10 Things to Think About When Using VR in Education

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Virtual Reality's entry into the commercial space has generated a lot excitement for gamers but also for educators. After looking for some concrete information about what it looked like to put VR in schools and finding very little, we decided to go ahead and do an exploratory study ourselves. We wondered, "what are some things people should know about putting VR in schools?" In the 2015-2016 school year, we partnered with 7 schools across North America to look at some trends and best practices for using VR in schools, particularly with advanced headsets such as the HTC Vive and Oculus Rift, and we learned a great deal. Though more formal examples of our findings are coming soon, we wanted to share some highlights because it turns out,putting VR in schools is quite different from other forms of media.

(1) Scaffolding VR content is important

Starting with super innocuous, relatable, controlled experiences, such as *Tiltbrush* (an artistic creation experience for the HTC Vive) is really important. It is vital that students figure out movement, sense of space, controls, and input while allowing them to largely control the environment at first so they feel comfortable and capable in VR. This effect was especially noticeable in kids who have less experience with games in general. *Tiltbrush* has no questionable content as players begin in just an empty room and then create 3D art. It is a phenomenal creative tool. This wasone of the top-rated experiences amongst the students and teachers we worked with this year. Other great intro-level content, just to familiarize students with the VR space includes:

Henry -- this experience on Oculus focuses on a story involving a cute hedgehog who is determined to make a friend. It introduces the user to the virtual space while not overwhelming them with motion and movement. The story did elicit a few tears though, even among high school students in our study (but it has a happy ending).

Job Simulator -- this experience on Vive, Oculus, and PS VR is another fave of students and teachers for learning to engage with the VR space. Users experience different types of jobs in the experience, chopping food, navigating through an office and all sorts of fun scenarios. The fun comes from the opportunity to throw, smash, move and interact with objects. It is another good entry-level experience for people who are not as familiar with gaming or virtual technology.

The Lab -- another great introductory experience on the Vive. Users have the opportunity to learn about moving through the VR space, teleporting from different locations, and can play and interact in a variety of different spaces including more game-based environments as well as traveling to existing places around the world. It does a nice job of scaffolding interaction for the user.

(2) Even content that seems very tame can be a lot for students to process in VR

One of the most surprising things for us came from watching hundreds of people go through *The Blu Experience*. This experience simulates being underwater on a shipwreck watching sea creatures swim by, including a large whale. As a team, we found this to be incredibly soothing and amazing. However, a noticeable number of students in our sample found the whale to be too much for them to handle and a generally stressful encounter (the experience gives the user a real sense of size and scale with the whale) due to things like a fear of the ocean or sometimes more personal and specific concerns. This was useful for us to see because it helped us to better understand that even content that seems quite tame to us may be very overstimulating to kids and teens. We quickly learned to let people know that the experience would be underwater and involve the appearance of a large sea creature.

In addition, we found and previous research has shown, that even when something looks "cartoony" or "gamey", it can still trigger a strong physiological response from users. We had some users play a zombie game, and even though the zombies didn't look "real," people still had a visceral response to them. Many found that response enjoyable and exciting, but not all. The first person immersive experience of VR can be a big transition from the real world and can catch students off-guard. One student noted that it was a little bit jarring to go from their classroom to the top of a mountain in Google Earth. It is important, as educators, that we help situate students in the experiences and help them transition into material, even if it doesn't seem like the content should be a big deal.

(3) Previous tech exposure seems to influence students' comfort level with VR

This might seem obvious, but it was quite interesting to hear about it anecdotally from teachers in the study and to see it emerge from our data. Controlling for other factors, students who self-reported higher scores for the item "I have a good understanding of what virtual reality is" at the start of the year were less likely to have experienced VR content that was overwhelming later in the year. Interestingly, students who self-identified as having had more actual experience with VR initially were more likely to have experienced VR content that was overwhelming, likely because they just had more exposure to content and often were more eager to try newer content. While in this particular study we did not control for it, we heard from many of the teachers in our study that students with more gaming experience tended to more readily adapt to the virtual environment and seemed less apt to find things, such as the large whale, as intense as students who were not gamers. This is something we hope to investigate further this coming year while controlling for gender differences in gaming experience.

(4) Pink-eye is a thing! Disinfect those lenses

Another seemingly obvious, but super important point, is to use alcohol wipes after each user switches the headsets if they are shared. One school had the unfortunate experience of spreading pink-eye around the room because they weren't diligent about cleaning after each user. This is an easy one for teachers who are new to using VR to forget, and can cause some

concern amongst parents and administrators. This makes it all the more important to ensure that good and thorough cleaning practices are upheld.

(5) Don't mess with people immersed in VR

It was quite important for teachers to set clear ground rules and guidelines for how kids could interact with people in VR. Essentially, if you are not the person in the headset, and the person in the headset is not going to run into a wall or hit someone with controllers, you leave them alone so they can stay immersed in the experience.

We anticipated that kids might make fun of one another while in the headsets, but actually that didn't really happen. The headsets became a normal part of the classroom after students had had some exposure to the technology.

However, it was extremely important to make it clear that you did not disrupt the person in the headset while they are immersed in a simulation. In order to be truly immersed, students and teachers referenced a need to feel safe in their environment; there was a level of trust between peers that had to be established, and no one was to interact with the immersed student unless there was a safety issue (e.g., a student about to walk into a wall or something). Several schools created barriers with tape that prohibited other students from crossing into an area when a student was using HTC Vive headset. Eventually students in several schools became so comfortable they would sit or lie on the floor as they experienced content. Ideally having a space that is solely used for VR is even more helpful in ensuring student comfort.

(6) Thinking critically about VR content is an important skill that must be taught

Whether students were content creators or content consumers, critical consumption conversations were important topics that were referenced often in our data. VR is often not a primary source material, someone creates these simulations, and it was apparent to teachers that this needed to be made explicitly clear to students. In game design and tech classes, these conversations were great for dissecting experiences to talk about what worked well and what could be improved on the technical and design side of VR content.

In more humanities based classes, it was really important to talk about simulated experiences (particularly history related ones) and perspective. Who is the creator of this experience? What perspective are they showing? Is that accurate? What are the designers trying to portray? Did they do it well? Teachers saw this is a great opportunity for enhancing media literacy and critical thinking skills. Again, for some students, VR experiences were seen as very real, so taking the time to debrief about what aspects may have seemed real, and which weren't, is vital.

(7) Let kids figure things out on their own

One of the great benefits of using VR right now is that it is such a new technology, so many things have not yet been figured out. All of the teachers spoke about the rewarding sense their students got both from working with cutting edge technology and from facing problems that aren't answerable through some creative googling.

The teachers didn't have all the answers either. So, students and teachers really had to commit, together, to figuring out the issues they faced. Students learned how to post professionally worded questions on forums, troubleshoot problems and often experienced great feelings of success when they figured things out on their own. In fact, one teacher said the best thing she did was NOT solve problems for her kids in VR because it forced them to think critically and problem solve in new ways.

(8) VR teachers, unite!

The teachers in our study expressed great interest in connecting with other teachers who were using VR. This interest stemmed not only from wanting to troubleshoot or brainstorm together, but also because they wanted to share content and have their students connect with one another. Establishing a connection between the classrooms was a unifying force amongst the teachers in our program and is now a goal of ours for the coming year's study (which has twice as many teachers). If there are other educators who also interested in connecting, we are interested in helping to facilitate those connections as well.

(9) Sound makes a huge difference

Visuals are important, but it was noted by the participants in the study that sound is key. Truly being able to take in the sounds in the VR environment was essential for immersion, particularly in a school environment with bells, announcements, and noisy learners. We also heard from students who found VR to be a very therapeutic experience and they mentioned how visually and aurally immersing themselves gave them the opportunity to reset and regenerate. On the content creation side, student developers really enjoyed the challenges of working with sound in a 3D space because it forced them to think about where those sounds originated from relative to the visual experience.

(10) VR lived up to the hype for the vast majority of students and they, along with their teachers, see it as a way to potentially change education

The teachers referenced that their students actually conceptualized of and saw VR differently than they, as adults, did. Adults found their thinking to be constricted at times and attributed this to boundaries in their minds about how they conceptualized VR, whereas students were able to think more broadly and felt more compelled to "figure things out" than some of the adults. Teachers told us that their students were asking questions and approaching problems in very different ways than they were as adults. And finally, while adults tended to sometimes think of VR as just being similar to games or moving diagrams, students visualized and played around with ways of interacting virtually that were unique and creative. Students had different ideas

about how one could move within the VR space, the manipulation of sound and the types of experiences they wanted to see in VR (many of which didn't exist, so they began working to create them on their own).

We are continuing our research this coming school year and adding additional schools. We will have about 20 schools in the US and Europe using all sorts of different types of hardware and software to teach with VR. In particular we are asking questions about content and perspective taking this time. We know VR can work in a classroom setting, but this time around, we really want to know what will make it great!