

# The awesomeness of augmented reality in education

Prof G Andrew Page and Dr Ragnar Purje on a new frontier for educators

**W**hat is augmented reality or AR? How can educators leverage this emerging technology for deep and active learning to promote impactful positive learning outcomes?

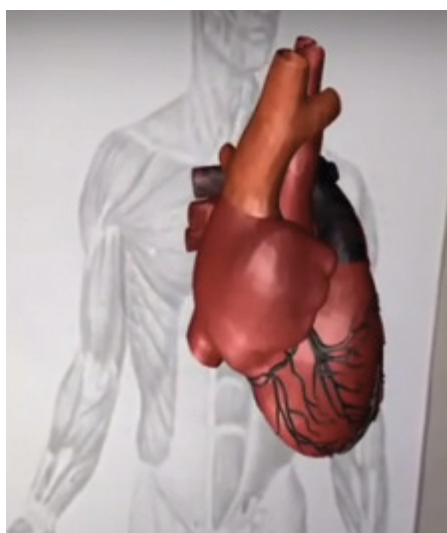
## What is Augmented Reality?

AR combines the real and virtual worlds, the physical and the digital, it is three-dimensional, and users can interact in real-time. One of the most popular examples of AR is the *PokeMon Go* interactive game, which featured cartoon characters in the real world. It was the fastest app to get to 500 million downloads to date.

Now, think back to when you were younger and the fascination of 'Pop-up Books'. This 3-D experience was low-tech but provided a deeper level of engagement with the story. However, the 'Pop-up Books' were static and the interaction was minimal. Now, imagine biology students examining and dissecting a 3-D human heart, or geography students learning the proximal relationships from a earth hologram. AR enhances the learning experience through the interactive environment and creative possibilities.

Learners as young as three and four years of age can use AR to view, manipulate, and enhance the learning experience with not only 3-D images but with interactive sound, movement, and more. Learners can experience a dynamic realm of multi-sensory images, witness relationship of cause and effect, and gain a deeper understanding of the world. This video provides creative examples of how AR can be used in education. <https://www.youtube.com/watch?v=rm2skiMTUJ8>

Augmented Reality or AR is an emerging technology that enhances the learning experience with applications in subjects such as STEAM as well as history and the humanities. Augmented Reality began to surface in 1950s with enhancing the cinematic experience to "draw the viewer into



the onscreen activity by taking in all the senses in an effective manner" Carmigniani, *et al.* 2011, p.352).

## AR and Education

AR can enhance the real world in real time by adding virtual objects such as a medical visualisation of the human body for an anatomy course, augmenting the visual acuity for learners with poor vision, and has grown to encompass all subjects. Simply reading about topics such as Geometry and Anatomy can help a learner become cognisant of a topic. AR allows for learners to see and manipulate 3-D solids (tetrahedron, icosahedron etc) or to perform a virtual dissection of the human body. The AR experience can be displayed through handheld devices such as a smartphone, a head mounted display (HMD), or even with an augmented reality headset. Here's a example of me showing AR e-Book that was created by my wife's students in Anchorage, Alaska. The goal of this collaboration between these first and fourth year e-book buddies was to create an augmented reality ABC book. The video demonstrates the 3-D nature of AR and shows a Puffin, a bird indigenous to the state of Alaska. Notice how camera lens is used to create the 3-D effect. (Link: <https://www.youtube.com/watch?v=mNzKlwSrWUU>

[youtube.com/watch?v=mNzKlwSrWUU](https://www.youtube.com/watch?v=mNzKlwSrWUU) Time: 0:26). We will explore the possibilities, cross-platform, open-source apps, and creative ideas for leveraging AR in all classrooms.

More augmented reality examples can be viewed in this video AR apps for the Classroom (Link: <https://www.youtube.com/watch?v=-IvUSDdm-Hc> Time: 1:41)

## How Augmented Reality Works

The next article will explore more details on HOW AR works and what tools educators can use to create engaging, active, 3-D lessons in their classroom. Future articles will explore AR Headsets and Hardware peripherals ([https://www.youtube.com/watch?time\\_continue=2&v=v7r\\_2fY-sWn0](https://www.youtube.com/watch?time_continue=2&v=v7r_2fY-sWn0) Time 0:48), free mobile augmented reality apps for iPhone and Android platforms (<https://www.youtube.com/watch?v=s0bt3G5ZAKy> (Time 4:03), a case study of a school district that has implemented AR into the curriculum.

## References for further discovery

Carmigniani, J, Furht, B, Anisetti, M, Caeravolo, P, Damiani, E, Ivkovic, M 2011, *Multimedia Tools and Applications*, 51, pp. 341–377, available at: [https://www.researchgate.net/profile/Ernesto\\_Damiani2/publication/216813812\\_Augmented\\_reality\\_technologies\\_systems\\_and\\_applications/links/53f488b-c0cf22be01c3ecb9e.pdf](https://www.researchgate.net/profile/Ernesto_Damiani2/publication/216813812_Augmented_reality_technologies_systems_and_applications/links/53f488b-c0cf22be01c3ecb9e.pdf)

Augmented Reality (2017). *What would the world look like if we could derive our identity from a more interactive form of communication that merges the digital and the physical?* TED Talk Digitally available at: <https://www.youtube.com/watch?v=RD-vBowq3ed8>

Longtime educator, researcher, and consultant **G. Andrew Page**, Ph.D. specializes on the diffusion and adoption of emerging, assistive, virtual, augmented, and mobile educational technologies He is affiliated with Alaska Pacific University in Anchorage, Alaska and lives in Savannah, Georgia USA where he is CEO and Founder of *The GAP Group*, an educational/training and research consulting group. Contact: [andy@gapgroup.org](mailto:andy@gapgroup.org)