INTERNATIONAL STANDARD

ISO/IEC 23126

First edition
2021-04

Information technology for learning, education and training — Ubiquitous learning resource organization and description framework

Technologies pour l'éducation, la formation et l'apprentissage — Description de l'organisation et ressources d'apprentissage omniprésent

Reference number
ISO/IEC 23126:2021(E)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives) or www.iec.ch/members_experts/refdocs).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents) or the IEC list of patent declarations received (see patents.iec.ch).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html. In the IEC, see www.iec.ch/understanding-standards.

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 and www.iec.ch/national-committees.

Introduction

Ubiquitous learning is becoming increasingly prevalent. Ubiquitous learning makes it possible for students to learn anything, at anytime, anywhere, using any learning device. To support ubiquitous learning for learners, a ubiquitous learning support model should be constructed to provide ubiquitous services. The model consists of four parts: user interface; sensor layer; educational cloud system; and learning resources and services (Figure 1). During the learning process, the user interface detects learners' learning status, logs, interactions and personal information in the real learning context through the sensor layer. Subsequently, the educational cloud system conducts computing and analysis before providing learners with adaptive learning resources and services (see Annexes A, B and C).

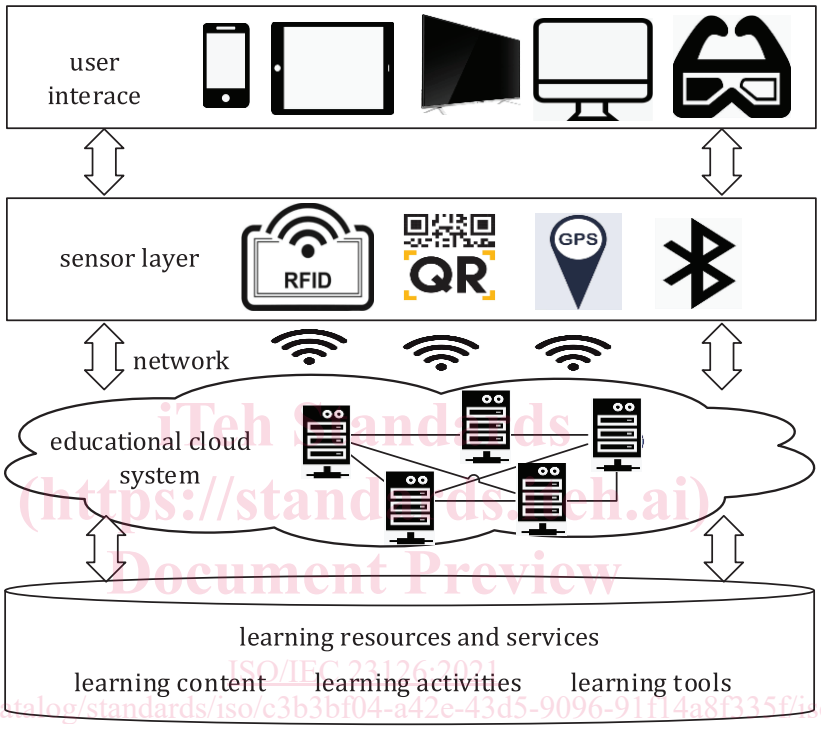

Figure 1 — Ubiquitous learning support model

Learning resources and services are central to learners' learning processes. However, learners' learning contexts can change as learners start and continue learning at different points across time and location. Under these circumstances, learners need adaptive resources and services to achieve effective learning. Traditional learning resources are designed and developed by experts for specific contexts. In some cases, the content is mostly static and cannot dynamically change to meet the diverse needs of learners who are accessing content in different environments. In addition, learners can encounter some difficulties as they learn specific topics. Related experts, peers or resources supporting the learning of the topic can be helpful for learners to expand their knowledge and knowledge-related connections. As time passed, learners can also contribute to current knowledge and thus promote the updating or evolution of knowledge while they achieve even higher-level knowledge. In order to make the learning process effective, it is important to provide learners with continuously evolving resources:

a) Learning resources should have the ability to adapt to different learners' needs under different learning contexts.

b) Learning resources should support the interactions not only between learners and resources, but also the interactions among learners and among resources.

c) Learning resources should evolve according to the contribution of learners or new knowledge so that they can be continuously adapted for learners with diverse needs.

d) In order to support personalized learning, dynamic and distributed resource aggregation service should be provided to learners with different learning requirements.

In summary, the ubiquitous learning support model needs to support diverse contexts, rich social interactions, continuous evolution and dynamic aggregation of knowledge. To that end, learning resources are the most important part for realizing the adaption of the learning process. In order to support that adaption, not only experts but also learners should be involved in the co-construction of learning resources. During the resource construction, resources should align with the contextual, social, evolvable and dynamic aggregated features. And in order to make the resources constructed by different contributors align with those features, a standardized guideline is needed for co-construction. However, existing standards for learning resources design and development focus on different aspects of static learning resources in terms of topic, description, related subjects, contributor and so on, and there is no description of the contextual, social, evolvable and dynamic aspects. In order to support these aspects, this document offers a ubiquitous learning resource organization and description framework, which is also referred to as a "learning cell framework". This document provides a description of the main framework for ubiquitous learning resources. It does not provide detailed definition.

