Reality Bytes: Virtual Reality and K-12 Education

Making learning more personalized, more relevant, and more immersive have always been the moving goal-posts of education. Digital media has helped create infinite opportunities in terms of access to dynamic content, but it's still, for the most part, an extension of traditional learning: groups of students watching and absorbing static information with minimal interaction.

Virtual reality (VR) is a term that has been with us for years, yet it is only recently that the technology has evolved to the point where it is actually realizing its potential. And in terms of education, the implications could prove especially profound.

Personalized learning, experiential learning and mastery-based learning are all more viable with VR technology. Personalized Learning—an approach to learning that addresses distinct learning preferences—has been linked to greater academic progress and to deeper learning on a neurological level. The more a student takes their learning personally, the more—and more deeply—they take it in. And once a subject inspires a student, their brain actually changes and they are more receptive.

So how to connect kids with the ways in which they learn best?

Immersive Technologies such as Virtual Reality and Augmented Reality can do everything modern computer technology can and then some: presenting rich worlds to students that they can interact with, freeing learning from beyond the confines of a screen.

Ahead of the Game

Immersive Technology began as a gaming medium, but now is expanding to include any number of applications, but nowhere is this as exciting as in the field of education. Educators can create experiences ranging from virtual field trips to interactions that defy the laws of physics: taking students to outer space, back in time, inside a molecule, or anywhere a concept can be more deeply explored.

Using technology such as Medivis, medical students can fully explore the human body without need of cadavers. Or using The Universe Sandbox, students can not only explore space, but also create their own interstellar systems.

Teachers are also using virtual reality apps to teach cultural understanding, global awareness, and historical perspective. After having a student interact with an ancient civilization, for instance, they can share their learning with the entire class. Nearpod—a platform enabling teachers to use their tablets to manage content on students' mobile devices—offers VR lessons that leverage virtual travel along with related activities. In partnership with Google Expeditions, Houghton Mifflin Harcourt offers curriculum-based virtual reality field trips, like a journey through prehistoric caves during the Age of Dinosaurs and a visit to the Everglades to experience the lives of the ancient Seminole tribe.

And what about traditional subjects such as, say, math? VR could help students to visualize geometric principles using 3D objects or for comparing the size or amount of objects in a more meaningful way.

Virtual reality and augmented reality technology is especially powerful for STEM subjects where real-time experimentation to absorb complex topics is critical. Students can examine 3D models of plants,

Clarity Innovations

animals, and geographic features by rotating, swiping, and zooming in and out. Students could also use virtual reality to witness the impact of a modern catastrophe, such as the aftermath of a hurricane, and then connect with those affected to discuss their experiences.

In Japan, students suffering from anxiety disorders can create virtual avatars: giving them the ability to improve their public speaking skills in different simulated social environments. With the help of VR and 360-degree videos, a panoramic video of the entire classroom can be streamed to a student in a remote location, making distance learning more seamless and satisfactory.

And, considering that this is the early stage of Immersive Technology's capabilities, a number of new innovations and opportunities to reach young learners are just around the corner. Exercises can be transformed into stories, with assessment built seamlessly inside learning environments to gauge progress.

> VR technology can help transform students from passive observers to more active parts of the learning experience.

In-the-Virtual Trenches

VR technology can help transform students from passive observers to more active parts of the learning experience. They can travel—risk-free—to the far corners of the earth, or to "impossible" places such as the subatomic world to play with physics. Virtual Reality is also a way to channel a student's energy, enthusiasm and curiosity into learning in a new way. Instead of fidgeting at their desk during a lecture, they can explore landmarks, dive deeper into concepts, or perhaps even find themselves in the middle of a historic moment where their decisions could affect the course of history!

Here are how some schools are using VR for education:

⊘ Michigan's Utica Community Schools is using VR to explore the human body, build rollercoasters to study gravitational pull and design car prototypes: "One of the reasons we wanted to introduce virtual reality to our students is because we sit in the heart of the defense and automotive industries," says Superintendent Christine Johns. "Industry is already using these tools to design the dashboard of a car, for example."

⊘ An Indianapolis charter school that educates students in recovery with drug and alcohol addictions uses VR to keep students engaged in science.

⊘ Hope Academy in Minnesota take virtual field trips to the California Redwoods so that students can learn about photosynthesis; Kitty Hawk, where they'll gain an understanding of design engineering; and Sunspot Mountain in New Mexico, for studies in astronomy. "Students today learn differently than those of 20 years ago and we plan to meet there where they learn," says Principal Linda Gagyi.

According to Futuresource Consulting, the number of students using virtual reality and augmented reality will grow from 2.1 million in 2016 to 83 million in 2021. And—in a forecast by Technavio—the K–12 game-based learning market is expected to grow at a compound annual growth rate of nearly 28 percent through 2021.

Clarity Innovations

The Cost is Clear

But what about the cost of VR? Consider the costs and resources associated with field trips. They provide a powerful opportunity to engage and educate, but they can not only be costly, but also require coordination, organization and logistics. Virtual reality, even at its most basic, can artfully simulate the modern-day field trip, or at least complement them. And a virtual field trip needn't require costly goggles or headsets. Google Cardboard (about $15), for instance, can provide an immersive and relatively affordable experience. And, if every other form of technology is any indication, fancier headsets will become more affordable as time goes on.

To properly enjoy these experiences, however, takes a stable infrastructure. The key is to start with something basic, such as Google Cardboard and Google Expeditions. As schools grow their collection of more sophisticated VR headsets, they can adopt a computer lab model so that all children can have the opportunity to experience more immersive VR. K-12 IT experts recommend keeping issues such as latency in mind to prevent possible motion sickness, as well as adopting a modular approach to network growth.

VR immersion can demonstrate material covered by a traditional lecture. A teacher can also moderate a VR lesson and launch different modules when necessary, or even become part of the virtual environment by customizing an avatar and participating directly in the process. Together, students can listen to the teacher, collaborate, and even perform group tasks using VR social features.

Virtual Reality Check

As educators know all too well, different students boast different learning styles. Some are content burying themselves in the pages of a book. Others need physical activity. Other need to be engaged in game-like interactions. Virtual and augmented reality is poised to serve all of these students.

But, as with any education technology, it must be successfully integrated into the educational curriculum, acting as a tool and enhancement, not as a replacement. VR immersion can demonstrate material covered by a traditional lecture. A teacher can also moderate a VR lesson and launch different modules when necessary, or even become part of the virtual environment by customizing an avatar and participating directly in the process. Together, students can listen to the teacher, collaborate, and even perform group tasks using VR social features. Virtual interactions such as these could unlock a very real world of opportunity for students and teachers alike.

Clarity Innovations