

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/316659544>

# "If this place could talk:" Using augmented reality to make the past visible

Article · January 2017

CITATIONS

0

READS

8

6 authors, including:



[Aaron Johnson](#)

University of Nebraska at Lincoln

8 PUBLICATIONS 3 CITATIONS

[SEE PROFILE](#)



[Doug A. Bowman](#)

Virginia Polytechnic Institute and State Uni...

229 PUBLICATIONS 6,113 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:



DARPA Robotics Challenge [View project](#)



Virtual reality [View project](#)

All content following this page was uploaded by [Aaron Johnson](#) on 03 May 2017.

The user has requested enhancement of the downloaded file. All in-text references [underlined in blue](#) are added to the original document and are linked to publications on ResearchGate, letting you access and read them immediately.

# “If This Place Could Talk”: Using Augmented Reality to Make the Past Visible

Aaron Johnson, David Hicks, Todd Ogle, Doug Bowman, David Cline and Eric Ragan

In 2014, Virginia’s Montgomery County school division adopted a place-based social studies curriculum titled “My Place in Time and Space” for fifth grade students. The curriculum promotes an awareness of the impact of place on local knowledge and disciplinary understandings in southwest Virginia, while also connecting local history to national history. Within this context, we describe how a team of fifth grade teachers, teacher educators, public historians, and computer scientists designed, developed, and implemented an augmented reality application, *CI-Spy*,<sup>1</sup> that ultimately enabled students to “see” how the separate but equal doctrine, specifically segregated schooling, impacted their own community.

Augmented reality (AR), put simply, layers computer-generated information onto the real world through the use of a mobile device or purpose-built display.<sup>2</sup> As such, this article provides an illustrative case of innovative and ambitious place-based teaching where students use AR to investigate a forgotten local history through the derelict historic site of a former African American school, the Christiansburg Institute. Additionally, we share some quick AR tools that can mirror some of our work and be used immediately in social studies classrooms (See sidebar on p. 114).

## Using AR to Explore a Hidden Local History and Support the C3 Inquiry Arc

The Christiansburg Institute (CI) was founded in 1866 with the mission of educating the children of former slaves in the Appalachian region of Virginia. The school began as a one-room rented

log cabin, and by the turn of the century burgeoned into a sprawling 185-acre, 13-building campus—including residential dormitories, academic buildings, and a communal hospital. After 100 years of service, Christiansburg Institute closed its doors in 1966, when desegregation had been implemented in the region. Over time, the school and most of its holdings were parceled off to commercial developers and other entrepreneurs. What once stood as the archetype of Booker T. Washington’s Tuskegee vision for trade-school education is today confined to a sole building (in a state of much disrepair), visibly hidden adjacent to the town’s most traveled stretch of highway.<sup>3</sup>

Considering the current physical state of Christiansburg Institute and the now “missing campus,” the team decided to package the week-long unit as a historical mystery, hence *CI-Spy*, with students taking on the role of junior detectives. To further enhance the historical mys-

tery design, the team relied on the four dimensions of the C3 Framework’s Inquiry Arc<sup>4</sup> and framed the unit around the question: “If this building (the lone Edgar A. Long Building) could talk (and this place could talk), what would it tell us about the people who were here 50 years ago?” (see Dimension 1). In order to prepare students to explore this question as part of a field trip to CI on Day 3 of the week-long unit, the unit began with two in-class lessons that focused on introducing the disciplinary and technological tools needed for the investigation (see Dimension 2) and also the use and analysis of historical sources from Christiansburg Institute<sup>5</sup> (see Dimension 3). After completing the on-site investigation, students communicated their findings in the form of a written detective’s report for the final two days of the unit (see Dimension 4). The fact that CI was a segregated school was not revealed to students but rather reserved as part of the historical mystery.

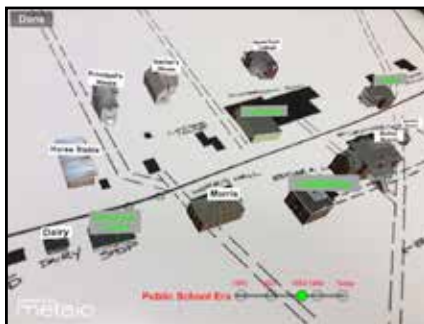
Christiansburg Institute, junior detectives would discover, represented a place where African American students from across the region would gather to learn subjects ranging from world languages and physics to barbering and cosmetology, but in the century that it operated, it represented a social anchor within the African American community of southwest Virginia.

## Disciplinary Scaffolds to Support AR Inquiry

The unit's first lesson featured a special in class video-based lecture from clue expert and public historian, Dr. David Cline, a.k.a. "Detective David," who stated that he works with evidence to solve mysteries about the past. Detective David was included as a recurring presence to support teachers in the dissemination of the unit and also leverage the historian/detective connection for students. After describing the nature of his work, Detective David, via video message, modeled for students the SCIM-C strategy for working with historical sources—the SCIM-C strategy was integrated within *CI-Spy* and operated as an analytic tool through which students would engage with sources across the unit. (Summarizing, Contextualizing, Inferring, Monitoring, and Corroborating<sup>6</sup>) Students then performed their own SCIM-C analysis, after which Detective David deputized them as "junior detectives" and enlisted their help regarding a new mystery located a few miles from their school.

During the unit's second lesson, Detective David returned again by way of video-based message and asked students to examine a recent image of the Long Building. Given the Long Building's condition, most students deemed it insignificant. To invite the mystery, Detective David, via video message, informed students that what they see (the Long Building) is all that remains of a very important place in their town, one that people from as far away as New York state once traveled to see. "Would you like to see why?" Detective David asked. To "see" Christiansburg Institute, teachers provided students with an AR map and *CI-Spy* with its special "magnifying glass" and time slider to examine the map closer. Using *CI-Spy* students could use the time slider to see the growth of CI as represented through the appearance of 3-D models of the actual 13-building campus over time. By tapping on selected buildings, students could access historical sources and begin to analyze them to

glean evidence regarding CI. By engaging with the map and sources, students acquired a familiarity with *CI-Spy* and its interface that would be used the following day onsite.



AR map of CI campus

## Into the Field: Augmented Reality in Situ

The unit's third lesson placed students onsite at Christiansburg Institute. Now standing in the shadow of the Long Building students were posed with the question: "If this building could talk, and if this place could talk, what would it tell us about the people who were here 50 years ago?" To gain an awareness for the scope of the campus and better conceptualize the landscape as it once appeared, students used the now familiar time slider within *CI-Spy* to see the campus grow from its one building origins to a 13-building campus with true-to-scale 3-D models of each CI building positioned in their original location.



3-D model on CI campus

Three of CI's buildings onsite were accessible by way of virtual or augmented reality for students to explore: The Long Building (academic building), the Scattergood Gym (extracurricular focus), and the Trades Building (trade/skill preparation). Using a specially designed

"x-ray" portal, students were allowed to peek inside the boarded up Long Building and examine what it was like to be a student in Ms. Viola Charlton's French class. Adjacent to the Long Building, students used *CI-Spy* "x-ray" vision to look inside the Scattergood Gym—a building that once hosted basketball games, harvest festivals, and theatrical performances—but has since been re-purposed as a local church. On the north side of campus, students traveled further into CI history by virtually entering one of the virtual 3-D models—the long demolished Trades Building. Housed within each of the mentioned buildings were specific artifacts that captured the nature of experiences unique to that location (see Table 1 on p. 114) that were collected and then analyzed in situ using SCIM-C. Student written analyses were recorded and stored within *CI-Spy* in their "virtual backpacks" and made available for further consideration in the classroom where students would write up their findings as a detective report.

Before leaving the site students were brought back to where their investigation began—the Long Building. Here students were asked to share their initial findings—it was during this process that their emerging hypotheses that Christiansburg Institute was an African American school was tested. Because they had explored three key buildings a new level of *CI-Spy* was unlocked and students were provided access to new sources that spoke to CI's closing, including a letter home from the school district informing an African American family that their son was to attend Christiansburg High School, not CI, for the upcoming fall semester. Back in the classroom for the final two days of the unit, students revisited their initial analyses and began the process of corroborating evidence to answer the historical question as part of their detective reports.

## Disciplinary Lenses and Walking in the Footsteps of Others

In developing the unit, the team was interested in the use of AR—when coupled with the use of a historical

source scaffold (SCIM-C)—to support student inquiry. Students overwhelmingly expressed how using the SCIM-C as part of *CI-Spy* helped foster their understandings of the evidence and in some cases suggested that it challenged them to think deeper about the evidence and its relationship to the guiding question. As one student noted, “by taking the evidence through analysis, we weren’t just given knowledge and that made it more fun. We had to think about it more—and if all we did was read about it in a textbook, it’s really not going to stick in our heads” (Junior Detective, Team 4). Similarly, students noted they felt like real historians, working with artifacts and interpreting the past. Interestingly one student even referred to the whole AR experience of seeing the Christiansburg Institute campus virtually appear as an artifact/evidence, “CI was cool because it is an artifact and not many people have seen what we have seen” (Junior Detective, Team 1)



### Junior Detectives Onsite

Conceptualizing the actual place as artifact speaks to the power of Augmented Reality to make the past visible. Many students made empathetic connections with the physical site and the students who once traveled the grounds: “It kind of felt like I was stepping in something that somebody discovered before me, something older than me, and that to step in here that actually means something important” (Junior Detective, Team 2). When reflecting on the types of connections made using AR, students overwhelmingly perceived *CI-Spy* as bringing the past to life: “Like, it helped a lot because if we didn’t have an iPad, we wouldn’t really be able to see what was actually there. But having the iPads, we could see where they stayed and where the Trades Building was. But if we

Table 1: Sources Embedded in *CI-Spy*

Location	Artifact/Sources
Edgar A. Long Building (Academic focus)	French textbook Student writing sample Oral history from Ms. Charlton’s student Daily schedule
Scattergood Gym (Extracurricular focus)	Image of CI band Oral history from CI band member Image of Nativity school play Newspaper clipping of CI Glee Club Image of CI basketball team
Trades Building (Trade/Skill preparation)	Oral history from CI barbering student Cosmetology tools from CI Yearbook photo of CI barbering class Cosmetology textbook Image of cosmetology class in action

## Augmented Reality within Reach



The augmented reality experience we describe with *CI-Spy* was a multi-year National Science Foundation project that involved several software development environments. Importantly, there are free and easy to use augmented reality solutions available online. Two examples, Aurasma and Wikitude, offer opportunities for both teachers and students to create AR experiences in short order.

Aurasma ([www.aurasma.com/](http://www.aurasma.com/)) and Wikitude ([www.wikitude.com/](http://www.wikitude.com/)) rely on

markers or targets, which are typically images you upload into the development engine. Markers can be used to annotate maps, textbooks, or access sources. The annotations can take the form of pictures, videos, web pages, documents, or 3-D models. When a user points their mobile device at the marker, the content specified is then triggered to load. Activities can be developed that can add historical sources, provide alternative views of historic places or structures, or embed multimedia within a written or otherwise static context. For example, a paper or wall-based timeline, with marker images placed upon it, can load 3-D images of the busts of Roman emperors downloaded from the British Museum via Sketchfab. Students could move the markers on the timeline to place them in correct chronological order. The busts could be viewed from multiple viewpoints and inspected for meaning that might be impossible to glean from a photograph or even a museum visit where the actual artifact is off limits to handling.

Both Aurasma and Wikitude are supportive of education, with the Aurasma teacher guide (<http://bit.ly/2ggPI5e>) and the Wikitude Academy ([www.wikitude.com/wikitude-academy/](http://www.wikitude.com/wikitude-academy/)) available to support your efforts.



## The Mystery of the Missing Campus

9/28/17

The Christiansburg Institute first opened its doors in 1866. It was an all African American school for boys and girls. The campus had thirteen buildings.

When I went to the Christiansburg Institute through a field trip, only 3 buildings were left. The professors there gave us i-pads and headphones. When you paint the i-pads at the buildings, you can see inside the buildings. You can see evidence and could click on it to answer questions. At the long building, I found out that the school inspired good grammar and taught lots of subjects. When me and my partner went to the gym we figured out the school was just for African Americans. We also figured out why the building closed, but I'll get there in a minute. When I went to the tragedy center I saw balls for bartering.

closed its doors in 1966, because the end of segregation. The Christiansburg Institute is a important building, and important buildings should be saved. Think about the white house. If we were to stop using it would we let it just sit there? Or run it down to become a bowling alley? No! We would probably turn it into a museum. Besides, if we turn the Christiansburg Institute into a museum, people could learn about Virginia's history! There could be a mini movie center that could show the history of the campus, and a treasure hunt for kids, so they would have to learn. Christiansburg Institute would be a great museum. When I went on this field trip I learned a lot, so save the Christiansburg Institute, because history can't talk. We have to make it!

didn't have *CI-Spy*, we would only be able to see the Long building" (Junior Detective, Team 2). Given the current state of CI (considering the change of the landscape and physical condition of the Long Building) more than one student recognized that without *CI-Spy* there would be no real reason to even go to the site. However, in using *CI-Spy* students consistently expressed how the technology cultivated an authentic and lasting

connection with the past and their local history. "It feels like it's more real, and it's not like this is some faraway object that really has never had any impact. It's like right there, even if it's on an iPad. It feels real. Even learning about dinosaurs, sometimes you don't think about dinosaurs are really real because some people never see fossils of them or anything. But when you can use *CI-Spy*, you can see the buildings" (Junior Detective, Team

4). Our work suggests that AR holds great potential for supporting inquiry through making the invisible visible in authentic and challenging settings. 🌐

#### Notes

1. This paper is based upon work supported by the National Science Foundation under award IIS-1318977.
2. Eric Klopfer and Josh Sheldon, "Augmenting Your Own Reality: Student Authoring of Science-based Augmented Reality Games," *New Directions for Youth Development* 128: 85–94 (2010).
3. Booker T. Washington served as an advisor to the Christiansburg Institute in 1896 and spoke at CI to a crowd of 5,000 Christiansburg, Virginia, residents in 1909.
4. NCSS, *The College, Career, and Civic Life (C3) Framework for Social Studies State Standards: Guidance for Enhancing the Rigor of K-12 Civic, Economics, Geography, and History* (Silver Spring, Md.: NCSS, 2013), 45.
5. We are grateful for the collaboration of the Christiansburg Institute Alumni Association, Christiansburg Institute Incorporated, and Montgomery County Public Schools.
6. David Hicks, Peter Doolittle, Tom Ewing, "Historical Inquiry," Virginia Tech, Historical Inquiry, SCIM-C, <http://historicalinquiry.com/#part2>; David Hicks, Aaron Johnson, Melissa Lisanti, Stephanie van Hover, Kelly McPherson, and Sharon Zuckerwar, "Junior Detectives: Teaching with Primary Sources as a Bridge to Disciplinary Literacy," *Social Studies and the Young Learner* 29, no. 1 (2016): 9–15; Hicks, Doolittle, and Ewing, "The SCIM-C Strategy: Expert Historians, Historical Inquiry, and Multimedia," *Social Education* 68, no. 3 (2004): 221–225.

## Free Curriculum to Connect Economics to Personal Finance

[www.HSFPP.org/ECON](http://www.HSFPP.org/ECON)



HSFPP provides social studies educators with tools to teach teens how economic principles relate to everyday money management decisions.

- **Free** turnkey curriculum
- Shipped directly to your school
- Turnkey instructor materials
- Relevant for teens
- Noncommercial and unbiased

"Students get practical hands-on experience that will help them in the future. The program equips you with everything you need to teach."

— Allison, HS Social Studies Teacher, Sparta, OH

**Nonprofit. Noncommercial. Always Free.**

**AARON JOHNSON** is Assistant Professor in the Department of Teaching, Learning and Teacher Education at the University of Nebraska-Lincoln and can be reached at [ajohnson147@unl.edu](mailto:ajohnson147@unl.edu). **DAVID HICKS** is Professor of History and Social Science Education at Virginia Tech and can be reached at [hicks@vt.edu](mailto:hicks@vt.edu). **TODD OGLE** is the Senior Director of Technology Enhanced Learning Environments Research and Development at Virginia Tech and can be reached at [todd.ogle@vt.edu](mailto:todd.ogle@vt.edu). **DOUG BOWMAN** is Professor of Computer Science and Director of the Center for Human-Computer Interaction at Virginia Tech and can be reached at [dbowman@vt.edu](mailto:dbowman@vt.edu). **DAVID CLINE** is Assistant Professor of History at Virginia Tech and can be reached at [davidcline@vt.edu](mailto:davidcline@vt.edu). **ERIC RAGAN** is an Assistant Professor in the Department of Visualization at Texas A&M University and can be reached at [eragan@tamu.edu](mailto:eragan@tamu.edu).