



**International  
Standard**

**ISO/IEC 9234**

**Information technology —  
Information modelling for virtual,  
augmented and mixed reality based  
education and training systems**

*Technologies de l'information — Modélisation de l'information  
pour les systèmes d'éducation et de formation basés sur la réalité  
virtuelle, augmentée et mixte*

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## Foreword

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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

Virtual, augmented, and mixed reality (VR/AR/MR) systems that are used for education and training require approaches that support systems integration with various industry areas. Because the integration aspects should include common functionalities, unique information modelling requirements are necessary. Use cases for education and training have been reviewed to determine education and training technologies that are in common use and to determine an information model that can be used to support these types of activities supported by VR/AR/MR technologies. This document includes these use cases.

VR/AR/MR based education and training systems have requirements related to learning and teaching approaches, representation, exchange, data, and interaction, in the following ways. First, existing learning and teaching approaches can be integrated with the use of VR/AR/MR technology and form the basis for user interactions with the systems and its elements. Based on differences in learning and teaching methods when using VR/AR/MR, requirements that support interaction and simulation should be included. For example, the use of haptics can be added to support user interaction with the system. Second, visual and interactive representation should be provided to enhance the effectiveness of education and training. Simulation can be an important aspect in representing information and in understanding education and training content. Third, information should be exchangeable over heterogeneous computing environments so that it is accessible to users to support their education and training activities anytime and anywhere. Fourth, education and training information and data should be organized, transferred, stored, and managed securely. Fifth, interfaces for interacting with devices and sensors should be included and should meet the requirements of users.

This document provides requirements and recommendations for developing VR/AR/MR based education and training systems to meet the requirements listed above. The requirements and recommendations include concepts, information modelling architecture, standards based functional components, and implementation components for VR/AR/MR based education and training.



# Information technology — Information modelling for virtual, augmented and mixed reality based education and training systems

## 1 Scope

This document provides requirements and recommendations for developing education and training systems using virtual, augmented and mixed reality (VR/AR/MR) technology. It specifies how to organize the information and data necessary for the development of VR/AR/MR integrated systems for education and training. It includes procedures for the development of VR/AR/MR integrated systems.

This document includes several topics for consideration when developing VR/AR/MR based education and training systems, as follows. First, it defines concepts of VR/AR/MR based education and training. Second, it defines an information modelling architecture for the systems. Third, standards based functional components for the systems are specified. Fourth, framework components for implementing the systems are specified. And, finally, use cases for the systems based on the information modelling architecture are included.

Device hardware technology for education and training systems is excluded from this document.

## 2 Normative references

There are no normative references in this document.

## 3 Terms, definitions and abbreviations

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 Terms and definitions

#### 3.1.1

##### **augmented reality**

##### **AR**

interactive experience whereby virtual objects are superimposed upon or embedded within the physical world

#### 3.1.2

##### **education**

process of receiving or giving systematic instruction, especially at a school or university

[SOURCE: ISO/IEC 19896-1:2018, 3.3]

#### 3.1.3

##### **gyro sensor**

sensor that measures angular velocity