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# Information technology for learning, education, and training — Immersive content and technology



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# Foreword

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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 and www.iec.ch/national-committees.


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# Introduction

In recent years, many people have widely spoken about virtual reality (VR) and augmented reality (AR). As the terms have not yet been standardized, media and IT companies use various words such as VR, AR, and mixed or merged reality (MR). This document refers to VR and AR as immersive technologies.

Immersive technologies are now becoming popular. At an early age, it grew in the entertainment industry, such as games, but now it is expanding its scope into education and training. Various standardization organizations have also begun to study the standards required for 360° video, virtual environments, and rendering technologies and the problems associated with using these technologies.

Due to the sense of immersion and practicality, immersive technology in the learning, education, and training (LET) domain is expected to improve learning efficiency. At the same time, however, there are some concerns, such as the age of the device's available use and VR sickness or fatigue. It is essential to consider several issues carefully, as some problems can have a more severe effect when applied to the education sector.

Immersive technologies are emerging technology addressing a diverse group of stakeholders and covering a wide range of applications. The following issues were identified and captured as general requirements for Immersive content and technology in the LET domain.

— Human factors guideline for the utilization of VR and MR content

— A catalogue information model for the utilization of VR and MR content

Therefore, this document gives a trend and outlook description of the immersive technology related to LET. This document specifies the understanding of immersive technology implications of using immersive technologies; and provides suggestions for items that could be standardized.

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# Information technology for learning, education, and training — Immersive content and technology

## 1 Scope

This document specifies potential directions for using immersive technologies in learning, education, and training (LET) and provides suggestions on what can be standardized for this purpose. For the purposes of this document, immersive technologies include augmented reality (AR), virtual reality (VR), mixed reality or merged reality (MR).

This document does not apply to technologies such as metaverse, digital twin and extended reality (XR).

## 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**
**virtual reality**
artificial environment presented using computer technologies

Note 1 to entry: Virtual reality has a high level of immersiveness, fidelity of information representation, and degree of active learner participation compared to other forms of mixed reality.

[SOURCE: ISO/IEC TR 18121:2015, 3.6]

**3.2**
**mixed reality**
display continuum in which both real and virtual images are combined in some way and in some proportion

Note 1 to entry: Augmented reality (AR) and virtual reality (VR) are considered to be on the mixed reality continuum

**3.3**
**immersive technology**
tools that enable the integration of virtual content and the physical environment in a manner that supports user engagement with the resulting blended reality

Note 1 to entry: Some types of immersive activities and experiences include virtual reality, augmented reality, pervasive games, digital twins, telepresence, and holography.

Note 2 to entry: Supportive technologies that are used to support these activities and experiences may include a combination of different items such as speech recognition, haptics, cameras, 3D displays, headsets, audio, gesture recognition, omnidirectional treadmills, etc.

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**3.4**
**augmented reality**
virtual objects superimposed upon or composited with the real world

Note 1 to entry: Virtual and real-world objects co-exist in augmented reality systems.

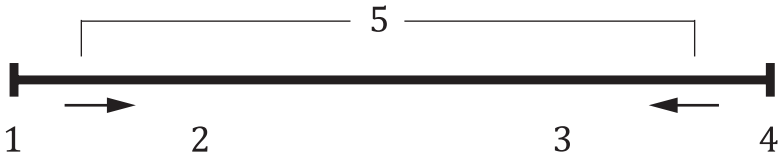
# 4 Abbreviated terms

| | |
|---|---|
| AR | augmented reality |
| AV | augmented virtuality |
| HMD | head mounted display |
| LET | learning, education, and training |
| MR | mixed reality or merged reality |
| VR | virtual reality |

# 5 Understanding immersive technology

## 5.1 Immersive technology

The Virtuality continuum represents all the technological possibilities between the real and virtual worlds, as shown in Figure 1.[10] The space in between these two extremes could characterize as MR. At the two ends of the sub-continuum making up this mixed reality are the AR (closer to the real environment) and AV (closer to the virtual environment). Adding elements of virtuality to the real world is the nature of AR, while adding elements of the real world to virtuality is that of AV. Immersive technologies integrate virtual content into the real environment by leveraging these technologies (AR, VR, MR) to allow users to participate in mixed reality naturally.




Reality virtuality (RV) continuum

**Key**
1 real environment
2 augmented reality (AR)
3 augmented virtuality (AV)
4 virtual environment
5 mixed reality (MR)

**Figure 1 — Simplified representation of a RV Continuum[10]**

## 5.2 Industrial trends and outlook

### 5.2.1 Market trends and outlook

According to Gartner's Hype Cycle report,[5] which analyzes the development and maturity of various emerging technologies, AR and MR technologies have entered a "difficulty of disillusionment" as of


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