

## Augmented Reality: Applications and challenges - Παπαδόπουλος Νικόλαος, PhD candidate

The poster aims to illustrate the broad applications and benefits of AR technology, while also acknowledging the challenges that come with its implementation, particularly in the educational context.

### FIELDS OF IMPLEMENTATION OF AR

#### Architecture and AR (Behzadan, 2008):

AR technology helps architects solve problems, making construction more cost-effective and time-efficient.

#### Medicine and AR (Samset et al., 2008):

AR technology is transformative in medicine, improving surgical and clinical procedures in terms of cost, safety, effectiveness, and efficiency.

#### Military applications of AR (Sisodia et al., 2007):

Air Force: Pilots use Head-Mounted Displays (HMDs).

Land Army: Soldiers use AR helmets to access three-dimensional, real-time information. These helmets highlight people and objects in specific colors, providing data like friendly forces, appointment locations, and dangers.

#### AR in advertising and marketing (Yuen et al., 2011):

AR applications engage customers and enhance their shopping experience by allowing them to interact with digital objects through hand gestures.

#### AR in entertainment (Yuen et al., 2011):

Markerless AR Tracking: used in social media and gaming industries.

Digital Transformation of Board Games: Monopoly has been digitized.

AR-Controlled Devices: Users can control drones via mobile apps.

#### AR in tourism (Raju, 2016):

AR applications enhance tourism by providing historical information about real-world locations through smartphones using GPS and camera features.

### THE ROLE OF AR IN EDUCATION

Effectiveness in compulsory education (Pellas et al., 2019): AR applications can be effective tools for learning in primary and secondary education.

Enhanced student experience (Dünser & Hornecker, 2007): AR enriches students' senses, offering real-time interaction in a more informative and stimulating environment by combining physical and virtual elements.

Mobile AR applications: AR content is often delivered through smartphones and tablets, which use their capabilities to create dynamic, context-aware, and interactive educational experiences (Wu et al., 2013). The features of mobile devices, connectivity, portability, personalization, social interactivity, and context sensitivity, benefit education.

AR promotes independent learning, digital literacy, and access to information without spatiotemporal limitations (Zaranis et al., 2013).

Rich instructional environments (Pellas et al., 2019): AR creates representationally-rich environments where learners can interact with digital objects within well-defined instructional settings.

Visually-rich learning (Cuendet et al., 2013): AR offers a visually-rich learning experience with digital objects integrated into the physical world.

### LIMITATIONS

Teacher-related challenges (Rajaan et al., 2014): Teachers' interest, internet connectivity, time constraints, budget, lack of administrative support, and interdisciplinary AR programs. Space and time limitations also hinder collaborative problem-solving tasks.

Assessment issues: Short assessment periods are inadequate to measure student learning performance and effectiveness.

Distraction and novelty effect (Jamrus & Razali, 2019): Students may become overly absorbed by the novelty of AR technology, leading to distraction from learning tasks. The loss of interest might occur as the novelty wears off, especially with complex AR systems.

Students' inexperience with AR technology, combined with large amounts of information, can cause cognitive overload, leading to feelings of disappointment and discouragement.

Complexity of learning process (Wu et al., 2013): The large volume of digital content and the simultaneous use of multiple technological devices can complicate the learning process, making it difficult for students.

Demotivation (Pellas et al., 2019): Limited availability of mobile devices restricts participation, contributes to a modest learning curve, and causes boredom among students.

Technical challenges: Improper display of virtual data can disappoint students, especially when they struggle to view augmentations.