

Adventures in Visualizing History: A Case of Creative Transdisciplinary Work at Virginia Tech

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This poster illuminates a series of inquiry-based Visualizing History projects developed by a transdisciplinary team of faculty, graduate and undergraduate students. Guided by the compelling question – if this place could talk, what would it tell us – our team uses immersive 3D environments, projection mapping, and mixed reality technologies to support projects that visualize hidden histories, stressing the concept of STEM as PROCESS. At the heart of this work is intensive faculty and student collaboration, working at the nexus of science, engineering, arts, and design in informal and formal learning environments.

Goals:

- Examine the potential of using emerging creative technologies and immersive environments to develop exhibits and resources to support visualizing hidden and/or hard histories in both informal and formal learning environments.
- Model how to work within and across teams, provide clear and positive communication, and self-direction. This involves having students lead team meetings and develop and maintain a work flow. It also requires learning and practicing skills within their field to create products with the end user in sight.
- Create a series of products, e.g. exhibits, AR tours, resources and curriculum to be used by learners and visitors. The design and development of products/projects are iterative and therefore requires the design of protocols for user testing and feedback.



VIRGINIA TECH
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VT 150

(2018 -)

If this Place Could Talk, What Would it Tell us About ... ?

Virtual VT – Campus AR Tour

ARIES, SOE Faculty and Grad Students, SOVA

- Campus tour using Augmented Reality
- Allows users to locate current buildings with links to each building's history
- Used to support orientation of students
- Building on the concept of a smart and connected community



Christiansburg Institute | CI Spy (funded by NSF Cyberlearning)

ARIES, SOE, SOVA, CS, History Faculty and Grad Students

- Historical Inquiry supported by place-based Augmented Reality
- Developed a place-based AR enhanced inquiry learning activity to support a new 5th grade curriculum to investigate a hidden local history
- Worked with the Christiansburg Institute (CI), a historic former African-American segregated school that existed until 1966, as our exploratory testbed. The legacy and significance of the CI campus in terms of racial segregation made it an ideal case study for teaching local history as a gateway to regional and national history



Smithfield Plantation

ARIES, SOE, SOVA, History Faculty, Grad Students and Undergrad Students

- Combination of three classes in University Libraries, School of Visual Arts, School of Education, and History all working on a cultural heritage project
- Students designed an immersive experience with learning objectives and performed digital preservation on objects and the house and grounds (laser scanning, photogrammetry, 360 video, ground penetrating radar)



World War I Tunnels of Vauquois (funded by VT Institute for Creativity, Arts, and Technology)

ARIES, SOE, SOVA Faculty and Grad Students, History, CS Faculty and Grad Students, SOPA, Mining

- Design and development of a virtual reality walkthrough of a tunnel section as well as a point cloud of the larger site through VR, and a 360 degree video documentary to explore the experiences of French, German and American troops and civilians at Vauquois Hill overlooking the French city of Verdun – where the shift from street fighting to trench warfare to tunnel and underground warfare on the Western Front lasting 4 years destroyed the village of Vauquois, scarring both the landscape and historical consciousness of those who were there
- Exhibited at Smithsonian National Museum of American History, Salem History Museum, VT libraries, Michigan State Library, Blacksburg Middle School VR Lab



VT 150 (funded by VT History Council)

ARIES, SOE, SOVA, History, CS, VT Stories

- Design and development of an augmented reality campus comprehensive tour including wearables allowing visitors to "see" the changing people, places, and events that have combined to make VT what it is today
- A 3D model of the Blacksburg campus, enhanced by projection mapping, documentary videos and AR app that allows visitors to explore the changing terrain, buildings, and peoples of Virginia Tech. Visitors will get to explore within this model a series of hidden/unknown facets of our university's history



Visualizing History: Creative Technologies, Immersive Environments, Transdisciplinary Learning – Images of the Possible

A collaborative course proposal where faculty and students engage with each other each work in a shared space for both faculty credit and student course hours

GUIDING QUESTIONS

- How can creative technologies and transdisciplinary research facilitate new visualizations and interpretations of the past? (see objectives 1, 6, 8)
- How do you ethically conduct historical research that addresses difficult topics and presents evidence-based and challenging interpretations for diverse audiences? (see objectives 2, 3)
- How do you build and sustain transdisciplinary teams to solve complex problems and achieve successful outcomes in a timely and efficient manner? (see objectives 1, 7, 8, 9)
- How does an understanding of the principles of formal and informal learning, place-based learning, the role of the cultural curriculum, and design-based research facilitate the creation of immersive learning environments? (see objectives 4, 5, 7, 8)
- How do you design, create, and assess the effectiveness of emerging visualization tools to make visible the invisible aspects of the past? (see objectives 6, 7, 8)

OBJECTIVES

- Within the context of the course, students will:
 1. Develop the ability to work effectively in transdisciplinary teams to engage in mode 2 research, drawing on multiple intellectual toolkits to solve complex, ill-structured problems
 2. Develop skills in historical research, including archival work, oral history collection, online research, and the interpretation of historical sources to create original, evidence-based presentations
 3. Investigate historical topics from diverse perspectives and develop strategies to engage multiple audiences around difficult topics
 4. Apply fundamental principles of learning to the creation of effective immersive environments within formal and informal settings
 5. Explore design-based methods of assessing learning within formal and informal settings
 6. Create or modify visualization experiences to support cultural heritage education
 7. Effectively use and evaluate appropriate visualization tools to create representations and new interpretations of the past
 8. Design, implement, and assess innovative experiences to share new visualizations and interpretations of the past with diverse audiences
 9. Create and maintain appropriate and flexible workflow models to achieve project outcomes

ASSESSMENT

- Weeks 2-6: Weekly 50-word reflections (see objectives 2, 3, 5, 7)
- Online quiz certifying understanding of foundational concepts in historical methods, learning theory, design-based research, visualization tools and techniques. (see objectives 1, 2, 3, 4, 5, 7)
- Progress update presentations (see objectives 4, 5, 6, 7, 8)
- Presentation of final product to class, faculty, and stakeholders (see objectives 4, 5, 6, 7, 8)
- Technical report including project documentation that details methods, outcomes, contributions of team members, iterative assessment (see objectives 8, 9)
- Construct scope of work and project plan with weekly milestones, report on progress each week and modify accordingly. (see objectives 1, 9)
- Individual reflection on team participation and personal journey (see objectives 1, 3, 4, 9)