Building Background Knowledge Just in Time with Virtual Reality

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Virtual reality is helping reimagine what is possible in classrooms. Virtual reality is considered as "computer-generated environments that simulate the physical presence of people and/or objects and realistic sensory experiences" (NMC, 2016). Students can travel through time and space, visit countries and landmarks, and experience activities that feel real. Educators are finding creative ways to apply this technology (Thompson, 2018). Specifically, teachers are recognizing opportunities to integrate virtual reality in their lessons to support reading growth. (Pilgrim & Pilgrim, 2017). This proposal focuses on the use of virtual reality such as HistoryView to build knowledge on topics that support the understanding of complex grade level texts in the K-12 setting.

Why this proposal?

As recommended by Student Achievement Partners in the *2021-2022 Priority Instructional Content in ELA/Literacy and Mathematics*, "students should spend lots of time actively reading content-rich, complex text" (2021). The dimensions of text complexity include qualitative factors, quantitative measures, and information about the reader and the task (Generation Ready, 2013). A criteria for qualitative features is knowledge demands which refers to the prior knowledge that students bring to the text. "Students with considerable prior knowledge of a subject can use strategies to problem solve more effectively than those with little prior knowledge, can focus on what is imp in a learning task, and can ask relevant questions about a topic" (Pilgrim & Pilgrim, 2016). A direct approach to building background knowledge is through accessing out-of-classroom experiences like field trips to museums and art galleries (Marzano, 2004). With HistoryView VR, historical sites and museums are brought into the classroom for free and without the purchase of headsets. "Each VR tour is equipped with touchpoints that students can select to learn more about the location" (Nieves, 2019). With this

technology, students develop key understandings on unfamiliar topics that become prior knowledge for accessing complex text.

Background

The power of virtual reality is the potential to enrich prior knowledge and motivation. Imagery, feelings, and personal experiences are valuable to meaning making. “VR creates sensory experiences that involve sight, touch, hearing, and motion to allow users to feel as though they are physically in that environment” (Hutchinson, 2018). Technology today expands the use of images to scaffold prior knowledge (Warschauer, 2008). “These tools enable teachers to expand on the notion of a single image to convey meaning to include virtual reality (VR) tools to provide ‘field trip’ experiences without the travel” (Pilgrim and Pilgrim, 2016).

The reading comprehension process is complex requiring the reader to create a mental images or representations of what the text is describing. “This mental image is based on the text information but also upon the reader’s prior knowledge” (Marzano, 2019). Together, they create the knowledge base that student use to learn more with.

The benefits of virtual reality are grounded in constructivist and experiential learning theories. Constructivism is the philosophy that learners learn by doing. VR environments allow the learner to feel stimulated and active. An experiential approach suggests that the learner needs to interact and engage with the VR technology. HistoryView VR is an interactive platform that sets up the user to engage and explore. Students are empowered to express their agency through discovery.

Policy Consideration

Policies should concentrate support in teacher preparation, development of more VR programs, and increased partnerships. Furthermore, policy needs to embed and pronounce more explicitly digital literacy standards.

Historically, teachers, when faced with emerging technologies like computers and instructional television, claimed an ineffective implementation. For example, during the 1990s, “the impact of computers was minimal, with substantial number of teachers reporting little or no use do computers for instructional purposes” (Reiser, 2001). Also, a reason for why instructional television was not used more effectively in classrooms was teacher resistance (Reiser, 2001). The suggestion is to fund programs or provide incentives for teachers or districts to learn how to implement emerging technologies.

HistoryView has many VR tours available and they are still inviting museums, art galleries, and historical sites to partner with them. Donations that support their future developments will provide more opportunities and access points for students to learn even more through VR technology.

Guy Merchant urges for policies to encourage, train, and support teachers in learning about and implementing emerging technologies that may disrupt known ways of classroom experiences. He explored digital literacy in an immersive virtual reality where students and teachers engage in play as avatars. He noticed differences between newer digital literacy practices that students demonstrated in the game and conventional literacy routines. Specifically, he recognized an informal genre of interactive written discourse and how the game “disrupts ideas of conventional spelling, turn-taking and on-task collaboration” (2009).

The current state of the field

“As the cost of equipment falls and schools have greater access to technology, there is great interest in virtual reality as an educational tool” (Thompson, 2018). Hutchison agrees that the lowering cost of VR technology and the increasing availability of VR applications make this technology great for classroom use (2018). Pilgrim and Pilgrim discuss common applications and share resources related to virtual reality including virtual trips and simulations. They also

assert that VR tools have the potential to enhance classroom instruction by providing prior knowledge and motivation (2016).

Current applications in classrooms are not limited to virtual field trips. “VR learning environments can also support the notion of situated learning where students learn while in the actual context where that learning is to be applied” (Youngblut 2018). For example, imagine an engineering student conducting potentially dangerous experiments in a power plant while immersed in a VR setting. This technology has the ability to match educational environments with students’ abilities, goals, and interests.

While evidence of impact is questionable, there is growth of implementation, increased affordability, and accessibility. More websites are offering VR tours and requesting partnerships and support.

Description for application

Virtual reality as an instructional tool to build background knowledge that will serve as prior knowledge for learning new content is meant to be used a just in time teaching method. This means that teachers are prepared with VR interventions and present them just in time to accelerate learning. Below is a description of a process teachers can use to prepare:

- Step 1: Identify the goals, key understandings, and outcomes for learning. This includes internalizing the text.
- Step 2: Anticipate misconceptions
- Step 3: Determine appropriate VR content that will address the misconception and support building the necessary understandings.
- Step 4: Sequence questions and tasks that support engagement with the text.

Assessment plan

Effectiveness will be measured through the use of a KWL chart. A KWL chart is a protocol used by students to identify what is known about a topic, what they want to know, and what they learned. Before engaging with a text or new content, students will list what they already know about the topic. After engaging with some of the text, students will pause and list what they want to know more about. This list will inform which VR content to use as bridges for understanding. After viewing the VR content, students will consider what they learned with the use of the VR technology. Additionally, students will reflect on their exit ticket if the virtual tour was helpful for learning new information.

Teachers should look at student work and measure the extent to which the virtual reality content was impactful. This can be done by reading through student responses of what was learned and matching that to the anticipated understanding of the VR content. Using a point system of 1-3, teachers will rate and track the effectiveness of VR interventions over time. At the end of units, teachers will reflect on the effectiveness of the intervention and consider changes for a stronger and more impactful use of VR technology for building background knowledge.

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