2 USE ICT TO ASSESS STUDENTS' UNDERSTANDING OF KEY SUBJECT MATTER CONCEPTS, SKILLS AND PROCESSES

Use ICT to assess not only factual knowledge but particularly to assess fundamental understanding of key concepts, and higher-level processes such as problem-solving, collaboration and critical thinking.

Consider the varied types of assessment for which ICT might be valuable, for example rubrics, tests, exams, portfolios, observations and interviews.

Consider how ICT could contribute to these different types of assessment, for example:

- Video recordings to assess practical tasks such as public speaking or sport performances.
- ICT applications which can detect features of a student's performance not readily apparent to the teacher, such as very specific difficulties and strengths in a child's reading skills or in math.
- Online standardized tests to compare students' attainment against established benchmarks.
- Intranet or email to share assessment criteria and objectives with students and parents.
- Digital visualizations to assess whether students have key concepts of (for example chemical reactions).

- Word-processing or spreadsheet applications used by students to create questionnaires for self-assessment and peer-assessment.
- ICT applications to help students with special needs, such as audio versions of text and Braille keyboards for visually impaired students.

TASK IMPORTANCE, DIFFICULTY AND OCCURRENCE

Very important, difficult and scheduled or planned for

PREREQUISITE KNOWLEDGE

Basic assessment skills and theory.

OBSTACLES

Lack of resources (for example only one computer so students have to take the test one at a time, telling each other the answers; or a slow Internet connection which makes the test take too long).

COMMON MISTAKES AND CONSEQUENCES

Use of ICT can result in assessment bias if it upsets the necessary balance between knowledge, skills, concepts and processes. Using too narrow a range of assessment tools.

MODULE 3

PEDAGOGY

Designing and implementing collaborative, project-based learning

The teacher:

- devises a suitable project-based learning activity incorporating ICT
- implements the learning activity
- considers how effectively ICT was integrated into the activity.

These three tasks are described in detail below.

3.1 DESIGN A PROJECT-BASED LEARNING ACTIVITY INCORPORATING ICT.

Identify a problem or issue which is relevant to the students. It may be a national, international, local or personal problem. Examples might be water shortage, bullying, earthquakes, poverty, climate change, domestic violence, sexual discrimination, healthy eating.

Teachers may need to consult colleagues and students, and conduct some research to find the most suitable problem.

The problem should:

- incorporate key concepts from the curriculum.
- be presented to students in a vivid and stimulating way, for example by a video case study.
- motivate students to be creative and innovative.
- be a challenging one, which can be approached in different ways and has multiple possible solutions.
- preferably, include more than one subject and require teachers to work collaboratively.

The learning activity based on the problem should:

- be suited to the knowledge, skill, and experiences of the students, but also challenge them.
- include data gathering, team work, data analysis, problem solving and decision making.
- encourage collaboration by requiring students to depend on each other to complete the task, to communicate with people in other locations and to respect the opinions of others.

- address any special needs of students, such a Braille keyboard for visually impaired students or different resources for particularly gifted students.
- include formative and summative assessment.

The plan for the activity should include aims, objectives, the timeline, instructions for the students, resources and reference material, the ICT to be available (which might include setting up a wiki or blog and booking time in a room with computers), the activities, the anticipated outcomes and the assessment criteria.

The teacher should keep a reflective journal describing why certain decisions were taken, to help them develop their skill in using ICT for project-based, collaborative learning activities.

TASK IMPORTANCE, DIFFICULTY AND OCCURRENCE

Critically important, somewhat difficult, and is scheduled or planned for.

ICT TOOLS

These might include the Internet, and productivity, multimedia, project manager, mind-mapping and collaboration applications.

OBSTACLES

Lack of creativity in designing activities.

Inadequate resources available to teachers for planning purposes.

Rigidity of curriculum or the external assessment system.

An unsupportive school environment, management or local community.

COMMON MISTAKES AND CONSEQUENCES

Not anticipating effects on third parties, for example timetable clashes with other lessons or interference with other school activities.
Overlooking copyright and privacy issues.
Inadequate communication with staff or parents.

CRITICAL MISTAKES AND CONSEQUENCES

Projects which are appealing but do not allow students to learn key concepts.
Not recognizing the student's work load or skill level.
Not addressing the key concepts in the curriculum.

3.2 IMPLEMENT THE PROJECT-BASED LEARNING ACTIVITY

Share the project objectives and assessment criteria with the students, explaining how they will be assessed.
Organize students into groups, as appropriate to the activity and the ICT integration.
Manage presentations, discussions, and reflection.
Coordinate with required peers as required in cross-disciplinary projects.
Facilitate critical thinking, problem solving, collaboration, and various forms of communication.
Conduct appropriate formative and summative assessment tasks and complete instruments. For example, evaluate student presentations and participation.
Maintain a reflective journal as described above.

TASK IMPORTANCE, DIFFICULTY AND OCCURRENCE

Critically important, somewhat difficult and is scheduled or planned for.

PREREQUISITE KNOWLEDGE

Understanding the role of a facilitator.
Understanding of the learner-centered approach in project-based activities.
How to manage time and distribute resources.

TOOLS USED

Internet, word processor, presentation and other productivity applications.
Multimedia tools (voice recorder, video camera etc).
Collaboration and information sharing tools (email, wiki etc).
Data gathering, analysis and storage tools.
Project management tools.

OBSTACLES

Inadequate technical skills.
Inadequate creativity in executing activities.
Inadequate integration of ICT tools, for example, when students need to integrate multiple sources of digital resources in a single project.
Inability to sustain the motivation of the students through the project.
Inability to control external environment, for example, the failure, in a collaborative project, of certain different groups to deliver their contribution to the project.
Ineffective communication in a project requiring collaboration.

COMMON MISTAKES

Not switching roles to being a facilitator rather than a lecturer.
Inadequate communication with staff members, parents and others as required for the project.
Not being strict about defined timelines.

CRITICAL MISTAKES

Not managing group dynamics properly.
Losing track of the project's objective.
Overestimating the reliability of the ICT resource.
Not recognizing the student's work load or skill level.

3.3 CRITICALLY ANALYZE THE EFFECTIVENESS OF THE INTEGRATION OF ICT IN THE PROJECT-BASED ACTIVITY.

Analyze students' outcomes from the project and their use of ICT during the project, with specific reference to:

- the student's level of understanding of the key concepts
- whether ICT was essential to the activity
- the appropriateness of the ICT selected and whether a different option might be used in the future to improve the effectiveness
- obstacles encountered in the selected ICT and how they were addressed
- how ICT integration in the activity might be strengthened.

Note the conclusions in the reflective journal referred to above and discuss with colleagues as appropriate.

TASK IMPORTANCE, DIFFICULTY AND OCCURRENCE

Critically important, somewhat difficult and scheduled or planned for.

PREREQUISITE KNOWLEDGE

Understanding the pedagogical integration of ICT into teaching and learning.

Understanding of the learner-centered approach in project-based activities.

OBSTACLES

Insufficient knowledge of integration of ICT resources into all stages of the project, for example data collection, data analysis, presentation, sharing of information.

Insufficient understanding of the teaching and learning strategies.

Insufficient understanding of project-based learning.

Insufficient knowledge of the characteristics of ICT.

CRITICAL MISTAKES

Focusing on the quality, characteristics or features of the technology instead of its appropriateness to the teaching and learning.

Seeing ICT as the solution rather than supporting the project outcome.

MODULE 4

ICT

Using ICT to create and manage students' collaborative, project-based learning.

The teacher:

- selects or creates suitable software and resources
- uses ICT to communicate and collaborate
- uses ICT to manage and monitor student projects.

These three tasks are described in detail below.

4.1 SELECT OR CREATE SUITABLE SOFTWARE AND RESOURCES

Investigate and consider the full range of ICT tools and resources available, taking into account their quality and reliability. Consult:

- organizations which provide advice on ICT in teaching, professional subject associations, officials who provide advice to schools, for example a history advisor
- students about what ICT they have found useful in previous lessons, and other subjects and in their own experience, for example social networks for acquiring information
- ICT support technicians, technology facilitators, administrators, ICT teachers, knowledgeable colleagues.

Select which ICT tools are most appropriate to achieve curriculum goals such as critical thinking, creativity, problem-solving, decision-making and knowledge-deepening in the subject area. Open-ended software could include, for example, tools for visualization and data analysis, multi-media software, and advanced use of productivity tools (presentation, word-processing, database, spreadsheets).

Search for suitable existing resources and create resources as necessary, for example blogs, wikis, video, audio, a learning management system, web pages, online storage, etc.

Take into account the age-group of students and their existing skills and knowledge, what resources are available to students at home and elsewhere.

Consider whether tools and resources help students apply their knowledge and skills to real problems in the world outside the classroom.

Ensure that needs of all students are met, from least able to most able and take advantage of the opportunities ICT offers to meet these needs, such as special applications for students with learning difficulties, or who are gifted or dyslexic or visually challenged.

TASK FREQUENCY, IMPORTANCE, DIFFICULTY AND OCCURRENCE

Quarterly, critically important, somewhat difficult, and scheduled or planned for

TASK TRIGGER

Part of the normal planning process for units, lessons and learning activities.

Realizing that students have failed to understand something and that a different approach is needed which uses ICT resources, for example a digital visualization in science to represent an abstract concept.

When school administration arrangements require selection of ICT resources, for example when equipment or a computer room must be booked at the beginning of semester.

When the school decides that ICT will be integrated into lessons.

When new ICT resources become available, for example when interactive white boards are installed.

PREREQUISITE KNOWLEDGE

How to use the Internet to find out what software tools and resources are available, for example to consult online teacher forums.

How to teach students to use ICT, for example how to use a data logger.

Opportunities for teachers to share ideas examples of best practice between different countries, regions and schools.

TOOLS USED

Internet, search engine, colleagues' suggestions, teacher forums, experience, catalogues.

OBSTACLES

Physical limitations such as an intermittent electricity supply.

Cultural, political, family or religious opposition to certain ICT resources. For example, access to Google or YouTube is blocked in some countries, or cultural objections to young people questioning authority figures like teachers.

Resources not available in native language or in language which students can understand.

COMMON MISTAKES

Being unduly influenced by the product's advertising and promotional material.

Choosing something which is not compatible with other tools and resources, for example a Macintosh program which cannot be used on a PC computer or an application which makes excessive memory demands.

Inadequate security measures to prevent vandalism or loss of data.

CRITICAL MISTAKES

Teachers not testing the equipment and familiarizing themselves with it before using it in lessons.

Not matching software to students' level of development.

Not making use of the full capability of the digital tools and resources, for example, using an interactive white board as a blackboard only the teacher using the interactive white board.

Choosing software or resources which are appealing and enjoyable but have no real value for teaching and learning. Using ICT when it is not needed or not helpful.

4.2 USE ICT TO COMMUNICATE AND COLLABORATE

Use ICT to communicate, share and collaborate with other teachers to develop lessons, units and projects.

Get students to use emails, social networking sites, video-conferencing, Twitter, chat, instant messaging, social gaming etc, to communicate with each other, with their teacher and with communities outside the school.

This interaction should promote a deeper understanding of the subject matter and a respect for the views and attitudes of others.

Use ICT to communicate with students, for example for them to submit their project reports online, with parents and with the school administration.

Makes use, as necessary, of ICT features which address particular learning needs such as students who have a different first language from the host country, or have impaired hearing.

Use tried and tested communication methods, for example email, where possible, but be willing to experiment with new resources as they become available, for example, video-conferencing.

TASK FREQUENCY

Daily, very Important, difficult and is scheduled or planned for.

PREREQUISITE KNOWLEDGE

ICT communication literacy, for example knowing how to use email, chat and set up video-conferencing.

BEGINNER AND ADVANCED TASK COMPONENTS

Beginner tasks include simple emailing and other basic communication tools (for example instant messaging). Advanced tasks include video-conferencing, getting students to respond to emails, collaborating with teachers and students in other countries

OBSTACLES

Restricted Internet access or speed.

Language barriers in communicating with students and teachers in other countries.

Time differences between different countries.

Equipment failure.

COMMON MISTAKES AND CONSEQUENCES

Distraction from intended subject matter and purposes. For example, students and teachers use communication for social purposes.

Inadequate planning, for example conferencing facilities not booked, time differences not taken into account, not choosing the right people to communicate with such as students in other schools who do not engage with project or have no real information to provide.

Failing to recognize cultural differences and sensitivities.

CRITICAL MISTAKES AND CONSEQUENCES

Choosing the wrong software and communication methods, for example a sophisticated video-conferencing facility at one school connected to a simple Skype facility at the other school, or incompatible technical systems.

DECISIONS RELATED TO THIS TASK

School decisions about what equipment to purchase.

Decisions by school, parents, government on what communication and external access is permitted.

Decisions by ICT technicians in school about what communication and Internet access is permitted for technical reasons.

4.3 USE ICT TO MANAGE AND MONITOR STUDENT PROJECTS

Use ICT, for example learning management systems or wikis, to manage project work and to assess the students' progress and outcomes.

Enable students to use ICT to manage themselves in collaborative work, for example to manage the process of getting different students to edit and revise a collaborative document, or to facilitate an online discussion, or to contribute to video editing.

Check that students are adhering to the project schedule and have submitted each piece of work specified in the project or assignment instructions on time.

Check on student progress regularly enough to detect problems in time to rectify them and to provide assistance where necessary.

Use tracking and revising tools (word processing programs, discussion forum posts etc.) to see what each student contributes to collaborative activities.

Use ICT to analyze records of students' work, grades and progress.

Provide opportunities for students to comment on the project and provide feedback.

TASK FREQUENCY, IMPORTANCE, DIFFICULTY AND OCCURRENCE

Weekly, very important, somewhat difficult, and is scheduled or planned for.

TASK TRIGGER

Giving the students a project assignment.
The need to report on students' progress.

PREREQUISITE KNOWLEDGE

Experience in conducting project-based learning and monitoring students.

Familiarity with software which can be used for monitoring, for example learning management systems, spreadsheets.

COMMON MISTAKES AND CONSEQUENCES

Teacher's management unnecessarily restricts students' initiative in their work.

Teacher does not identify the key features which need to be monitored.

Teacher tries to check and manage too much of what students do.

Unreflective use of existing software which may not adequately capture aspects of students' work which need to be monitored.

CRITICAL MISTAKES

Teacher fails to give timely formative feedback to students.

Teacher fails to define tasks and timelines clearly enough.

MODULE 5

ORGANIZATION AND ADMINISTRATION

Managing physical, human and time resources to integrate ICT into the learning environment

The teacher uses ICT to manage:

- the physical learning environment and resources
- time and human resources.

These two tasks are described in detail below.

5.1 MANAGE THE PHYSICAL LEARNING ENVIRONMENT AND RESOURCES

Consider:

- available ICT resources which are appropriate for the learning goal, for example the number of computers or cameras
- technological infrastructure, for example Internet speed, wireless facilities, networking
- special needs of students with regard to accessing the ICT resources, for example students with limited physical mobility
- any limitations imposed by school policies or by the school management, for example access to a budget or a computer lab being locked after school hours.

Arrange the physical resources to produce a flexible learning environment which meets different learning goals and pedagogical approaches such as the need for students to work in groups as well as individually. This includes the positioning of tables, desks, computers and equipment.

Ensure the learning environment is compliant with safety, security, and other environmental conditions, for example that electrical wiring does not restrict mobility, safe online collaboration can take place, vandalism is prevented, firewalls are configured and a virus scanner installed. The teacher should have sufficient skills to state these requirements to a technical specialist. Note that the learning environment may include the home and the community as well as the school.

Have a contingency plan for ICT resource failure, and plan for maintenance and sustainability.

Engage students to take the role of ICT administrators and monitors, as appropriate.

The task does not include:

- purchasing ICT equipment
- configuring the computers, for example installing the operating system and applications
- configuring the network
- maintenance of ICT resources.

TASK IMPORTANCE, DIFFICULTY AND OCCURRENCE

Important, difficult and is scheduled or planned for.

TASK TRIGGER

When designing and implementing a project.
When planning learning activities.
When planning or reviewing school facilities and the physical infrastructure.
When planning the budget.

TOOLS USED

Graphical and drawing applications.
Resource management and inventory systems.
Scheduling systems.

OBSTACLES

Teachers not included in decision making, for example where infrastructure decisions are made by the ministry or school policy.
Rigidity of policies, or policies which are driven by financial considerations rather than pedagogical needs, for example a policy which forbids the use of cell phones

and does not allow teachers to use mobile learning strategies.

Curriculum and assessment requirements which do not allow flexible ICT use.

Limited ICT resources resulting in the need to share and negotiate access.

Lack of information about the available ICT resources, for example if the ICT resource manager does not freely share information about resources in the school.

5.2 MANAGE TIME AND HUMAN RESOURCES USING ICT

Manage the scheduling of the learning environment, for example ensure ICT resources are available as per project timeline, check whether students need to be rotated for ICT resource access, ensure project stays on schedule, plan for students having ICT resources access at school and home and for those who have ICT access only at school.

Manage and schedule group work in a project that uses ICT, for example where students need to be grouped appropriately depending on whether there is one computer per student or multiple students to a computer.

Coordinate required ICT support and collaboration from peers, for example for cross-disciplinary ICT-related activities.

Coordinate in-school ICT resources with out-of-school resources such as home access, community technology centres or libraries.

Manage an ICT resourced classroom, for example setting up rules, procedures and routines.

Manage classroom teaching time to avoid losing track of time due to over enthusiasm or distractions, and plan for technology set up time.

Use ICT to manage and coordinate personal planning time.

This task is separate from traditional classroom management skills and time management skills.

TASK FREQUENCY, IMPORTANCE, DIFFICULTY AND OCCURRENCE

Weekly, very important, somewhat difficult and the task may be scheduled or planned for, or it may occur as the result of an unplanned event.

PREREQUISITE KNOWLEDGE

Time management skills.

Communication skills.

Classroom management skills.

TOOLS USED

Communication and collaboration tools, project management tools and scheduling systems.

OBSTACLES

Professional restrictions, for example union regulations or contracts of employment.

Insufficient time for planning.

Constraints due to policies related to class schedule and curriculum.

COMMON MISTAKES AND CONSEQUENCES

Not keeping to schedule.

Not planning for contingencies (expecting immediate response time from peers).

Critical mistakes and consequences.

Underestimating time allocated for tasks.

MODULE 6

PROFESSIONAL LEARNING

Use digital resources and online collaboration for professional learning

To learn professionally the teacher:

- finds, manages and uses digital resources
- collaborates with others in online communities.

These two tasks are described in detail below.

6.1 MANAGE AND USE DIGITAL RESOURCES FOR PERSONAL PROFESSIONAL LEARNING.

Using ICT resources such as the Internet and online-forums search for professional learning resources (for example documents, video, examples of lesson plans and projects, advice from experts) to develop:

- a deeper knowledge of the subject, or subjects, taught
- pedagogical skills
- skills in integrating ICT into teaching.

Digitally organize the professional learning resources. For example use bookmarking tools and email software to keep contact details of experts.

Make use of the identified resources to improve professional skills and knowledge.

TASK IMPORTANCE, DIFFICULTY AND OCCURRENCE

Very Important, somewhat difficult, and this task may be scheduled or planned for, or it may occur as the result of an unplanned event.

TASK TRIGGER

When professional needs assessment indicate that new skills need to be learned.

When an obstacle is encountered in the design or implementation of a project or lesson planning, for example how to help students develop problem solving approaches.

When there is a need to deepen subject matter knowledge.

Professional learning requirements from the school principal or education authorities, for example for a teaching certificate to be periodically renewed.

TOOLS USED

Internet, bookmarking tools, online communities, education portals.

Self-paced professional learning which includes simulation-based learning.

Online video case studies demonstrating different classroom practices

OBSTACLES

Network bandwidth, quality of Internet connectivity.

Language barriers.

Cultural barriers.

Lack of support from school management.

6.2 COLLABORATE ONLINE TO DEVELOP PROFESSIONALLY.

Regularly collaborate with peers, participate in different social networks and learning communities to deepen knowledge of the subject or subjects taught, pedagogy and the integration of ICT into teaching. Schedule time for this collaboration.

Communicate with online community members to solve problems, find information and share ideas using all available digital media formats such as text or video. The online communities may include other teachers, school principals, mentors, curriculum and subject matter experts, academics, ICT administrators and

practitioners who can help with knowledge application in the real world, for example in the case of biology the practitioner might be a physician. Using ICT, learn from experts, for example by participating in a shadowing or mentoring program. Using ICT, collaborate with peers in professional learning activities, for example to develop improved learning materials. Reflect on the pros and cons of the collaboration using the various collaboration tools. This task does not include technical aspects of setting up an online collaboration group. TASK FREQUENCY, IMPORTANCE, DIFFICULTY AND OCCURRENCE Weekly, very important, somewhat difficult and this task may be scheduled or planned for, or it may occur as the result of an unplanned event.	TASK TRIGGER When local or school resources cannot meet a professional learning need. When evidence is needed of participation in a professional community, for example for career development. When required by school policy. PREREQUISITE KNOWLEDGE Online inter-personal skills ("netiquette"). OBSTACLES Network bandwidth, quality of Internet connectivity. Language barriers. Fear of participation (fear of peer assessment). Cultural barriers. Financial constraints, for example if professional communities require a fee for membership.
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SYLLABUS CANDIDATES

The primary candidates for the UNESCO ICT-CFT Knowledge Deepening professional learning would be teachers using ICT and interested in integrating ICT effectively

into education. The secondary candidates would be those in teacher education, preferably with some experience of teaching. They would have the following attributes.

- Competence in Internet use and able to research online.
- Competence in productivity tools such as word processing, spreadsheets, and presentations.
- Competence in using communication and collaboration tools such as email, video conferencing, social networking.
- A basic knowledge of how ICT resources can support curriculum outcomes.
- An interest in continuously improving their knowledge of the subject matter they teach and their teaching skills.

- A knowledge of the subject, or subjects, they teach, appropriate to the age of their students.
- Classroom management and organization skills.
- A knowledge of teaching and learning strategies which help students achieve in-depth knowledge; for example collaborative learning, problem-based learning, project-based activities, games and simulations, enquiry experiments, case studies, coaching, mentoring, formative assessment.

NOTES

References to **Task Frequency** are on a six-point scale: Hourly, Daily, Weekly, Monthly, Quarterly, Yearly.

References to **Task Importance** are on a five-point scale: Critical, Very Important, Important, Somewhat Important, Not Important.

References to **Task Difficulty** are on a five-point scale: Very Difficult, Difficult, Somewhat Difficult, Low Difficulty, Not Difficult .

Under the **Obstacles** heading for each task, it should be assumed that obstacles include a lack of resources, time and creativity.

Knowledge Deepening: Exam Specifications

ICT-CFT MODULES	ICT-CFT OBJECTIVES (TEACHERS SHOULD BE ABLE TO ...)	SYLLABUS MODULE	EXAM FUNCTIONAL GROUP
MODULE 1 UNDERSTANDING ICT IN EDUCATION	KD.1.a. Explain and analyze the principles of using ICT on education. Describe how these principles can be put into practice in their own teaching. Analyze what issues arise in implementing these principles and how those principles can be addressed.	Policy Understanding education policies about ICT in teaching.	Understand how ICT policies impact learners and teachers.
MODULE 2 CURRICULUM AND ASSESSMENT	KD.2.a. Identify key concepts and processes in content areas; describe the function and purpose of subject-specific tools and how they support students' understanding of these concepts and processes and their application to the world outside the classroom. KD.2.b. Develop and apply knowledge and performance-based rubrics that allow teachers to assess students' understanding of key subject matter concepts, skills, and processes.	Curriculum and Assessment Achieving curriculum and assessment goals through ICT.	Use ICT to achieve curriculum goals.

PATH 1 OBJECTIVES FROM WORKSHOP (MANY REQUIRING PORTFOLIO/PEER ASSESSMENT)	PATH 2 PROPOSED OBJECTIVES FOR MEASUREMENT WITHIN A COMPUTER-BASED ENVIRONMENT
1. Analyze and discuss how ICT can be used to develop problem-solving, collaborative, creative learners who achieve a deep knowledge of their school subjects and the application of the subjects to issues in the real world. 2. Explain how ICT can contribute to all aspects of the teacher's work.	1. Given an ICT policy, identify its potential impact on learners. 2. Given an ICT policy, identify its potential impact on different aspects of a teacher's work.
1. For a given area of a curriculum, select the concepts and processes that can be taught using ICT and justify the selection. The justification should include how ICT can promote deeper understanding of the concepts. 2. Given a topic in the curriculum, design an ICT-based rubric to assess students' understanding of a key concept or process in the curriculum. 3. Given a range of ICT assessment tools, analyze which would be the most useful for assessing higher-level skills (such as problem-solving, critical thinking, etc.) and fundamental understanding of key concepts.	1. Given a scenario, identify the concepts and processes that can be taught by using ICT resources. 2. Given a scenario and an assessment goal, design an appropriate ICT-based rubric. 3. Given a scenario and skill assessment goal, identify an appropriate ICT tool.

ICT-CFT MODULES	ICT-CFT OBJECTIVES (TEACHERS SHOULD BE ABLE TO ...)	SYLLABUS MODULE	EXAM FUNCTIONAL GROUP
MODULE 3 PEDAGOGY	KD.3.a. Describe how collaborative, project-based learning and ICT can support student thinking and social interaction, as students come to understand key concepts, processes and skills in the subject matter, and use them to solve real-world problems. KD.3.b. Identify or design complex, real-world problems and structure them in a way that incorporates key subject matter concepts and serves as the basis of student projects. KD.3.c. Design online materials that support students' deep understanding of key concepts and their application to real world problems. KD.3.d. Design unit plans and classroom activities so that students engage in reasoning with, talking about, and using key subject matter concepts while they collaborate to understand, represent, and solve complex real-world problems, as well as reflect on and communicate solutions. KD.3.e. Structure unit plans and classroom activities so that open-ended tools and subject-specific applications will support students in their reasoning with, talking about, and use of key subject matter concepts and processes while they collaborate to solve complex problems. KD.3.f. Implement collaborative, project-based unit plans and classroom activities, while providing guidance to students in support of the successful completion of their projects and their deep understanding of key concepts.	Pedagogy Designing and implementing a collaborative, project-based learning activity which focused on a real-world problem and incorporates ICT.	Design and implement ICT learning activities.

PATH 1 OBJECTIVES FROM WORKSHOP (MANY REQUIRING PORTFOLIO/PEER ASSESSMENT)	PATH 2 PROPOSED OBJECTIVES FOR MEASUREMENT WITHIN A COMPUTER-BASED ENVIRONMENT
1. Given a learning goal, use ICT to research and select an appropriate real-world problem. 2. Given a real-world problem, justify the integration of ICT in the process of designing a project-based activity. 3. Given a real-world problem, formulate a suitable way to present the problem to the students by using ICT. 4. Describe the different teaching and learning strategies to be used in the learning activity and how ICT would be integrated into them. Explain how the strategies would foster innovation and creative collaborative learning, problem-based learning, and what use would be made of activities such as games and simulations, enquiry, experiments and case studies. 5. Given the parameters of a project and the desired outcomes, specify a strategy to monitor students' work which incorporates ICT resources. 6. Given a project-based activity, provide recommendations for the improved use of ICT in the activity, and justify the recommendations.	1. Given a learning goal, select the most appropriate ICT resources to achieve the goal. 2. Use ICT resources to design a project-based activity. 3. Use ICT resources to present real-world problems to students. 4. Given a description of a learning activity, identify how to integrate ICT resources into the activity. 5. Given project parameters and desired outcomes, use ICT resources to monitor student work. 6. Given a project-based activity, recommend how to incorporate ICT resources into the activity.

ICT-CFT MODULES	ICT-CFT OBJECTIVES (TEACHERS SHOULD BE ABLE TO ...)	SYLLABUS MODULE	EXAM FUNCTIONAL GROUP
MODULE 4 ICT	KD.4.a. Operate various open-ended software packages appropriate to their subject matter area, such as visualization, data analysis, role-play simulations, and online references. KD.4.b. Evaluate the accuracy and usefulness of web resources in support of project-based learning with the subject area. KD.4.c. Use an authoring environment or tools to design online materials. KD.4.d. Use a network and appropriate software to manage, monitor, and assess progress of various student projects. KD.4.e. Use ICT to communicate and collaborate with students, peers, parents, and the larger community in order to nurture student learning. KD.4.f. Use the network to support student collaboration within and beyond the classroom. KD.4.g. Use search engines, online databases, and email to find people and resources for collaborative projects.	ICT Using ICT to create and manage students' collaborative, project-based learning.	Use ICT to manage student learning.
MODULE 5 ORGANIZATION AND ADMINISTRATION	KD.5.a. Place and organize computers and other digital resources within the classroom so as to support and reinforce learning activities and social interactions. KD.5.b. Manage student project-based learning activities in a technology-enhanced environment.	Organization and Administration Managing physical, human and time resources to integrate ICT into the learning environment.	Integrate ICT into the learning environment.
MODULE 6 TEACHER PROFESSIONAL LEARNING	KD.6.a. Use ICT to access and share resources to support their activities and their own professional learning. KD.6.b. Use ICT to access outside experts and learning communities to support their activities and their own professional learning. KD.6.c. Use ICT to search for, manage, analyze, integrate, and evaluate information that can be used to support their professional learning.	Professional learning Use digital resources and online collaboration for professional learning.	Integrate ICT resources into professional learning.

PATH 1 OBJECTIVES FROM WORKSHOP (MANY REQUIRING PORTFOLIO/PEER ASSESSMENT)	PATH 2 PROPOSED OBJECTIVES FOR MEASUREMENT WITHIN A COMPUTER-BASED ENVIRONMENT
1. For a given area of a curriculum, analyze which ICT tools will best teach the key concepts. The justification should explain how these specific ICT tools will meet the needs of all students and promote deeper understanding of the key concepts in the subject area. 2. For the given area of a curriculum, analyze which ICT tools will best promote higher-level mental processes such as problem-solving, creativity, collaboration and critical thinking. 3. For a given list of subject matter requirements, create an example of a suitable ICT resource which could be designed by the teacher or the students. 4. Given a peer-focused communication goal, analyze which would be the most appropriate ICT resource to achieve the goal. 5. For a given project or scenario, explain how ICT tools can promote student collaboration and communication. 6. Compare and explain the advantages and disadvantages of different ICT tools for communicating with parents and administration. 7. Given the parameters of a student project, or students' work generally, and the desired outcomes, specify a management strategy which incorporates ICT resources. 8. For a given project goal, explain how the project could be designed so that students use ICT to manage the project themselves, creating their own project plans monitoring their progress.	1. Given a list of key concept requirements, select the most appropriate ICT resources to teach that concept. 2. Given a desired learning outcome (for example, increased problem-solving ability), identify appropriate ICT resources to achieve that outcome. 3. Design an ICT resource strategy to meet specified subject matter requirements. 4-6. Use ICT resources to optimize communication with and collaboration between peers, learners, school administration, and parents. 7-8. Given the parameters of a student project and the desired outcomes, recommend a management strategy that incorporates ICT resources.
1. Given a scenario with a specified learning strategy, design the physical learning environment to support ICT integration. Provide a rationale for decisions made. 2. Given a scenario, plan access to resources needed for ICT integration. Plan should include ICT resource access and human resource coordination. The scenario should include the learning strategy that should be applied.	1. Design a physical learning environment to support ICT integration and learning goals. 2. Given an ICT integration scenario, identify environmental and infrastructure considerations.
1. Given a professional learning goal, identify the ICT resources that could be helpful in achieving that goal. Justify the selection. 2. Given a scenario, create an individual professional learning plan. The scenario may include a professional learning goal and ICT resource list. Justify the choice of ICT resources. 3. Given a scenario, create an individual professional learning plan. The scenario may include a professional learning goal and ICT resource list (experts, online communities, communities of practice). Justify the use of outside experts and learning communities, Explain how the collaboration would support professional goals.	1. Given a professional learning goal, identify the ICT resources that could be helpful in achieving that goal. 2. Given a professional research scenario, identify appropriate ICT resources that support the research activities. 3. Given an online collaboration goal, identify the ICT resources that could be used to achieve the goal.

GLOSSARY

Simple definitions of technical terms used in this publication.

- **application** – a computer program (see program below).
- **assessment for learning** – a new name for formative assessment (see formative assessment below).
- **authoring environment** – software for creating websites.
- **capacity-building** – increasing people's abilities, usually their ability to carry out their work, by improving their knowledge and skills.
- **competency** – the skills, knowledge and understanding needed to do something successfully.
- **computer laboratories** – a classroom full of computers so each student has their own computer to work on.
- **course** – a programme of study.
- **curriculum** – a list of the topics to be learnt in a course of study. (The terms 'curriculum' and 'syllabus' are used slightly differently in different countries, but essentially they both mean a list of what is to be learnt.).
- **curriculum framework** – a set of ideas and principles from which a more detailed curriculum or syllabus can be developed.
- **curriculum standards** (the level and extent of the skills, knowledge and understanding which the student is expected to achieve).
- **didactic teaching / didactic instruction** – teaching by telling students about the subject; teaching by talking, explaining, demonstrating, lecturing, posing questions to students, answering students' questions and conducting discussions with students. This is in contrast to teaching by helping students to learn through experimenting and reflecting, by getting students to do things rather than primarily listening to the teacher.
- **digital** – (as in digital content, digital devices, digital resources, digital technology) – essentially, another word for computers and computer technology. (Computers store and process information by converting it all to single-figure numbers – digits.).
- **digital citizenship** – having the ICT equipment and skills to participate in a digital society, for example to access government information online, to use social networking sites, and to use a mobile phone.
- **digital literacy** – basic computer skills such as being able to do word-processing or go online
- **digital tools** (as in 'Matching digital tools and resources with learning objectives ...') – another name for ICT
- **drill-and-practice software** – computer programs which help the student to learn through repeated practice, for example to memorise vocabulary in a foreign language or to learn maths procedures.
- **Exam Functional Groups** – the groups of competencies which the exam assesses. They indicate the function of the exam, not its form, so the exam questions do not need to be presented to the exam candidates in these groups
- **formative assessment** – assessment which helps students to learn (which shapes, or forms their learning) by showing what the students have not understood, what they might need to repeat and whether they are ready to move to the next stage. See also summative assessment below.
- **graphics software** – computer programs, like Photoshop, which create and manipulate images, pictures, photographs, diagrams and drawings.
- **ICT** – Information and Communication Technology, which means computers, mobile phones, digital cameras, satellite navigations systems, electronic instruments and data recorders, radio, television, computer networks, satellite systems ... almost anything which handles and communicates information electronically. ICT includes both the hardware (the equipment) and the software (the computer programs in the equipment).

- **ICT-CFT** – UNESCO's ICT Competency Framework for Teachers, also referred to as the Framework.
- **Internet** – the Internet and the World Wide Web (or web, or websites) are often used interchangeably, but strictly speaking the Internet is the network which connects computers around the world, and the websites are the documents, images and other material on the network.
- **knowledge society** – a country, or economy or community, in which knowledge is very important because much of its economic and social activity involves handling information.

See also

<http://unesdoc.unesco.org/images/0014/001418/141843e.pdf>

and

<http://unesdoc.unesco.org/images/0012/001295/129531e.pdf>

- **knowledge society skills** – the skills needed to handle and create information and knowledge, which means skills such as problem-solving, critical-thinking, analysis, collaboration, communication, understanding others' points of view, and being able to use ICT which is a key tool for handling information.
- **learning organisations** – organisations, such as a school or a company, which embrace the idea that everyone needs to keep learning throughout life. So teachers would continue to learn more about the subjects they teach and learn more about how to teach those subjects.
- **learning society** – a society which embraces the idea that everyone should keep learning throughout life.
- **module** – a part of something. In this publication, the modules are parts of the ICT-CFT. A course of study in teacher-education or a professional learning programme based on the ICT-CFT might be divided into these Framework modules or it might have a different modular structure.
- **networks** – linked computers. Computers may be linked together either by wires or wirelessly. The linked computers could be just the computers in a classroom or an office building or a set of computers in different parts of the world.
- **off-the-shelf educational software** – educational programs which are ready to be used with students without the teacher having to do anything to them, for example a program to help students learn spelling. This is in contrast to a digital resource which the teacher creates, such as a list of spelling words created by a teacher in a word-processing program.
- **online** – connected to the Internet or a computer network, for example accessing websites and email.
- **open-ended tools** – computer programs which can be used for many different purposes, for example word-processing or spreadsheet programs. This in contrast to a computer program which can only be used for a specific purpose, such as program which provides a visualisation of a particular scientific process.
- **operations** – (as in hardware and software operations) using the hardware and software, for example pressing buttons, moving levers, clicking on menus, taking photographs with a digital camera, taking measurements with a digital thermometer.
- **package** – computer program (see program below)
- **pedagogy** – this usually means teaching methods, styles and techniques, the way in which the teacher teaches. It can also mean simply teaching, or the study of teaching.
- **planning and thinking tools** – computer programs which can be used to create the lists, calendars, schedules, diagrams or other types of document used in planning and thinking.
- **presentation software** – computer programs, like PowerPoint, which are used to create and display a series of slides (text and images) typically to an audience watching a large screen.
- **productivity software** (or tools) – word-processing, spreadsheet and presentation software.
- **professional learning** – the additional skills and knowledge which teachers acquire in their work, beyond what they learnt to become qualified teachers. Teachers can gain this additional knowledge and skill in various ways, through courses, programmes, conferences, seminars, events and workshops, from colleagues, through experience and experimentation, personal research and reflection, and through membership of professional networks and associations. Sometimes referred to as 'professional development' or 'CPD' (continuous professional development).

- **program** – another word for software, application, package, for example Microsoft Word, or Photoshop, the set of instructions loaded into a computer which enable it to provide specific functions such as word-processing, spreadsheets, presentations, databases, and image editing.
- **publishing technologies** – any digital method for spreading information to a wide audience, for example desk-top publishing (the software used to produce printed documents) podcasts and websites.
- **resource** (as in digital, ICT, web, online resource) – digital information, and digital hardware and software.
- **rubrics** (as in assessment rubrics, knowledge-based rubrics, performance-based rubrics) – criteria for assessment, the features to be looked for in evaluating students' work. For example, the assessment criteria in a piece of writing might include correct spelling and punctuation, good use of paragraph divisions, and a clear logical structure. Rubrics often include the weightings or the number of marks to be awarded to different aspects of a piece of work.
- **software** (software package etc) – computer program (see program above).
- **student-centred** (as in student-centred teaching or student-centred activities) – teaching styles or learning activities in which students are active rather than passive, in the sense that they undertake projects or investigate or experiment for themselves rather than listening passively to the teacher.
- **summative assessment** – assessment which sums up what the student has achieved, the point they have reached in their learning, to see if they qualify for a certificate or award or a place at university or a particular job. Summative assessment usually takes place at the end of a course of study, and produces information used by third parties such as employers or admissions officers. It is in contrast to formative assessment (see above) which takes place during a course of study, which produces information for the student and teacher and is intended to help the student learn. The difference between the two types of assessment lies in the purpose of the assessment, rather than the form of the test or exam. So a spelling test may be formative or summative depending on the way the results are used.
- **syllabus** – another word for curriculum (see curriculum above).
- **teacher education** – the course of study, usually provided by a university or other higher education institution, which qualifies a person to be a school teacher. Sometimes referred to as 'teacher training' or 'initial teacher training'.
- **teacher-centred** – (as teacher-centred teaching or teacher-centred activities) – didactic teaching. See didactic teaching and student-centred above.
- **technology** – often used as another word for ICT, although strictly speaking 'technology' can mean almost any type of tool or applied knowledge. For example, pencil and paper, slates, blackboards and whiteboards are all types of writing technology.
- **technology resources** – digital information, and digital hardware and software
- **tool** (as in digital tools) - digital hardware and software.
- **tutorials** (as a type of software) – usually a video explanation or demonstration.
- **unit (as in unit plans)** – part of a course of study, a module.
- **web content** – information on websites.
- **wiki** – a website which can be edited by users (directly, via their web browsers).

