Concept of ICT

Meaning & Definition

ICT is technology that supports activities involving information. Such activities include gathering, processing, storing and presenting data. Increasingly these activities also involve collaboration and communication. Hence IT has become ICT: information and communication technology.

Some underlying principles

Technology does not exist in isolation
  - ICT contributes at various points along a line of activity
  - ICT is used in activities – the ICT use depends on the activities
  - The key outputs of educational activities are context are knowledge, experience and products
  - The output should be useful to the users (self and others)

What is a useful concept of ICT?

It depends on the local culture and the particular ICT available and how it is configured and managed. The understanding, management and configuration of the available technology might vary the concept of ICT from
  - a collection of tools and devices used for particular tasks, eg, publishing, course delivery, transaction processing...
  - an organised set of equipment (like a 'workshop') for working on information and communication
  - components of integrated arrangements of devices, tools, services and practices that enable information to be collected, processed, stored and shared with others
  - components in a comprehensive system of people, information and devices that enables learning, problem solving and higher order collaborative thinking, that is, ICT as key elements underpinning a (sharable) workspace.

Creativity or Productivity?
Stephen Heppell of Ultralab proposes a set of dimensions for considering these two orientations.

<table>
<thead>
<tr>
<th>Creativity</th>
<th>Productivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>quality assurance</td>
<td>quality control</td>
</tr>
<tr>
<td>learning tools</td>
<td>teaching machines</td>
</tr>
<tr>
<td>standards</td>
<td>Standardisation</td>
</tr>
<tr>
<td>participative (people)</td>
<td>interactive (ICT)</td>
</tr>
<tr>
<td>creative</td>
<td>Predictable</td>
</tr>
<tr>
<td>building community</td>
<td>delivering content</td>
</tr>
</tbody>
</table>

Stephen also reports that using ICT to support creativity is commonly found in small, democratic, high value economies focused on smartening up. Conversely economies that are large and low value (focused on minimising costs including labour costs) tend to be focused on using ICT to support productivity (at least in the short term).

Let's focus on the three words behind ICT:

- INFORMATION
- COMMUNICATIONS
- TECHNOLOGY

A good way to think about ICT is to consider all the uses of digital technology that already exist to help individuals, businesses and organisations use information.

**ICT covers any product that will store, retrieve, manipulate, transmit or receive information electronically in a digital form.** For example, personal computers, digital television, email, robots.

Information and communication technology (ICT)
Information and communication technology, or ICT, is defined as the combination of informatics technology with other, related technologies, specifically communication technology.

In this book, these three definitions have been collapsed into a single, all encompassing, definition of ICT. This definition implies that ICT will be used, applied, and integrated in activities of working and learning on the basis of conceptual understanding and methods of informatics.

**Aims & Objective**

Information and communication technology (ICT) has become, within a very short time, one of the basic building blocks of modern society. Many countries now regard understanding ICT and mastering the basic skills and concepts of ICT as part of the core of education, alongside reading, writing and numeracy.

UNESCO aims to ensure that all countries, both developed and developing, have access to the best educational facilities necessary to prepare young people to play full roles in modern society and to contribute to a knowledge nation. Because of the fundamental importance of ICT in the task of schools today, UNESCO has previously published books in this area as a practical means of helping Member States: for example, *Informatics for Secondary Education: A Curriculum for Schools (1994)* and *Informatics for Primary Education (2000)*. Rapid developments in ICT now demand a completely new document in place of the first of these publications.

This book has two key purposes. The first is to specify a curriculum in ICT for secondary schools that is in line with current international trends. The second purpose is to outline a programme of professional development for teachers necessary to implement the specified ICT curriculum successfully.

**ICT AND EDUCATION**

All governments aim to provide the most comprehensive education possible for their citizens within the constraints of available finance. Because of the pivotal position of ICT in modern societies, its introduction into secondary schools will be high on any political agenda. This book gives a practical and realistic approach to curriculum and teacher development that can be implemented quickly and cost effectively, according to available resources.
The curriculum is designed to be capable of implementation throughout the world to all secondary age students. The programme of teacher professional development relates closely to the ICT curriculum, and particularly to the stage of development that schools have reached with respect to ICT.

**CURRICULUM AND TEACHER DEVELOPMENT**

Keeping pace with technological development and the changing competencies required of both students and their teachers requires a state-of-the-art curriculum and appropriate teacher development.

**Professional development for teachers**

Teachers need to be adequately prepared to implement a state-of-the-art ICT curriculum. Indeed, introducing any new curriculum calls for careful preparation, management, resourcing, and continuing support. In the case of an ICT curriculum, even more concerns have to be considered. Educational research studies show that programmes of professional development for teachers are most effective if directed to the stage of ICT development reached by schools. The implications of these research findings are that teacher development is best conceived as an ongoing process, with many professional development activities conducted in schools.

**Availability of resources**

In any educational system, the level of available resources places a restriction on the degree to which any new subject can be introduced into the school curriculum, especially where only the most basic facilities have so far been provided. But ICT is of such importance to the future industrial and commercial health of a country that investment in the equipment, teacher education, and support services necessary for the effective delivery of an ICT-based curriculum should rank high in any set of government priorities. The curriculum proposed takes account of these resource issues and specifies minimum requirements for effective delivery in different circumstances. Information and communication technology, or ICT, is defined as the combination of informatics technology with other, related technologies, specifically communication technology.
In this book, these three definitions have been collapsed into a single, all encompassing, definition of ICT. This definition implies that ICT will be used, applied, and integrated in activities of working and learning on the basis of conceptual understanding and methods of informatics.

ICT AND EDUCATION

STAGES OF TEACHING AND LEARNING

Teaching and learning are best thought of, not as separate and independent activities, but rather as two sides of the same coin, interconnected and interrelated. Studies of teaching and learning in schools around the world identify four broad stages in the way that teachers and students learn about and gain confidence in the use of ICT. These four stages give rise to the model depicted in Figure 2.2 that shows the stages in terms of discovering, learning how, understanding how and when, and specializing in the use of ICT tools.

Discovering ICT tools

The first stage (Stage A in Figure 2.2) that teachers and learners go through in ICT development is of discovering ICT tools and their general functions and uses. In this discovery stage, there is usually an emphasis on ICT literacy and basic skills. This stage of discovering ICT tools is linked with the emerging approach in ICT development.

Characteristics

CHARACTERISTICS OF SCHOOLS RELATED TO ICT DEVELOPMENT

Along with approaches to ICT development noted above, there are various characteristics of schools, or aspects of school leadership, that relate to a school’s progress in ICT development. Below are general descriptions of the
more important of these characteristics of schools that have an effect on ICT development within schools.

**Vision**

Vision refers to the aspirations and goals of both individuals within a school and the school system as a whole. As the school advances, the mission statements should become clearer and provide a basis for decision-making. Mission statements should help individual members of the learning community visualize a school’s aspirations for the future and act in harmony.

**Philosophy of learning and pedagogy**

Ways in which teachers and students interact and how the school is managed for learning are part of what is meant by a school’s philosophy of learning and pedagogy.

**ICT DEVELOPMENT AT THE SCHOOL LEVEL**

**ICT IN EDUCATION**

A CURRICULUM AND PROGRAMME OF TEACHER DEVELOPMENT

These philosophies will necessarily characterize the ways in which ICT is incorporated into a school. A setting that is dominated by the teacher as the main provider of subject content is adopting a teacher-centred philosophy. The teacher controls the use of ICT in such a setting as well. A learner centred philosophy, by contrast, describes a setting where content comes from a variety of resources, and where projects are chosen and designed by the students.

ICT tools and resources are selected by students in ways that match the aims of a project best. These contrasting approaches to pedagogy are sometimes referred to as instructivist and constructivist respectively.

**Development plans and policies**

How a school's vision and teaching philosophies are carried out is translated into development plans and policies. In the detailed steps of such plans and policies, goals and objectives are further defined providing interim and
long-term targets. Policies are set, a budget is allocated, facilities are determined, roles are defined, tasks are delegated, and an evaluation plan is created to define the direction ICT development will take.

**Facilities and resources**
The learning environment in which ICT is used requires certain facilities and resources. Facilities include basic infrastructure such as electrical wiring, Internet access, lighting, air-conditioning, and space. Decisions on inclusion or lack of ergonomic design and choice of furniture impact not only on use of ICT, but also on the health and well being of users. Resources include various types of technological devices from computers with peripherals, video equipment, and specialized tools like digital microscopes. Further resources include various types of software, as well as traditional tools like books, videos, and audiotapes.

**Understanding the curriculum**
An understanding of the curriculum affects the progression of ICT in the curriculum in following various stages of development. First, is an awareness stage in which students become ICT literate with regard to what technology is available and how it might be used. Second, as students learn basic skills, they begin to apply various ICT tools to their regular learning assignments and projects. Third, as students become more capable and confident with ICT, they begin to integrate and overlap both subject areas and tools. Last, is the applied use of ICT in which students are now enabled to address larger, more complex, real-world professional issues.

**Professional development of school staff**
In parallel with the curriculum for students, there must be professional development of the staff within a school. The personal productivity and professional practice of teachers are enhanced with the use of ICT. First, is an awareness stage in which teachers and staff become ICT literate with regard to what technology is available and how it might be used. Second, as teachers and staff learn basic skills, they begin to apply various ICT tools to their regular tasks and projects. Third, as teachers and staff become more capable and confident with ICT, they begin to integrate and overlap both subject areas and tools.
Last, is a change in professional practice in which teachers are now enabled to design lessons to incorporate larger, more complex, real-world projects using ICT tools and resources. As ICT is introduced into school systems, there is a tendency to move from discrete skills training to reflective practice and integrative professional development. Budgetary allocation and provision for release time for teacher professional development seriously impact on the ability of a school system to incorporate ICT in a meaningful way.

Community involvement

Community involvement may include parents, families, businesses, industry, government agencies, private foundations, social, religious and professional organizations, as well as other educational institutions such as vocational schools and universities. Community involvement can come in the form of donations of equipment and resources, or may be in human resources provided for training and technical assistance. As a community contributes to a school, so the school can give back in many ways. For example, a school may decide to provide community members with evening access to computer labs, or have students offer training to parents. The use of ICT provides an opportunity for a school and its students to interact with both local and global communities. Interaction may range from building web sites for community organizations, to sharing projects with remote schools.

Assessment

Assessment includes both assessments of students as well as overall evaluation of a school system, two aspects that are intricately interwoven. An improvement in the one should predicate an improvement in the other. Means of student assessment should reflect choices in learning pedagogy and an understanding of ICT in the curriculum. For example, in the emerging and applying stages of ICT, assessment may be linked to pencil and paper tests, whereas in the infusing and transforming stages project based portfolios may be more appropriate. Each part of a school system needs to be evaluated to determine its impact on learning. Assessment should inform practice and support the management of learning. Assessment should allow a system to determine whether outcomes have been met, and then reviewed and revised accordingly. Budget allocations, policies, and