

Virtual reality and 360° video: What's the difference and how do they work?

Virtual reality (VR) has been all over the news in the last five years as companies like Apple, Facebook, Google, and Samsung have raced to release VR systems for the masses. All this competition is driving the quality up and the prices down, and the result is an explosion of innovation in VR applications.

You've probably heard about VR games and rides, but entertainment is just one facet of this new digital world. Designers, engineers, and artists can use VR to make digital 3D models using intuitive, physical motion. Telepresence will take on a whole new meaning, making you feel like you're really there participating in an event, looking at a house you might buy, or visiting an exotic place.

In education, VR creates new possibilities for teaching skills that are hard to practice in the real world. At Acclimate, we're using it to help people with developmental disorders learn practical life skills in a safe, low-stress environment that is available anytime and anywhere.

Just like you, the therapists and teachers we work with want to know: how does this stuff work?

VR is cheaper and better than ever

Until recently, any kind of VR was a major investment. You needed a large headset, special hand controls, and a powerful computer to make it work – hardware that can easily cost thousands of dollars.

But now there are affordable options that bring VR within reach for almost anyone. In 2014 Google released Cardboard, a simple headset that pairs with any smartphone to create an immersive visual experience for just \$5. This technology is called **mobile VR**, and it has revolutionized the possibilities for using VR in everyday life.



How mobile VR works

The many variations on this headset all work the same way. You slide your phone into the slot, behind two binocular-like lenses. The VR application on your phone displays two images taken from slightly different angles, one for each eye, and the lenses focus them onto your eyes to create a complete image.

To make the VR application interactive, programmers can use the phone's own hardware to sense your movements. The accelerometer and gyroscope measure the device's speed and direction, which can translate into movement within the virtual space. The camera can track your eye movements, allowing you to control the app with your eyes.

You can't touch your phone screen while it's in the headset, but there is an elegant solution to that problem. A single button on the side uses magnets to simulate touch. Combine this with eye tracking, and you can make selections in the app just by focusing on a point on the screen and tapping the button.

That's how, with just a smartphone, some cardboard, and a few simple lenses and magnets, you can explore a virtual world for less than it costs to buy lunch.

CGI vs. 360° video

VR environments can be created in two different ways: with computer generated images (CGI – think video games) or with 360° video (think Google Street View).

CGI is great for making complex worlds that users can navigate on their own, choosing where and when to move and how to interact with objects and characters. The downside is that the larger and more life-like the environment, the more computing power it requires. A smartphone can't handle the elaborate scenery and fine-tuned movement of a realistic CGI simulation.

That's why some people still opt for expensive headset systems like the Oculus Rift. It has higher quality sensors than a smartphone and requires a hard-wired connection to a powerful computer that renders the graphics as the user moves around the virtual world.

But even the best CGI is still a far cry from reality, and that's where 360° video comes in. It captures the true sights and sounds of a place in *all* directions, not just in front of the camera. The trade-off is that video offers less mobility in the virtual world than CGI. The user can't control how they move – they can only go where the camera goes.

But because there is less mobility, there's also less computation, so 360° video works just fine on a smartphone. You can get the highest level of visual realism without any expensive equipment.

Visual realism helps students transfer skills

When Acclimate talked to real therapists about teaching children with autism and other developmental orders, it was clear that more realistic simulations were necessary.

“We currently use computer programs with virtual representations of community places to teach our students a lot of these life skills...but we are finding that our students often have a hard time generalizing the skills learned in a computer game. Using video with real people and real places and immersing them in the experience would be so beneficial because it's much more realistic. Our kids will generalize a lot easier if it's as real and mimics as closely as possible to an actual experience.”

It was an easy choice – our users needed affordability *and* visual realism, so 360° video was clearly the way to go. But passively watching a video isn't a very effective way to learn, so how to deal with the limitations on user interactivity?

Embedded assessments make 360° video interactive

With most 360° video the user is just along for the ride, with no ability to control what happens. Not so in Acclimate's learning simulations – we create opportunities for users to make choices and receive feedback, even though they can't navigate freely in the virtual world.

For example, in our simulation of buying food at the grocery store, the student must choose items from the shelf and decide how much money to give the cashier. They receive feedback on each choice and can try multiple times before moving on.

We do this with the eye tracking system mentioned earlier. In this lesson, the student can choose their grocery items by looking at the product they want on the shelf and tapping the button on the side of the headset. They choose how much money to give the cashier by looking at an assortment of bills and tapping the button to pick which ones to use.

When the student makes a selection, the app then tells them whether they made the right choice and gives helpful hints when they don't. Meanwhile, the teacher or therapist can watch the process on a separate screen and provide additional guidance if needed.

Learn more

We're currently running pilot studies and getting ready to launch Acclimate VR for public use. This blog is where we give updates on our progress and share our knowledge to help people with autism gain practical skills to enjoy safer, more independent lives. [Subscribe here](#) to join us on the journey!