



BRINGING THE PAST TO LIFE WITH AR/VR

How to integrate mixed reality into social studies and history curriculum.

Augmented and virtual reality learning is getting real in K-12 classrooms. Schools that leverage these next-level technologies are getting better results via better student engagement and access to more compelling content. The potential for improved educational equity is palpable with these technologies, and they bode well at a time when budgets are tight and expensive professional development is not an option.

Though initially used primarily in STEM content areas, augmented and virtual reality — collectively called mixed reality, or MR — is taking hold in the arts, English and Social Studies.

There's no doubt that the tech and gadgets look cool — but do they actually help teachers teach and students learn?

Research by Rebecca Hite, assistant professor of curriculum and instruction at Texas Tech University's College of Education, shows that it does.

TANGIBLE EVIDENCE OF LEARNING FROM AR AND VR

[Hite's research](#) explored how sixth- and ninth-grade students experienced 3D, haptic VR instruction. The quantitative and qualitative results indicate that mixed reality instruction has tangible benefits. These positive findings warrant further study in other content areas, including Social Studies.

"In an assessment of cardiac knowledge and function, both sixth- and ninth-grade students had significant gains from pre-test to post-test. Regarding cardiac physiology or function, both groups again had significant gains in understanding of cardiac circulation — or how the blood moves within the heart chambers. When students were asked to draw the heart, all groups had significant gains in understanding of the heart's shape, components — vessels, chambers, and values — and function," Hite said.

Hite's research confirmed that students asked higher-level questions after their virtual experiences when compared to less engaging means.

She theorizes that the difference lies in the fact that virtual environments are active and learners must make choices or actions to advance through the content.

In Hite's dissertation research, students asked 36% more higher level interactive questions upon learning science content with zSpace. As with other modes, students use prior knowledge to learn new content via active questioning and create levels of meaning beyond the new content. The interactive nature of MR for learning suggests students engage in deeper questioning and they create levels of meaning beyond the new content.

When asked what modality increased their understanding, students in Hite's study expressed a strong preference for videos and virtual reality options over less immersive and interactive experiences, such as using physical models, teacher instruction and reading ebooks or textbooks.

DEEPER UNDERSTANDING IN SUPPORT SOCIAL STUDIES

"Within History and Social Studies, the goal of creating meaningful experiences at times may be more difficult, as many students desire a more hands-on approach to learning of the past and present cultures and peoples," says Danielle Marshall, a master's candidate in TTU's Museum Science and Heritage Management program.

Moving from books and movies to MR brings the social sciences to life when the real world is unavailable or impractical.

Hite, a former classroom teacher, says, "How wonderful would it be to guide students through a virtual city to explore the art and culture of Ancient Rome? Or, if you don't have access to often-expensive building materials, to create a 3D representation of cultural artifacts representative of the people or society of interest?"

For example, in a unit on Greek architecture, students can use educational technology like zSpace to learn about and carefully examine elements of architecture. Then they can scan examples of architecture in their community or create their own features using 3D modeling software. These projects can then be used for compare-and-contrast and other activities.

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MINI CASE STUDY: USING MR TO EXPLORE ANCIENT INDIGENOUS CIVILIZATIONS

The [Museum of Texas Tech University](#) saw mixed reality as an opportunity to deliver a more immersive, engaging and educational experience. Museum staff collaborated with Hite to use zSpace to teach about ancient indigenous civilizations.

The [interactive installation](#) incorporates a curriculum designed by Marshall with 3D scans of pottery from the William C. and Evelyn M. Davies Gallery of Southwest Indian Art. The technology enables visitors to explore the rich cultural history of indigenous peoples by “touching” scanned representations of past and present art. The virtual artifacts can be examined inside and out and even taken apart for closer inspection. In addition to the physical and virtual objects, guests are given cultural and historical context through narration, music and photos.

Activities in the curriculum guide guests to notice specific elements within the object or explain how it was used. “Customized activity questions range from multiple choice, true-false, open-ended,

and even ‘take a photo,’” Marshall notes. “We provide them an engaging learning experience and a more in-depth understanding of the subject matter.”

As a result, visitors spend much more time interacting with the artwork than they would spend solely reading text panels or looking at an object within the gallery.

“On average, our guests who used the zSpace platform within an exhibit spent an average of seven minutes on the system, which was about six minutes more than an average guest looks at an object within an exhibit,” Marshall says. “We were also able to witness levels of engagement and excitement through guests’ remarks while using the system and their eagerness to show others what they were seeing.

“Our next goal in the coming months is to implement our research plan conducting surveys, interviews and focus groups of guests’ experiences with technologically-enhanced exhibits.”

When students interact with an object or “visit” an ancient land in this way, their curiosity is sparked.

“The incorporation of AR/VR can transform history and social studies study from an explanation-based to an inquiry-based experience for students,” Marshall says. “Students are able to build a deeper understanding of the topic.”

A VALUABLE TOOL FOR TEACHERS

AR/VR technology like zSpace makes teachers even more effective, giving them more tools to share knowledge with students and ignite their interest in the subject matter.

“I am of firm belief that the teacher is the value asset to teaching and learning,” says Hite. “Technology should be used to enhance, not supplant, the guidance and expertise that the classroom teacher brings to his or her students.”

And integrating MR technology into Social Studies and History lessons is easy, even for educators who may not be tech-savvy.

[In another study](#), Hite discovered that experienced teachers are more open to using new technology like MR, reporting a higher preference for and incorporation into future teaching practices with zSpace than their less-experienced or pre-service colleagues.

“Leverage your knowledge and creativity as you think about what AR/VR experiences could enhance in your curriculum and instruction,” Hite says. “Think of one thing you would like to try and go from there. Overcoming incremental challenges and celebrating your successes will place you on the pathway to using more and/or different technologies in your practice.” ■

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ABOUT ZSPACE®

zSpace® is a mixed reality educational technology and content solution that relates to all core academic and career and technical education courses. It allows students to do things that would be dangerous, impossible, counterproductive, and expensive when done with real materials. From completing basic dissections to manipulating the amount of force applied to an object, the VR space allows for students to engage in the key process skills that result in learning. Unlike other AR/VR tools, zSpace doesn't require head-mounted displays, so students can work collaboratively using the stylus and tracking glasses. And, importantly, they don't experience dizziness or disorientation. Visit zspace.com, or follow @zSpace on Twitter.

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