United Nations
Educational, Scientific and
Cultural Organization

ICT COMPETENCY STANDARDS FOR TEACHERS

Competency Standards Modules

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Foreword

To live, learn, and work successfully in an increasingly complex, information-rich and knowledge-based society, students and teachers must utilize technology effectively. Within a sound educational setting, technology can enable students to become:

- Capable information technology users
- Information seekers, analyzers, and evaluators
- Problem solvers and decision makers
- Creative and effective users of productivity tools
- Communicators, collaborators, publishers, and producers
- Informed, responsible, and contributing citizens

Through the ongoing and effective use of technology in the schooling process, students have the opportunity to acquire important technology capabilities. The key individual in helping students develop those capabilities is the classroom teacher. The teacher is responsible for establishing the classroom environment and preparing the learning opportunities that facilitate students' use of technology to learn, and communicate. Consequently, it is critical that all classroom teachers are prepared to provide their students with these opportunities.

Both professional development programs for teachers currently in the classroom and programs for preparing future teachers should provide technology-rich experiences throughout all aspects of the training. Standards and resources within UNESCO's project "ICT Competency Standards for Teachers" (ICT-CST) provide guidelines for all teachers, specifically for planning teacher education programs and training offerings that will prepare them to play an essential role in producing technology-capable students.

Today's classroom teachers need to be prepared to provide technology-supported learning opportunities for their students. Being prepared to use technology and knowing how that technology can support student learning have become integral skills in every teacher's professional repertoire. Teachers need to be prepared to empower students with the advantages technology can bring. Schools and classrooms, both real and virtual, must have teachers who are equipped with technology resources and skills and who can effectively teach the necessary subject matter content while incorporating technology concepts and skills. Interactive computer simulations, digital and open educational resources, and sophisticated data-gathering and analysis tools are only a few of the resources that enable teachers to provide previously unimaginable opportunities for conceptual understanding.

Traditional educational practices no longer provide prospective teachers with all the necessary skills for teaching students to survive economically in today's workplace.

Foreword cont'd

Through the ICT-CST project, UNESCO is responding to: (a) its function as a standard-setting agency, (b) its mandate within the Education for All (EFA) Programme, (c) its mandate as the lead agency for action lines C4 on "capacity building" (with UNDP) and C7 on "e-learning" as decided by the Geneva Plan of Action adopted by WSIS[1] (2003) and (d) to its overarching objective of building inclusive knowledge societies through communication and information.

The ICT-CST project provides a complete framework for ICT Competency Standards for Teachers by (a) addressing the underlying "Policy Framework" (document 1 of 3), (b) examining the components of educational reform and developing a matrix of skill sets for teachers which correspond to various policy approaches and education reform components[2] (document 2 of 3), and (c) providing a detailed description of the specific skills to be acquired by teachers within each skill set/module[3] (document 3 of 3).

The second phase of the ICT-CST project involves the establishment of a UNESCO mechanism to endorse training programs for compliance with the UNESCO standards. The complete guidelines for submission, evaluation and endorsement will be published on the UNESCO website dedicated to this project: http://www.unesco.org/en/competency-standards-teachers.

Furthermore, UNESCO will map existing teacher training standards and training programs to the ICT-CST matrix of skill sets in an attempt to streamline the global efforts in this general area. We do hope that this work will contribute to the development of appropriate training programs for ICT skills of teachers with a global recognition.

Finally, it is important to note that the development of the UNESCO ICT-CST has been a true example of the power of strategic public-private partnerships for development. We are pleased to acknowledge the outstanding support of our numerous partners in both academia and the IT private sector. Most notably, we would like to express our gratitude to Microsoft, Intel, Cisco, the International Society for Technology in Education (ISTE) and the Virginia Polytechnic Institute and State University (Virginia Tech). Their contributions are greatly appreciated.

Abdul Waheed Khan
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1. WSIS stands for the "World Summit on the Information Society" which was held in two phases. The first phase took place in Geneva from 10 to 12 December 2003 and the second phase took place in Tunis, from 16 to 18 November 2005. Check http://www.itu.int/wsis/basic/about.html for more details.
2. Such a matrix is referred to as the "Competency Standards Modules".
3. Such description is included in the "Implementation Guidelines" document. It is important to note that this document is a dynamically evolving set of guidelines which will be continuously updated and posted on the website http://www.unesco.org/en/competency-standards-teachers to reflect technology evolution on the teaching/learning processes.

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The Curriculum Framework

By crossing the three approaches to education reform[1] based on human capacity development—technology literacy, knowledge deepening, and knowledge creation—with the six components of the educational system—policy, curriculum, pedagogy, ICT, organization, and teacher training—a curriculum framework is created for the UNESCO ICT Competency Standards for Teachers (ICT-CST) project. Each of the cells of the matrix constitutes a module in the framework. Within each of these modules, there are specific curricular goals and teacher skills. An overview of these modules is presented below and in the attached appendices. A draft description of detailed teacher competencies, objectives, and methods for each module is provided in a companion website, specifically designed for professional development providers and teacher educators. The intent is that providers and educators will review the curriculum framework and the competency standards with an eye to developing new learning materials or revising current materials so as to support one or more of the three approaches. In parallel, providers and educators can comment on the draft competencies, enabling the community to collectively shape the standards.

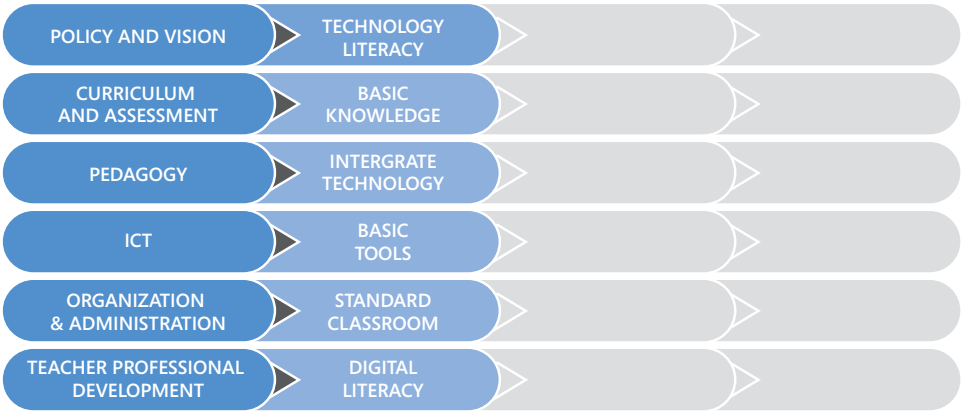
POLICY AND VISION	TECHNOLOGY LITERACY	KNOWLEDGE DEEPENING	KNOWLEDGE CREATION
CURRICULUM AND ASSESSMENT	BASIC KNOWLEDGE	KNOWLEDGE APPLICATION	21st CENTURY SKILLS
PEDAGOGY	INTERGRATE TECHNOLOGY	COMPLEX PROBLEM SOLVING	SELF MANAGEMENT
ICT	BASIC TOOLS	COMPLEX TOOLS	PERVASIVE TOOLS
ORGANIZATION & ADMINISTRATION	STANDARD CLASSROOM	COLLABORATIVE GROUPS	LEARNING ORGANIZATIONS
TEACHER PROFESSIONAL DEVELOPMENT	DIGITAL LITERACY	MANAGE AND GUIDE	TEACHER AS MODEL LEARNER

The first component—policy and vision—is used as a given in the ICT-CST framework. That is, it is assumed that a country is starting with one or more of these specific approaches to education reform based on their economic and social development goals. However, once an approach has been selected each has different implications for other components of the education system and for teacher professional development programs. These implications are elaborated below

1. This document follows a companion UNESCO document whose title is "UNESCO ICT Competency Standards for Teachers – Policy Framework".

Technology Literacy

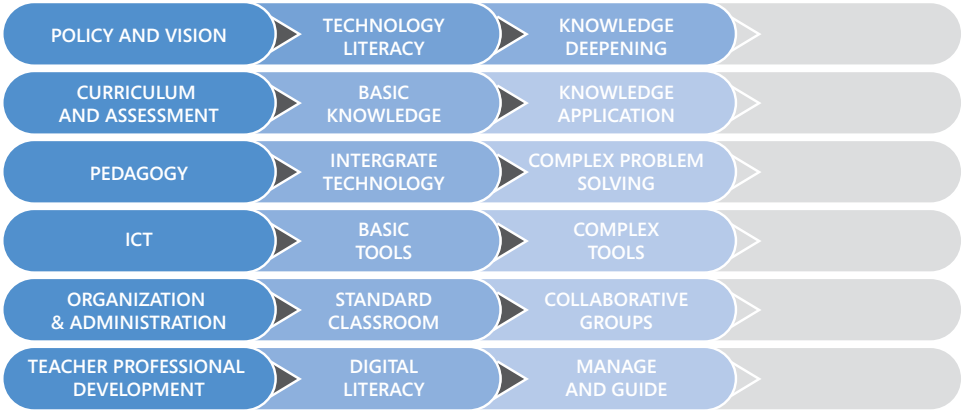
As stated above, the policy goal of the technology literacy approach is to prepare learners, citizens, and a workforce that is capable of taking up new technologies so as to support social development and improve economic productivity. Related policy goals include increasing enrollments, making quality resources available to all, and improving literacy skills, including the use of a range of hardware and software resources and tools. Teachers should be aware of these goals and be able to identify the components of education reform programs 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 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 technologies, tools, and e-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 the technology for classroom activities and presentations, for management tasks, and to acquire additional subject matter and pedagogical knowledge in support of the teachers' own professional development. Little change in social structure occurs in this approach other than, perhaps, the spatial placement and integration of technology resources in the classroom or in labs to assure equitable access to all. The technologies involved may include the use of computers along with productivity software; drill and practice, tutorial, 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 along with the ability to select and use appropriate off-the-self educational tutorials, games, drill-and-practice, 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 development.

Knowledge Deepening

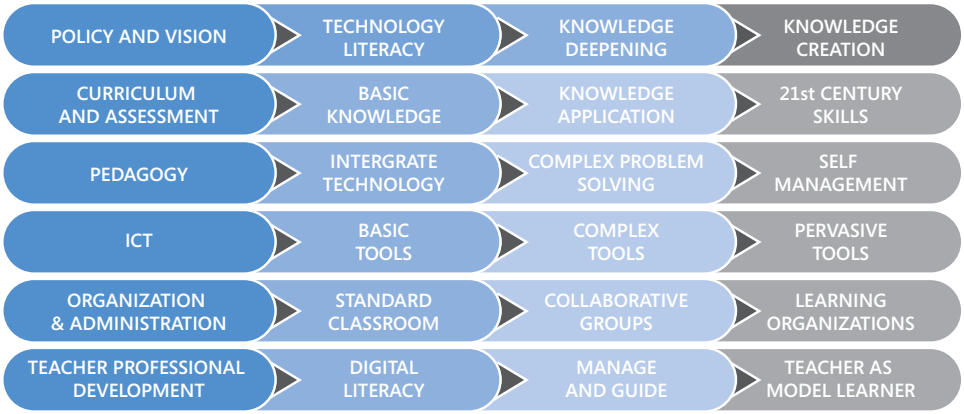
The policy goal of the knowledge deepening approach is to increase the ability of students, citizens, and the workforce to add value to society and the economy by applying the knowledge of school subjects to solve complex, high priority problems encountered in real world situations of work, society and life. Such problems might relate to the environment, food security, health, and conflict resolution. With this approach, teachers should understand the policy goals and social priorities and 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 change focuses on complex problem solving and incorporating assessments into the ongoing activities of the class. 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-centered in this approach and the teacher's role is to structure problem tasks, guide student understanding, and support student collaborative projects. In this role, teachers help students create, implement, and monitor project plans and solutions. With this approach, classroom structure is also different. Class periods 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 technology tools that are specific to their subject area—visualizations in science, data analysis tools in mathematics, 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-centered teaching methods and collaborative projects in support of students' deep understand of key concepts and their application to solve complex, real-world problems. To support their collaborative projects, teachers would use network 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 access experts and collaborate with other teachers making use of networks to access information, colleagues, and other experts in supporting their own professional development.

Knowledge Creation

The policy goal 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 and innovation and life-long learning. Teachers, in this approach, should not only be able to design classroom activities that advance these policy goals but participate in the development of programs 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 21st century skills that are needed to create new knowledge. Skills such as problem solving, communication, collaboration, experimentation, critical thinking, and creative expression become curricular goals in themselves and these are the objects of new assessment methods. Perhaps the most significant goal is for students to be able to determine their own learning goals and plans—the ability to establish what they already know, assess their strengths and weaknesses, design a learning plan, stay on task, track their own progress, and build on successes and adjust to failures; skills that can be used throughout a lifetime to participate in a learning society. Assessment is itself a part of this process—the ability for students to assess the quality of their own and each others' products. The role for teachers is to overtly model these processes, structure situations in which students apply these skills, and assist students in their acquisition. Teachers build a learning community in the classroom in which students are continuously engaged in building their own and each others' learning skills. Indeed, schools are transformed into learning organizations in which all actors are involved in the learning process. From this perspective, teachers are themselves master 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 to create and support this community in its production of knowledge and anytime, anywhere collaborative learning.



Teachers who show competence with 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 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 leadership role in training colleagues and in creating and implementing a vision of their school as a community based on innovation and continuous learning, enriched by ICT.

The attached description of the Competency Standards Modules articulates these distinctions in more detail.

UNESCO ICT Teacher Competency Standards Modules

Technology Literacy Approach

Policy & Vision	The policy goal of this approach is to prepare learners, citizens, and a workforce that is capable of taking up new technologies so as to support social development and improve economic productivity. Related educational policies goals include increasing school enrollments, making quality resources available to all, and improving basic literacy skills, including technology literacy.	
	Curricular Goals	**Teacher Skills**
Policy	Policy Awareness. With this approach, programs make direct connections between policy and classroom practices.	Teachers must be aware of policies and be able to specify how classroom practices correspond to and support policy.
Curriculum and Assessment	Basic Knowledge. 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 contexts, which will involve time in the curricula of other subjects for the incorporation of a range of relevant ICT resources and productivity tools.	Teachers must have a firm knowledge of the curriculum standards for their subject, as well as knowledge of standard assessment procedures. In addition, teachers must be able to integrate the use of technology and technology standards for students into the curriculum.
Pedagogy	Integrate Technology. Changes in pedagogical practice involve the integration of various technologies, tools, and e-content as part of whole class, group, and individual student activities to support didactic instruction.	Teachers must know where, when (as well as when not), and how to use technology for classroom activities and presentations.
ICT	Basic Tools. The technologies involved in this approach include the use of computers along with productivity software; drill and practice, tutorial, 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.
Organization & Administration	Standard Classroom. Little change in social structure occurs in this approach other than, perhaps, the spatial placement and integration 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 assure equitable access.
Teacher Professional Development	Digital Literacy. The implications of this approach for teacher training 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 teachers' own professional development.

Knowledge Deepening Approach		
Policy & Vision	The policy goal of this approach is to increase the ability of the workforce to add value to society and the economy by applying the knowledge of school subjects to solve complex problems encountered in real world situations of work, society, and life.	
	Curricular Goals	**Teacher Skills**
Policy	Policy Understanding. This approach often involves teachers in understanding policies such that they can design lesson plans to specifically implement national policies and address high-priority problems.	Teachers must have a deep knowledge of national policies and social priorities, and be able to design, modify, and implement classroom practices that support these policies.
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 as a measure of students' understanding.
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-centered in this approach and the teacher's role is 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.
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, role play simulations in social studies.	Teachers must be aware of a variety of subject-specific tools and applications and 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 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.
Organization & 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-centered activities and flexibly apply technology to support collaboration.
Teacher Professional Development	Manage and Guide. The implications of this approach for teacher professional development 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 development.

Knowledge Creation Approach

Policy & Vision	The policy goal of this approach is to increase productivity by creating students, citizens, and a workforce that is continually engaged in and benefits from knowledge creation and innovation.	
	Curricular Goals	**Teacher Skills**
Policy	iPolicy 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 programs intended to implement these policies.
Curriculum and Assessment	21st Century Skills. With this approach the curriculum goes beyond a focus on knowledge of school subjects to explicitly include the 21st century 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 cognitive thought processes, know how students learn, and understand the difficulties students encounter. They must have the skills required to support these complex processes.
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 others' knowledge base and learning skills.	The role of teachers in this approach is to overtly model learning processes, structure situations in which students apply their cognitive skills, and assist students in their acquisition.
ICT	Pervasive Technology. 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 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.
Organization & 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 colleagues and in creating and implementing a vision of their school as a community based on innovation and continuous learning, enriched by ICT.
Teacher Professional Development	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 and inclination to experiment and continuously learn and use ICT to create professional knowledge communities.

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