Chapter 2

Immersive Virtual Reality, Google Expeditions, and English Language Learning

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A "genius hour" or "20 percent time" is a concept that has been popularized by many major tech giants, including Google, Apple, and 3M. It is a paradigm in which engineers at the company use 20 percent of their workweek pursuing a pet project—something they are passionate or curious about. This concept, now extensively used in educational environments, has proven so effective that it has led to a number of Google products, including Gmail and Google Expeditions.[1]

Google Expeditions was created by Google engineers David Cox and Damien Henry during their 20 percent time.[2] They presented their concept, named Google Cardboard, for the first time at the 2014 Google I/O Developers conference.[3] By 2015, Google had released a kit that included a tablet for teachers, devices for student use, and Cardboard viewers in class sets. According to CNET, it was the first virtual reality (VR) system directly targeted at kids.[4] This focus on children and the classroom experience from the initial development forward has created an experience very different from immersive technologies created for gaming.

While gaming and social networking have driven much of VR content, Google Expeditions (née Cardboard) was born during the 20 percent time of engineers at the Google Cultural Institute and, therefore, has a very different heritage. Education is figuratively in its DNA. While content was initially populated with Google Cultural Institute's museum content, Google Expeditions has quickly added content through partnerships with important institutions including the Smithsonian, the Wildlife Conservation Trust, and the Royal Collection Trust.[5] This has helped keep the quality of the content high.

Nicole Lee's article "Google Makes Its Case for VR by Reinventing the Field Trip" notes that this makes field trips accessible for all students.[6] What is unsaid is that it provides a stepping stool for the students who have the least access to print text in English, travel, and technology—our English language learners (ELLs). ELL students disproportionately benefit from an extremely visual experience that is enhanced by audio narration. Google Expeditions opens up concepts to these students in particular by virtue of its presentation, content, and affordability.

Immersive Virtual Reality in the Classroom

The first time I did an Expedition with a class, I worked with a small group exploring organelles in cell biology. The Expedition was one of four stations in a standard biology class. All the students had to do at the station was experience, watch, and listen. In the first two blocks of the day, there were lots of oohs and aahs. It was fun. It was easy to keep their attention or direct it to points of interest.

There is some value to the "wow" factor in education. Content that engages the learner in a common

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experience both creates community and provides a framework and context for the content to be remembered. Engagement in learning, as in Carnini, Kuh, and Klein's 2006 study, correlates to traditional learning outcomes, with students of the least ability benefitting the most.[7] As a classroom teacher of many years, I feel that there is ample anecdotal and commonsense evidence about the links between engagement in learning and outcomes. It is difficult to help kids learn when they do not care. Disinterest is the death knell of any lesson. However, engaging technology will draw student attention to content.

Immersive VR visually blocks out distractions. Not only does it engage students with interesting content, but it also removes anything else competing for visual attention. When we speak about accessibility of content for our students who suffer from attention deficit disorder, anxiety disorders, or impulsivity, a device of this nature literally eliminates distractions. Accessibility takes on many forms; addressing language barriers is one of them. For our ELLs, it helps them concentrate on the content of the visual scene without the stress of decoding written language.

In VR, the value is in perspective. Understanding perspective by (virtually) standing in the shoes of history is a powerful experience. It helps students to think critically about the history that is being taught. While it may be easy to see the pyramids at Giza in the millions of available photographs, immersive VR helps students to stand at the foot of Khufu's pyramid and see the scale of blocks and the distance from water. It may help them understand the engineering involved in the architecture. Measurements and maps say only so much. Standing on the battlefield, on the floor of the Roman Senate, or beneath the glass pyramid at the Louvre helps students understand how events fit together in their context. Rather than presenting stories of lands far away, immersive VR helps history to be that much more real—less about heroes and villains and more about circumstance and humanity.

Unique to immersive VR, the sensation of standing in a scene and being able to turn to see distance, proximity, and perspective helps students think critically about events in history.

Immersive VR and ELL Students

Engaging technology will draw student attention to content. That is exactly what I saw in the first two blocks of that of biology class: student attention focused on organelles.

However, in the last block of the day, I had a group of students who speak English as a second or other language. For them, not only is learning vocabulary words like *mitochondria*, *endoplasmic reticulum*, and *ribosomes* difficult, but the language barrier makes these terms additionally opaque because the surrounding vocabulary can be an obstacle as well. Words like *powerhouse*, *highway*, or *control center* pull the content even further out of sight. Not only do the students not understand the actual vocabulary, they also do not understand the metaphors commonly used to explain that vocabulary.

Imagine a scenario in which you not only do not understand that there are tiny things inside cells, you also do not understand the word *cell* or any of the other words your teacher is using while pointing to a squishy-looking graphic on a PowerPoint slide. While ELLs vary in language attainment, the more visual context and clarity the teacher can provide to surround the concept increases the likelihood of comprehension.

By putting students visually inside the cell and by moving from far away to close up in a guided way, language is removed as the necessary component to understanding the concept. As students move through the Expedition with guidance from the teacher, they better understand both the idea of a cell and the idea that there are tiny parts to it that have various functions.

Immersive VR is a visual experience. According to Gersten and Baker's study of effective instructional practices with ELLs, "during English-language content instruction, effective teachers intentionally vary the cognitive and language demands."[8] When the cognitive load is high, as it would be when exploring organelles, language demands should be low. By including immersive VR, the teacher would be keeping the language demands low while increasing the cognitive load. The experience of exploring cells and organelles is a high cognitive load, not only due to the vocabulary, but also due to the concept that tiny invisible working organs control living things. Balancing the demands on student thinking may help with concept attainment, but immersive VR also allows for additionally helpful instructional strategies that are effective for ELLs.

In addition to varying the cognitive and language loads, using inquiry to move through a virtual experience increases science knowledge as well as facility in English language.[9] Posing questions—both the leveled questions offered by Google Expeditions and those offered naturally by the teacher—coupled with the ability to explore in 3-D, makes for a uniquely effective lesson for ELLs.

Why the Library

There is a reason why technologies like immersive VR often find their foothold in schools through the library. First, librarians are both master teachers and subject

area generalists who often carry multiple endorsements. Second, one of the foundational concepts of libraries is open access. Technologies that begin in the library are accessible to all teachers and all students.

MLS is not always "master of library science." Sometimes it is "master of looking up stuff." It is one of the tenets of our profession that we can find information faster and better than anyone else in our school building. That includes finding, reading, and applying instructional manuals.

Immersive VR is an addition to our technology offerings. The technology first showed up as a Google Daydream. The Google Daydream is a single-user headset. Students immediately used it for wandering the world using Google Street View, exploring the Dalí Theatre-Museum in Spain, and swimming in the Galapagos using Google Expeditions. The library was the perfect location for students to use VR because it was single user and because it had such varied uses across disciplines.

Librarians teach across all subject areas. In a single week, even those of us on a flexible schedule may teach geometry, biology, language arts, and American history classes. From this position, we are able to demonstrate to teachers best practices in technology integration. One of the AASL's Common Beliefs is, "Qualified school librarians have been educated and certified to perform interlinked, interdisciplinary, and cross-cutting roles as instructional leaders, program administrators, educators, collaborative partners, and information specialists."[10] This cross-cutting role lets us demonstrate to our school communities how immersive VR can be used in whole-class, small-group, and individual instruction. Because librarians are master teachers who coteach, demonstrate, co-plan, and introduce new resources across disciplines, the library is a key component in introducing not just VR, but all kinds of new technologies that should begin their instructional tenures here.

Due to the nature of the library as the heart of a school, it is the one place all students can come to explore ideas and wander through information to create something new. After our experience with immersive VR exploring organelles in biology class, one of the amazing side effects of engagement in learning was joy in learning. All of a sudden, the library was the place to be for ELL students.

Providing access to ideas and information should transcend language. Many of us carry collections in a variety of languages; why would we not use technology in a similar way? Immersive VR allows student access to ideas and information while reducing the cognitive load that ELL students constantly carry. I do not need to wonder why the library in general and immersive VR in particular are popular. Both provide a common experience around common vocabulary without a heavy second language component. It is fun. It makes learning that is fun.

Therefore, the last block of that biology day was a revelation for me. Immersive VR is a technology that can and does transcend a language barrier to both deliver content and enable concept acquisition. Further, it encourages engagement for students in learning and in the library culture. When the library is open to new ideas, new patrons, and new technologies, it is 20 percent time all the time—no matter the subject, no matter the language, no matter which teenage genius is in front of me.

Notes

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