

Chapter 6

Exploring Time and Space: Merging Historic and Contemporary Virtual Reality Technologies in the History Classroom



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Abstract This article delves into the burgeoning fascination with immersive experiences enabled by virtual and augmented reality technologies, tracing its origins to the painted panoramas and to the later interest in stereographic and panoramic photography. It posits that the combination of historic and modern virtual reality technologies in the history classroom offers a unique opportunity for teachers to engage students deeply in historical places and processes, augmenting their spatial awareness of temporally and geographically distant locations.

Keywords Stereographs · Panoramas · Virtual reality · History classroom · Technology

6.1 Introduction

Recent virtual and augmented reality technologies have kindled a growing interest in immersive experiences (Liang, 2021). However, the human fascination with such experiences can be traced to earlier times, back to painted panoramas and to the 19th-century craze for stereographic and panoramic photography (Belisle, 2021; Lescop 2017; Ford, 2016). Merging these historic and contemporary technologies of virtual reality (VR) in the classroom provides a unique opportunity to engage students deeply in historical places and processes (see, for example, Cobb & Nieminen, 2023; Eidinger & McCracken, 2019; Kheraj, 2019).

Historic environments have the potential to serve as a canvas within which students can explore the cultural and societal dynamics of historical phenomena. However, considering their temporal and spatial distance, these historic environments often remain too detached and foreign for students. It can be challenging to imagine how a place might have appeared in the past. Therefore, by immersing students in historic

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environments through VR, using both historical content and contemporary technologies, we can ignite students' imagination about these places and encourage them to consider the spatial dimensions of history. This article presents the deployment of historical immersive visual sources within VR during two courses taught in the History Department of Hong Kong Baptist University: 'Global History of Tourism' and 'History of Cities in the Modern Era.' Here, I assess the viability of this approach and articulate the benefits and challenges experienced during implementation.

The 'Global History of Tourism' course, taught during the spring of 2022, offered an opportune setting for a pilot experiment with new immersive technologies in the classroom. Since tourism often engages with historic places through sightseeing, VR can allow students to 'visit' a large number of tourist attractions without ever leaving the classroom or home. During the COVID-19 pandemic, many turned to exploring distant places through screens to disrupt the monotony of isolation (Rastati, 2020; Zhang et al., 2022). Virtual tours of historic sites usually show what they look like today, but lack comprehensive views of how they may have appeared in the past. Yet, we have a resource for depicting such sites immersively as they used to look—historical photographs, stereographs, and panoramas. These were created for tourists of the 19th and early 20th centuries, often as mementos to remind them of their trips, so they fit perfectly with introducing historic sites and cities to students today. Plus, these images specifically capture the touristic imaginaries of the time, a key theme explored in the tourism course.

After the successful implementation of VR in the 'Global History of Tourism' course, we next experimented with VR in the 'History of Cities in the Modern Era' course with immersive engagement in historic cities. As the overall focus of this second course was on urban environments rather than on tourism, we concentrated on the historic panoramic views of cities rather than the site stereographs. We did tours with both historic images as well as modern 360° photographs and videos of the cities so that students could compare and observe change over time.

Beyond the possibility of making historic environments more comprehensible to students and increasing their visual-spatial awareness, exposure to virtual teaching and learning tools also holds the potential to increase the digital literacy of students. Today, students engaged in humanities and social sciences cannot escape the reality that their work will need to be produced and used mostly in the digital realm. By engaging them in digital technologies in the classroom, we aim to improve our students' confidence in exploring new technologies that push the boundaries of their disciplines. The first section of this article offers a concise overview of the history of stereographs and panoramas before delving into their classroom applications. The second section outlines a digital humanities assignment where students were tasked with producing annotated panoramas of historic urban environments.

6.2 Stereographs and Panoramas

Stereographs consist of two nearly identical photographs, paired to produce the illusion of a single three-dimensional (3D) image when viewed through a device known historically as a stereoscope. Each eye views only one image and the human brain interprets the differences between them as 3D depth. This is basically the exact same principle underpinning VR headsets today. While the idea of creating 3D imagery with two slightly different images predates the invention of photography, photographic stereographs were first produced in the 1850s and became a coveted household item between 1870 and 1920 (Hannavy, 2008). They were collected by many middle-class families in the late 19th century for entertainment akin to watching television or going to the movies today.

Stereographs are particularly meaningful in a course on the history of tourism. Tourism, as a mass phenomenon, emerged in the 19th century at the same time as stereographs. These images often depicted tourist attractions as their main subject and were collected as souvenirs. A souvenir can be defined as an object that serves as a proxy for one's travels (Fortenberry 2013; Gleadhill, 2022). As David Hume posits "as an aide-memoire souvenir's power rests in its ability to drag the experience of the destination into the tourist's ordinary life" (Hume 2014, 1). Thus, these stereographs were often experienced after a tourist returned home, by the person who travelled or shown to friends. This is somewhat analogous to how a student today could view these stereographs. We are fortunate that thousands of stereographs of interesting locations have been preserved by various institutions and are often freely available online today (Fig. 6.1).

Just as stereographs are excellent for visualizing specific attractions, panoramas are useful for exploring places like urban landscapes or natural environments, where



Fig. 6.1 Egypt—the second Pyramid and Sphinx. 1870. Stereograph. Library of Congress, <https://www.loc.gov/item/90713670/>



Fig. 6.2 View of Vienna, with river Danube in the foreground. Etching by Matthäus Merian I [after Jacob Hoefnagel]. After 1649. The British Museum, 1898,0725.8.1436. https://www.britishmuseum.org/collection/object/P_1898-0725-8-1436

the broad surroundings are more important than the 3D details. Up until the end of the 18th century, urbanscapes and landscapes were predominantly represented through bird's eye views (Fig. 6.2). However, by the end of the 18th century, panoramas had become particularly popular in Europe and North America. Robert Barker, a Scottish painter, envisioned a painted landscape that would surround the viewer in 360 degrees. Not only did Barker's panoramas isolate the spectators from the external world by enveloping them with a continuous and seamless image, but also through manipulated sightlines, perspectives, and lighting. The end result was that Barker's panoramas created a close approximation of a landscape (Ford, 2016).

Barker's panoramas provided spectators with an immersive experience of cities such as London and Edinburgh. However, these experiences required a purpose-built structure and several critical interventions such as standing platforms and the strategic use of lighting to produce a fleeting sense of immersion. Indeed, "the panorama was the most convincing visual delusion mankind had ever devised. Viewers of the panorama, for example, of Constantinople (now Istanbul) at Barker's Panorama in London's Leicester Square in 1801-02 could be deceived into thinking that they had been magically transported to a distant foreign location" (Ellis, 2017; see also, Oettermann, 1997) (Fig. 6.3). Visitors to the panoramas were also provided with guides to what they were seeing. Souvenirs in their own right, these guides conveyed



Fig. 6.3 Panel one from ‘A Series of Eight Views Forming a Panorama of the Celebrated City of Constantinople and its Environs, Taken from the Town of Galata, by Henry Aston Barker’. 1813. The British Library, Maps K.Top.113.75.f.3. <https://www.bl.uk/collection-items/panorama-of-constantinople>

information on important attractions depicted in the panoramas through both written descriptions and a visual diagram (Ellis, 2017; Oleksijczuk, 2011).¹

The invention of photography would be closely linked with panoramas. Louis Daguerre, who is credited with inventing the eponymous daguerreotype process

¹ While the popularity of painted panoramas and their purpose-built structures has waned, they did not disappear. A recent example is Werner Tübke’s monumental painting “Early Bourgeois Revolution in Germany,” displayed at the Panorama Museum in Bad Frankenhausen. For more information, visit <https://www.panorama-museum.de/en/monumentalpainting.html>.

of photography, was in fact trained in panorama painting (Hannavy, 2008). In the early days of photography, the desire to capture wide views of cities and landscapes prompted photographers to create panoramic photographs. This can be considered as a natural extension of the 19th century interest in panoramic paintings. However, as the creation of such panoramas was technically challenging, a number of photographers and inventors started experimenting with cameras that were designed specifically to capture panoramic images (Hannavy, 2008; Vanvolsem, 2011). Innovative panoramic cameras led to a proliferation of panoramic views, many of which, like the stereographs, have been preserved by cultural institutions.

6.3 Integrating Historical Stereographs and Panoramas into History Courses Using VR Technologies

Both stereographs and panoramas offer unique ways for students to gain immersive experiences in the classroom utilizing modern technologies. The basic principles that stereo viewers used in the 19th century continue to be valid today. Rather than using cardstock, however, the first generation of contemporary VR devices, like the Google Cardboard, used smartphone screens to project two slightly different images. A simple contraption holds the phone in front of the face and divides screen viewing between the two eyes. For use in the classroom, we provided students with historic stereo images of places we were to explore in our next meeting, so that they could download the images to their cell phones. During lectures for the ‘Global History of Tourism’ course, students were invited to take time to view the stereographs while we discussed popular tourist attractions ranging from Niagara Falls to Pompeii, approximating the way people in the 19th century experienced such places remotely.

Today, it is very easy to produce panoramic images. One can even accomplish this task with the use of a smartphone. Taking advantage of this recent proliferation in 360-degree imagery, students in both courses were exposed to contemporary panoramic photographs and videos through YouTube VR app, which is available in both Cardboard (A Google developed VR headset) and the Oculus Quest 2 (A VR headset developed by Meta). In the ‘Global History of Tourism’ course, students had a chance to ‘visit’ a wide range of tourist attractions ranging from the archaeological site of Chichén Itzá in the Yucatán peninsula to the Grand Reef in Australia. In the ‘History of Cities in the Modern Era’ course, students walked through Zócalo in Mexico City and flew over Dubai. While these explorations did not necessarily engage with historical aspects of these places, they nonetheless enabled students to experience these places immersively and virtually.

Google Cardboard is relatively inexpensive, so we found it accessible to implement. One challenge, however, was that Google recently ended support for Cardboard, given the emergence of more immersive devices such as the Oculus Quest 2. We needed to rely on third party applications to keep our workflows functional,

including fixes to imprecise user interfaces. Oculus Quest 2 devices are considerably more expensive when compared to Cardboard, but provide a more intensified encounter with places. Ultimately, both stereographs and panoramas, whether viewed through Cardboard or Oculus devices, enriched the students' in-class experiences and allowed them to engage with historic places in alternative ways that moved beyond 2D visualizations.

6.4 Annotated Panoramas as a Digital Humanities Assignment

In both courses, a digital humanities assignment invited students to engage directly with historic panoramic photographs. Each student chose an image of a tourist site or city, and then annotated the image for VR using their own original research. Through this process, they gained an understanding of an individual landmark, a landscape, or a city. They explored how features in cities related to each other conceptually and spatially. This assignment not only aimed to improve students' virtual-spatial awareness but also strived to improve their digital literacy as they immersed themselves in these historic environments.

Students were asked to choose a historic panoramic image of a city that included many identifiable elements. These might include architectural landmarks like skyscrapers and religious structures, or infrastructure like ports, aqueducts, and train tracks, or landscape features such as mountains and rivers. As the quality of the selected panorama impacted the final class project results, students were encouraged to select panoramic images with high resolution. The Library of Congress' 'Panoramic Photograph Collection' was particularly useful as that collection not only included a myriad of panoramas for students to choose from but also offered a wide range of resolutions, including uncompressed TIFF images (loc.gov) (Fig. 6.4).



Fig. 6.4 Panoramic view of Michigan Ave., Chicago. Haines Photo Co. c1910. Library of Congress. <https://www.loc.gov/item/200766082/>

Utilizing a freely-available online panoramic software, students first converted their images into 360 degree photographs.² These online panorama makers are not designed to work with historic imagery. Therefore, the dimensions of the panoramic photographs did not always work well and a certain amount of image processing, such as expanding the height of the panoramas, became necessary.³ Once the panorama selection was completed and the students were satisfied with how their chosen panoramas displayed as 360-degree spheres, they then engaged in research on their urbanscapes.

In order to identify buildings, the students needed to ‘convert’ between the distant view of a city in the panoramas and the real layout of each city. This required students to engage with alternative ways of thinking. They might consult maps and consider the locations of some well-known buildings, helping them to identify other important elements in their panoramas. This proved to be one of the most challenging aspects of the assignment as students struggled with identifying parts of the city captured in the image beyond a handful of well-known landmarks. However, this pushed them to start understanding the city spatially, paying attention to building locations and relations to one another.

Spatial intelligence, or visual-spatial intelligence,⁴ was one of the concepts developed by Howard Gardner as part of his ‘multiple intelligences’ framework (Gardner, 1993). It is defined as the capacity to “solve spatial problems of navigation, visualization of objects from different angles and space, faces or scene recognition or to notice fine details” (Anthony, 2019, 233). Richard Cary has recently challenged Gardner’s framework in a recasting that is more attuned with a ‘sense of place’. Accordingly, “the challenge for a critical reconstruction is to develop a concept of spatial intelligence in which sense of place is meaningfully cast...Individuals who have a high degree of visual-spatial intelligence are those who, through cognitive, affective, and sensory modalities, forge a sense of place from direct experience” (Cary, 2004, 103–104).

While not feasible for each history student to develop a deep embedded sense of place for every site or city, their immersive experiences of such places through VR can help them develop their general visual-spatial awareness about distant places of the past. As Thomas B. Sheridan posits, VR can create a “sense of being physically present with visual, auditory, or force displays generated by a computer” (Sheridan, 1992, 120). Students’ immersive encounters and efforts to identify locations in the panoramas required them to spatially puzzle out each city.

Once students spatially deciphered an urban environment, they then annotated their panoramas. In this step, students were urged to use both visual and textual media to create their annotations. While some locations were only annotated with a

² For the ‘Global History of Tourism’ course, we used cloudpano.com. However, as the terms of service changed to a paid subscription, for the “History of Cities in the Modern Era” class, we switched to panoee.com.

³ For image processing, we used a free online photo editor Photopea, available at photopea.com.

⁴ This article uses ‘awareness’ rather than ‘intelligence’ as intelligence has a connotation of innateness while awareness can be ever changing.

simple title and a historic image, others included well-researched blurbs that made use of primary and secondary textual sources. Some students added material onto a single panorama while others embedded other panoramas of the same city through ‘hotspots’. Students ended up with a final product that represented their research aptitudes both visually and spatially. Their annotated panoramas also demonstrated their technological, organizational and aesthetic skills.

Digital humanities assignments of the type described here should strive to achieve a range of goals. They should engage with historical phenomena through thoughtful inquiry. They should emphasize a purposeful integration of technology. Technology should be used to make the research more legible and consumable but should not be utilized to put a glossy cover over inferior research. It is also critical for teachers to acknowledge that creating such digital humanities projects can take more time than traditional research papers. Therefore, it is necessary that such assignments should be limited in their scope, so that students can complete them within a reasonable amount of time.

6.5 Conclusion

Historic panoramas, both painted and photographic, as well as stereographs have immersed people in urbanscapes and landscapes since the late 18th century. Recent developments in VR technologies make it possible for our students to virtually travel to all parts of the earth without the necessity of leaving their homes. Merging historical materials such as panoramas or stereographs, which were already produced to immerse people in places, with contemporary technologies makes it possible for teachers to engage students in historic places in new and novel ways. While VR cannot completely create a sense of historical place, it nonetheless provides an approximation that was not possible until a few years ago. While the integration of VR activities and assignments requires time and resources from the teacher, this type of teaching can enrich students in myriad ways. Students not only deeply engage in places spatially, but they also increase their digital literacy. They also produce a project that foregrounds their research in technologically innovative and visually engaging ways that can become a centerpiece in their portfolios.

References

- Anthony, J. (2019). *Education psychology new dimensions*. EDTECH.
- Belisle, B. (2021). *A history of presence*. Art in America. <https://www.artnews.com/art-in-america/features/history-of-immersive-media-virtual-reality-1234582072/>
- Cary, R. (2004). *Howard Gardner's Theory of visual-spatial intelligence: A critical retheorizing*. Counterpoints.
- Cobb, P. J., & Nieminen, J. H. (2023). Immersing in Mesopotamia: Virtual reality site tours in the remote classroom. *Near Eastern Archaeology*, 86(3).

- Eidinger, A., & McCracken, K. (Eds.). (2019). *Beyond the lecture: Innovations in teaching Canadian history*. Active History.
- Ellis, M. (2017). The spectacle of the Panorama. *British library picturing places*. <https://www.bl.uk/picturing-places/articles/the-spectacle-of-the-panorama>
- Ford, L. (2016). "Unlimiting the Bounds": The Panorama and the Balloon View. The public domain review. <https://publicdomainreview.org/essay/unlimiting-the-bounds-the-panorama-and-the-balloon-view>
- Fortenberry D. (2013). *Souvenirs and new ideas: Travel and collecting in Egypt and the Near East*. Oxbow Books.
- Gardner, H. (1993). *Multiple intelligences: The theory in practice*. Basic Books.
- Gleadhill, E. (2022). *Taking travel home: The souvenir culture of British women tourists, 1750–1830*. Manchester University Press.
- Hannavy, J. (Ed.). (2008). *Encyclopedia of nineteenth-century photography*. Taylor & Francis Group.
- Hume, D. L. (2014). *Tourism art and souvenirs: The material culture of tourism*. Routledge.
- Kheraj, S. (2019). The presence of the past: The possibilities of virtual reality for history. In A. Eidinger, & K. McCracken (Eds.), *Beyond the lecture: Innovations in teaching Canadian history*. Active History.
- Lescop, L. (2017). 360° Vision, from Panoramas to VR. In T. Maver, P. Chapman, C. Platt, V. Portela, & D. Eaton (Eds.), *Envisioning architecture: Space/Time/Meaning* (pp. 238–251). Routledge.
- Liang, J. (2021). Mixing worlds: Current trends in integrating the past and present through augmented and mixed reality. *Advances in Archaeological Practice*, 9(3), 250–256. <https://doi.org/10.1017/aap.2021.16>
- Oettermann, S. (1997). *The Panorama: History of a mass medium* (D. L. Schneider, Trans.). Zone Books.
- Oleksijczuk, D. B. (2011). *The first Panoramas: Visions of British imperialism*. University of Minneapolis Press.
- Panoramic Photograph Collection. (n.d.). *Library of Congress*. <https://www.loc.gov/pictures/collection/pan/>
- Rastati, R. (2020). Virtual tour: Tourism in the time of corona. In A. Pratiwi, A. T. Sari, & D. Widyan-toro (Eds.), *Proceedings of the 1st international conference on social sciences, humanities, education and society (ICSHEs 2020)* (pp. 63–66). Atlantis Press.
- Sheridan, T. B. (1992). Musings on telepresence and virtual presence. *Presence: Teleoperators and Virtual Environments*, 1(1), 120–126.
- Vanvolsem, M. (2011). *The art of strip photography: Making still images with a moving camera*. Leuven University Press.
- Zhang, S.-N., Li, Y.-Q., Ruan, W.-Q., & Liu, C.-H. (2022). *Would you enjoy virtual travel? The characteristics and causes of virtual tourists' sentiment under the influence of the COVID-19 pandemic*. Tourism Management.