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**Information technology for  
learning, education and training —  
Reference model for information and  
communications technology (ICT)  
evaluation in education**

iTeh STA *Technologies de l'information pour l'apprentissage, l'éducation et la  
formation — Modèle de référence pour l'évaluation des technologies  
(standards.iteh.ai) de l'information et de la communication (TIC) dans l'éducation*

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## Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

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This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 36, *Information technology for learning, education and training*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html) and [www.iec.ch/national-committees](http://www.iec.ch/national-committees).

## Introduction

Information and communications technology (ICT) has been pervasive in the modernization of society. ICT in education has become integral to achieving quality learning and supporting lifelong learning. The Reference Framework for the Description of Quality Approaches (RFDQ) (ISO/IEC 40180) is an elaborate and extensive process model. It harmonizes existing concepts, specifications, terms and definitions for learning, education and training.

Evaluation of ICT in education is a key issue for policy and strategy development in education. It is also integral to quality assurance of ICT development in education, but also essential to management and decision-making.

This document provides a standard reference for evaluation reports, education policies, related research and significant issues related to ICT in education. As such it aims to support the quality processes related to ICT in education by informing governmental agencies, management organizations, local evaluation units and schools.

This document presents a scientific and rational indicator model and framework of ICT in education to support evaluation and development of ICT deployment in education. Specifically, this document aims to:

- i) establish an evaluation indicators framework for ICT in education with respect to data collection, performance monitoring and decision support services based on the investigation of typical ICT evaluation cases;
- ii) outline approaches to reflect the development level of ICT in education for description or comparison between different regions or schools;
- iii) take localized demand into consideration, proposing optional indicators and expanded indicators based on the information gaps.



# Information technology for learning, education and training — Reference model for information and communications technology (ICT) evaluation in education

## 1 Scope

This document defines an abstract model and an indicator system framework for the evaluation of information and communications technology (ICT) in learning, education and training (LET). The abstract model accommodates requirements domains, including K12 education, vocational education, higher education and continuing education. The framework describes ICT service levels in the areas of learning, education and training, and aims to assist in quality processes associated with ICT in LET contexts.

## 2 Normative references

There are no normative references in this document.

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at <https://www.iso.org/obp>

— IEC Electropedia: available at <https://www.electropedia.org/>

### 3.1

#### indicator

quantitative, qualitative or descriptive measure

### 3.2

#### performance

way in which an individual, group or organization carries out, accomplishes and fulfils its important functions and processes, usually with regard to effectiveness

### 3.3

#### evaluation

systematic determination of the extent to which an entity meets its specified criteria

## 4 Abstract model of the evaluation of ICT in education

### 4.1 Evaluation of ICT in education

Evaluation of ICT in education refers to the use of information technology and scientific performance assessment methods to reflect the development process and level of the implementation, execution, benefits or other aspects scientifically according to the goals and performance standards of ICT in education. The definition of evaluating indicators is beneficial in analysing the situation, achievements and limitations for the development of ICT in education.

The evaluation indicators of ICT in education have two levels: macro and micro. For the macro level, evaluation indicators provide scientific and reasonable assessment system and empirical data to reflect

the education development of one country or specific area. For the micro level, the evaluation indicators reflect the development of ICT in one school for students' learning abilities in ICT in class, the input and output of one school for the development of ICT in education and other aspects.

## 4.2 Abstract model

### 4.2.1 General

[Figure 1](#) represents an abstract model framework of ICT in education, which contains core indicators, optional indicators and extended indicators. This abstract model contains three types of indicators which consider the regional differences and cover all types of education at all levels.

The abstract model follows these three principles:

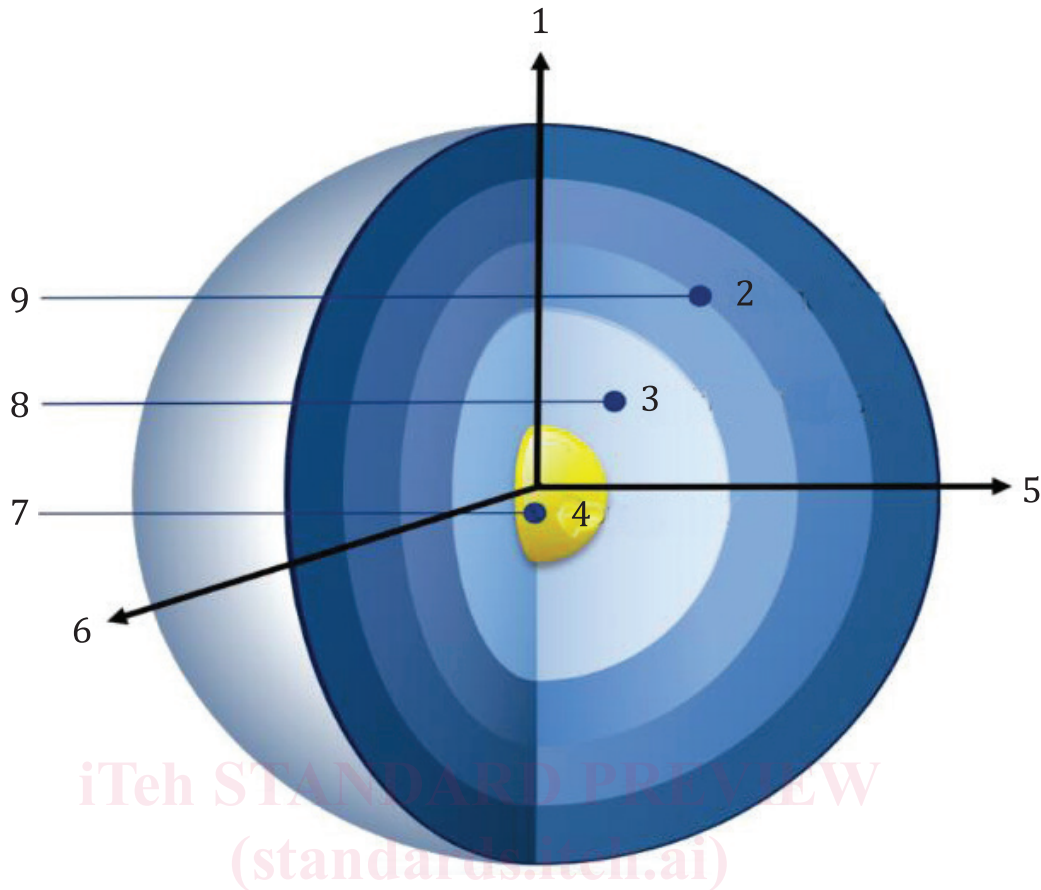
- i) **Scientificity:** The indicator system is mainly used to evaluate and guide the development plan and policy of ICT in education. The indicators need to follow the development rule of ICT in education and analyse each irreplaceable index comprehensively and systematically to avoid repetition and contradiction.
- ii) **Operability:** It is important to consider the necessity of certain indexes and the convenience of collecting data. The connection of existing statistics and the data for the evaluation is beneficial for the reduction of cost to collect corresponding information correctly and in a timely manner.
- iii) **Sustainable development:** The development of ICT in education is a dynamic process involving multiple stakeholders. The indicator system is iterative and provides direction for the development of ICT in education. As such, it is responsive to change according to the need of practice.

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**Key**

- 1 evaluate applicability reduction [ISO/IEC TR 4339:2022](https://standards.iteh.ai/catalog/standards/sist/6d0832b6-4e06-444a-be12-2c7b980bc572/iso-iec-tr-4339-2022)
- 2 extended indicators
- 3 optional indicators
- 4 core indicators
- 5 evaluate details enhancement
- 6 evaluate accuracy improvement
- 7 designed for universal application
- 8 based on education type
- 9 combined with regional characteristics

**Figure 1 — Abstract model of ICT evaluation indicator in education**

#### 4.2.2 Core indicators

Core indicators are indispensable for evaluating the situation and performance of ICT in education at school or regional level. The core indicators reflect the requirements of national plans for education reform and development and include five dimensions: ICT infrastructure, digital resources, application in teaching and learning, ICT-based management and guarantee mechanism.

#### 4.2.3 Optional indicators

Optional indicators reflect the specific needs of basic education, vocational education, higher education and continuing education. Different levels of education have various needs, for example, basic education emphasizes diversification and personalized learning, vocational education pays more attention to training and simulation training and collaborative research based on networks is more popular in

higher education. Optional indicators provide a set of indicators which allow the evaluation organization to select the appropriate indicators according to their specific requirements from core indicators.

**4.2.4 Extended indicators**

Extended indicators allow schools to consider local construction requirements and put forward indicators to reflect development characteristics of ICT in education to supplement core and optional indicators. The specific content of extended indicators is not indispensable in the indicator framework, but the framework indicates the direction of the development. The extended indicators can be broken into ICT infrastructure, digital resources, application in teaching and learning, ICT-based management and guarantee mechanism.

**4.3 Indicators for candidates**

Different districts have their own objective in education, so indicators used to evaluate ICT in education across jurisdictions. According to the abstract model described in 4.2 and referring to the typical international ICT evaluation indicators in education (see Annex A), Table 1 gives some candidate indicators to guide the administrator and third-party evaluators.

**Table 1 — Indicators of ICT evaluation in education for candidates**

	First level	Second level
Core indicators	ICT infrastructure	Exit bandwidth that have access to average school (Mbps/school)
		Proportion of classrooms with projectors in total number of classrooms in school (%)
		Proportion of computer classrooms in total number of classrooms in school (%)
	Digital learning resources	Proportion of schools establishing network security system (%)
		Proportion of schools building school-based resource (%)
	Application of ICT in teaching and learning	Quantity of digital learning resources for students (giga-bytes/student)
		Types and quantity of ICT activities carried out by teachers (number)
	ICT-based educational management	Proportion of teachers registered in learning space (%)
		Proportion of schools building information portals (%)
	Guarantee mechanism	Number of commonly used management information systems (number)
		Proportion of schools with chief information officer system (%)
		Proportion of schools with ICT management mechanism (%)
		Proportion of ICT investment in total annual education investment (%)
		Number of full-time ICT teachers (number)

Table 1 (continued)

<b>Optional indicators</b>	Virtual simulation training system	Types of virtual simulation training system used by teachers (number)
		Frequency of virtual simulation training system used by teachers (times/week)
	Digital research platform	Proportion of schools using digital research platform in the study (%)
		Types of academic document, digital books, periodical articles
		Collaborative teaching and research system (number)
	Official online system	Proportion of schools using course selection and teaching evaluation online (%)
		Proportion of schools with recruit teaching staff system (%)
		Proportion of schools with entrance and transfer system (%)
		Proportion of schools with the arrangement of digital equipment system (%)
		Proportion of schools with the arrangement of experimental equipment system (%)
<b>Extended indicators</b>	Public service platform	Proportion of schools participating of educational resources public service platform (%)
	E-card system	Number of functions commonly used in all in e-card system (number)

## 5 Framework of the evaluation indicator of ICT in education

### 5.1 Indicators framework

The framework of the evaluation indicator of ICT in education includes five main dimensions, as shown in [Figure 2](#).