

# Developing Virtual Reality Experiences for Archival Collections: Case Study of the May Massee Collection at Emporia State University

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## ABSTRACT

Virtual reality has recently transformed from a complex and expensive technology that was not a practical educational tool for archives to one that is easily affordable and easy to use in a variety of archival and special collection situations. This case study discusses the use of virtual reality technology to make a special collection at Emporia State University accessible 24/7 to a global audience of classrooms and individuals. Without complex coding or high cost overhead, the design of high-quality virtual reality experiences is now accessible to any organization and can be carried out by a student assistant or intern without causing a great amount of additional work for the busy archivist. The article discusses the design process for Emporia State's virtual reality experience for the May Massee Collection, along with challenges faced and outcomes of the project.

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## KEY WORDS

Virtual reality, Special collections, Learning, Project management, Outreach

Emporia State University's (ESU) May Massee Collection is the most comprehensive collection of original manuscripts, artwork, and artifacts from the prolific children's book editor's forty-year career.<sup>1</sup> The Collection is known both for its breadth of children's literature artwork, from pencil sketches, preliminary woodcuts, and marker and watercolor works, to finished artwork suitable for publication, as well as its nearly 500 items of correspondence between the editor and her famed clients, including Robert McCloskey, Ludwig Bemelmans, Don Freeman, and Munro Leaf, that tells the story of how writing talent should be cultivated among young authors. This collection has been in the possession of Emporia State University's Special Collections and Archives since 1972.<sup>2</sup> During the first decade of its existence, the collection held annual workshops that invited many of the above-named authors to speak on campus, which kept the collection in the public eye. In the three decades following, the archival staff has attempted to promote the collection to a target audience of students interested in the production of children's literature with varied levels of success. The barrier of geography frequently presents a problem that is difficult to overcome.

This barrier occurs commonly among many special and archival collections. In 2006, Beth Whittaker suggested that among the greatest challenges facing special collections are access and promotion.<sup>3</sup> Both issues are evident in the May Massee Collection, which unfortunately must be secured behind locked doors and is only available for a limited number of hours each week. This has not deterred the efforts of the archives department to promote the collection with regular open houses and through the loan of artwork from the collection to museums across the United States. The collection struggles, however, to meet staff expectations in regard to number of visitors and its overall engagement and use.

In an effort to promote the May Massee Collection to a broader audience, ESU's Special Collections and Archives decided to investigate using a tool that showed promise as an emerging educational technology: virtual reality (VR). Virtual reality offered us the opportunity to create an interactive experience that approximates an in-person trip to the collection for individuals and classes that cannot physically visit the collection.

## What Is Virtual Reality?

Virtual reality is an immersive, interactive experience presented by a computer device. The experience incorporates images/video and may also include audio, touch, or other sensory elements. The images/video may be entirely computer generated (such as animation or video game environment) or comprise images/videos of real environments captured using special camera equipment to create 360-degree images/videos. The type of virtual reality

discussed in this article is an image of a real place (May Massee's office) that incorporates interactive elements (points on the image that—on hover—open new images or audio clips on the screen). This experience can be viewed on a desktop computer (in a similar manner to using Google street view to virtually “view” a location) or using a smartphone and headset (in a similar manner to using a classic View-Master, except that as the headset is moved, it adjusts the view of the image as though one were physically in the space).

Virtual reality differs from augmented reality. Augmented reality is the technology that fuels games like *Pokemon Go* and Snapchat filters. With augmented reality, computer-generated imagery is overlaid on real-time images. A real image is viewed through the lens of a smartphone camera and then computer-generated elements modify the real image in some way. Augmented reality technology can be useful to integrate technological elements onto real objects, such as artifacts in a museum that trigger videos to open on a visitor's smartphone to present more information about the artifacts. Augmented reality, however, requires a physical presence among the collection. Virtual reality, on the other hand, takes an image of the entire environment (such as the room with the objects in it) and allows viewers to virtually “visit” the space. Augmented reality aspects (the overlays that open videos) can still be integrated into the virtual reality experience, but virtual reality removes the barrier of needing to be in the same physical space as the collection. This is important for the May Massee Collection, as the aim is to reach populations that cannot physically visit the collection.

## Literature Review

Virtual reality has, for many years, been considered an effective method of delivering instruction that improves student engagement and outcomes.<sup>4</sup> Jennifer Vogel, Adam Greenwood-Erikson, Clint Bowers, and Ting Wang demonstrated that using virtual reality for learning activities can improve retention and scores from pretest to posttest by a larger margin than more traditional instruction.<sup>5</sup> Across all grade levels, from pre-K through postgraduate education, these new learning technologies engage students more fully and help them retain concepts.<sup>6</sup> Additionally, qualitative feedback from students, reported by Zahira Merchant et al., indicate sustained interest in using virtual reality in K–12 classrooms.<sup>7</sup>

An archival or special collection can also be an excellent forum to provide experiential learning that improves learning outcomes.<sup>8</sup> However, often the archival collections most suitable for a particular lesson are not necessarily located near the classroom.<sup>9</sup> Several essays and research articles have been published on the topic of virtual exhibitions, involving the display of archival

content/exhibitions on the Internet.<sup>10</sup> Virtual exhibitions may incorporate virtual reality (especially at museums, such as the Frick Collection in New York<sup>11</sup>) or may consist of a series of images, videos, audio, text, and links that together form the exhibition. The field of archival and cultural heritage informatics, in particular, offers a growing body of research relevant to the prospect of using internet exhibitions and incorporating virtual reality elements.<sup>12</sup> A few professionals and researchers have created virtual experiences for representations of literary works.<sup>13</sup> These projects serve a purpose similar to the May Massee VR, except that we envisioned a specific type of representation (virtual reality, as opposed to static images) based on the hypothesis that it would be more engaging to the target student audience.

Peter Lester raised some concern about virtual exhibitions being inadequate substitutes for the “real thing.”<sup>14</sup> This concern may be valid for those who want to experience the document (as a thing) rather than just view a virtual representation. However, for an audience of casual viewers and amateur (elementary student) researchers, the virtual experience has the ability to bridge geographic barriers, which supersedes the need for a completely genuine experience. Virtual reality likely will never be viewed as a substitute for the “real thing,” but it can be better than no access to a collection at all.

The profession of librarianship has also taken note of virtual reality for curating immersive learning experiences, with 2019 publications by the Council on Library and Information Resources and Ken Varnum (editor of *Information Technology and Libraries*) being two prominent examples.<sup>15</sup> None of this research, however, provides a practical investigation of the creation of a virtual exhibition in an archival setting that can be viewed using a modern VR headset (i.e., Google Cardboard).

At ESU’s Special Collections and Archives, we believed that virtual reality was ripe for use as a tool for accomplishing three main tasks of the department: 1) to educate the public, particularly school students learning about the history and process of literature production (the strength of ESU’s collection); 2) to promote accessibility to collections that can be difficult to reach outside the limited operating hours of Special Collections and Archives; and 3) to market Special Collections and Archives to a broad, global audience. Because the largest target audience of Special Collections is students, these interrelated goals all boiled down to the need to create a tool that could be used in classrooms to supplement learning in cases where geography, time, or other barriers prevent a physical visit to Special Collections and Archives.

This rationale stemmed from our understanding of the barriers to and opportunities for the adoption of an educational technology in a classroom environment, as informed by evidence-based research in this area:<sup>16</sup>

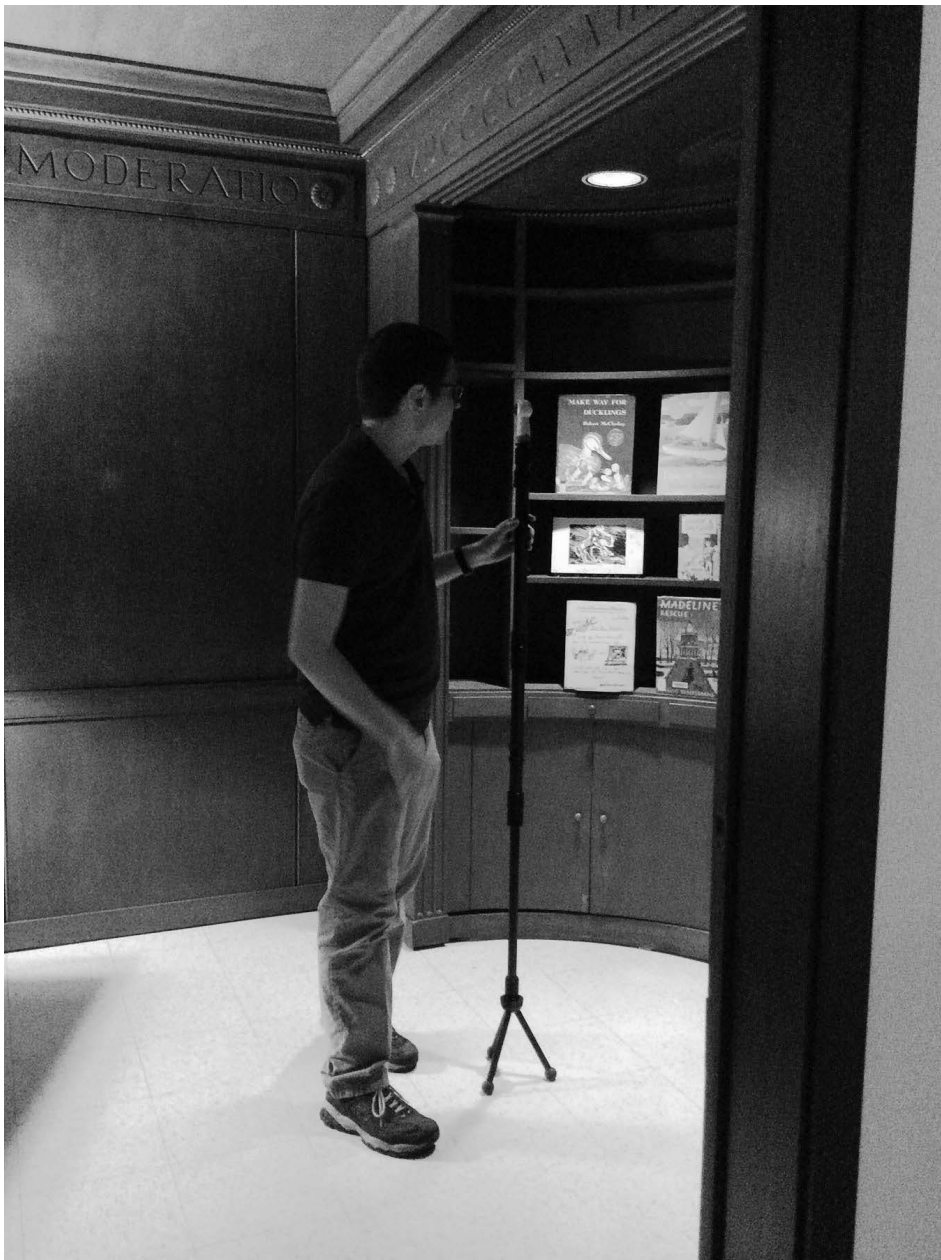
1. Practicality—how long will completing the project take versus how much time is available?
2. Affordability—what is the cost of a new technology versus the perceived value of said technology?
3. Stability—will the product's manufacturers continuously support and update it? (This is based on the specific VR platform that the university uses—InstaVR—and trust that it, as a company used "by over 50,000 companies and professionals,"<sup>17</sup> is not at immediate risk of folding.)

Until recently, virtual reality as a learning technology did not meet several of these conditions. The technology was difficult to use both for content creators and students (particularly children). Quality VR systems (the type one would want to use for instruction) could cost hundreds if not thousands of dollars. VR companies could easily fold or stop supporting older products. These factors made it impractical to use virtual reality in the classroom for anything more than a one-off session. However, recent developments in virtual reality and the ubiquity of smartphones now make it possible to provide access for only a few dollars per student, and major companies have emerged that promise the stability schools are seeking.

ESU's Special Collections and Archives aimed to be one of the first university archives to adopt this technology to share its collections and special exhibitions and to investigate the efficacy of using virtual reality to make them accessible for learning both among classrooms and individuals. Emporia State had experimented with augmented reality technology<sup>18</sup> and has some support from its educational technology department, which made the implementation of such a project feasible. The use of virtual reality technology was an extension of these previous efforts to expand access to the collections and to engage a broad population of learners.

## Methods

This project began as a practicum assignment for a master's of library science student during the spring semester of 2018 (January 22–May 4) who worked alongside an assistant archivist. We used an evaluative method for library and information organizations (needs analysis) adapted from the work of Robert Grover, Roger Greer, and John Agada to guide the development process.<sup>19</sup> We looked at the current usage of the May Masee Collection, including what the typical user looks like, how often and when the collection is visited, and feedback from visitors. We also hypothesized what other potential users might want from the collection. Finally, we accessed the composition of the collection, methods for providing access, and means for engaging the collection in a more proactive process of advocacy, outreach, and satisfying the information needs of



**FIGURE 1.** Designing the May Massee office

potential users. We also thought about how this experience might be used in a classroom. We wanted to eliminate information we felt would be less relevant to potential users and to focus only on the elements that directly contribute to telling the story of Massee’s life and the major authors with whom she worked (as opposed to details from her personal life).

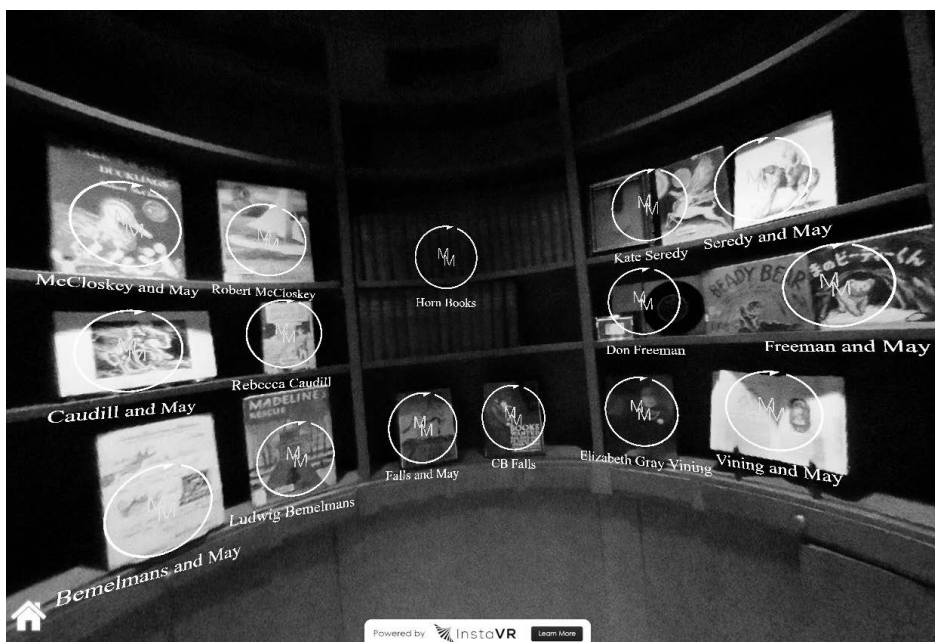


Virtual reality design technology is now accessible to the archival employee through software that requires no coding or major technical knowledge.<sup>20</sup> The design process, however, can still be time consuming. Just as one would with any physical display developed by a special collection and archives facility, we benefited from fully acquainting ourselves with the collection and then determining how to share the most important information as succinctly as possible. For example, for the thousands of pieces of work in the May Massee Collection, we used only twenty-two hotspots that, when clicked, recount a part of the May Massee story. Each of these hotspots provides about a hundred words of text and an image. In total, the project included just twenty-two pictures and 2,200 words to tell a story that could probably fill the length of a novel.

We found it useful to think of virtual reality design as an in-person tour with an archivist. Before beginning any of the technical aspects of the VR experience, we developed a written narrative of the story we wanted to tell visitors. What facets of Massee's life and career were important enough to be included in a five-to-ten minute story and, if an aspect of the story just would not fit the VR format, was there a reasonable way to link out to an online resource or video? We intentionally selected and arranged every object in the experience, just as a film director would do. The aim was to take advantage of every possible aspect of the VR design space.

For the May Massee Virtual Reality Experience, we used InstaVR virtual reality software and a Samsung 360 camera. Several comparable products are available online and in electronics stores for little cost; however, our university provided these particular products free of charge, and both worked well. Free VR software can be found online (Google VR is one option), so the only cost we had to incur was the 360 camera. These small cylindrical devices with two camera lenses facing opposite directions can cost anywhere from \$75 to \$300-plus based on quality and producer.<sup>21</sup> The camera connects (via wifi or Bluetooth) to a mobile phone, so images can be captured remotely, avoiding the presence of a camera operator in the picture. With one click, the camera will simultaneously take two images and merge them into one conjoined image. After the images have been taken, one can load them into a photo editor like Adobe 360 or ActionDirector 360 (a free software) to "stitch" the conjoined image into a 360 image. At this point, the 360 image can be imported into InstaVR (or a similar virtual reality design platform).

Within a virtual reality design platform, creators have the opportunity to add hotspots to the 360 image. Until recent years, the process of adding interactive elements to 360 images was laborious and required coding skills. Today, it is as simple as drag and drop. When an element is placed, creators have the opportunity to edit it by adding an image, text, sound, links, and transitions. This is where the story can really be told. While a static digital object in a repository is



**FIGURE 2.** The May Massee VR Experience from Desktop

passive, the virtual reality experience allows users to see the object on the shelf just like they would in-person and then click on that object and learn more by reading or listening to an audio clip.

May Massee's office, which was transported from Viking Press in New York City and reconstructed within Emporia State University's William Allen White Library during the collection's founding in the 1970s, serves as the base 360 image for the May Massee Experience. The office is small, approximately nine by thirteen inches, which is compatible with the camera, the best range of which is likely fifteen to twenty feet. A significant issue for the 360 image is lighting. Massee relied on a large window on the north side of her office to provide light; however, the window currently looks out onto rows of library stacks, and so we decided to block it out with a painting of New York. We then had to experiment with a variety of artificial lighting, including light boxes, lamps, and a wide diversity of bulbs to introduce sufficient light to the office. This challenge will likely be relevant to many special collections and archives settings where proper lighting is vital and exposure to too much light might damage the collection.

## Limitations of Developing a VR Experience

One of the more challenging aspects of designing the virtual reality user experience is arranging the physical location of objects in the room as well as the hotspots. Users will tend to gravitate toward the center of the 360 image,



the equivalent of eye level at a museum or archival display. This can be excruciating for the designers of the virtual reality experience, who, given a 360-degree platform, may want to fill it with 360 degrees of objects and hotspots. It is likely, however, that objects on the floors and ceilings of a space will only rarely be viewed.

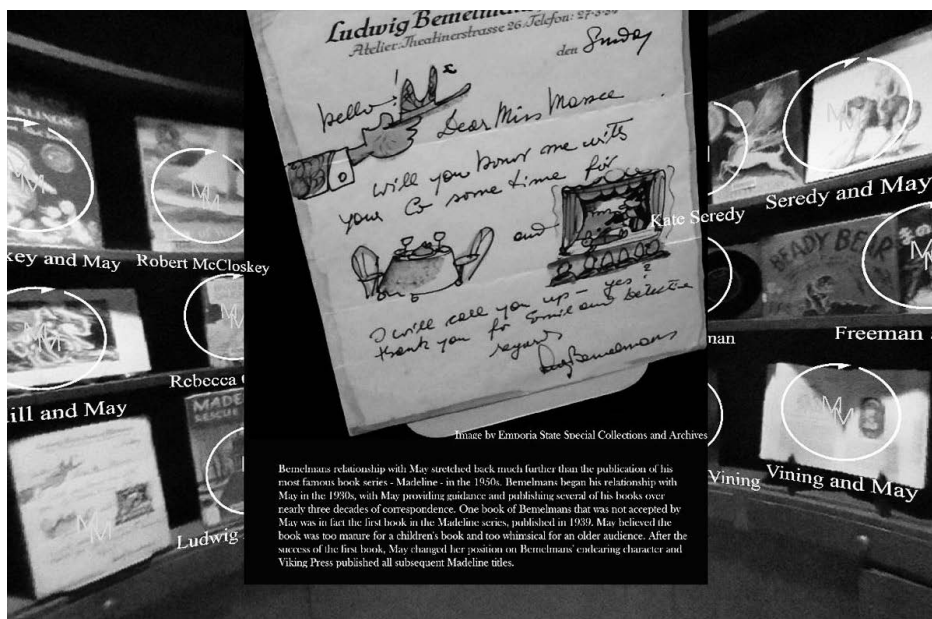
In the May Massee Experience, we addressed the challenge of arrangement by placing most of the physical objects on a bookshelf situated level with the 360 camera. Most of the hotspots for the experience were placed within the “eye-level” view to which the experience reverts upon loading. Some elements, however, could not be made to accommodate. Massee’s office includes two elements for which the user must direct attention upward: her motto, which she had carved around the top of all four walls of her office; and a Taurus carving, a design carved into a single log of wood that adorns the ceiling. There is no perfect way to direct users to these two elements. The most practical is referencing their existence in one of the hotspots at eye level (e.g., “May said that the Taurus carving [on the ceiling above] was her favorite part of this office”).

A second issue with the physical design of the experience is visual acuity.<sup>22</sup> Virtual reality mimics the real world in that objects that appear far away in the real world will also appear far away in a virtual world. This issue may be minimal when the virtual reality experience is embedded in a website, as most users will wear corrective lenses if needed, but it can be a major issue if it is made available on phones, as many headsets are not constructed to be worn with glasses.

Finally, disorganization may arise as a challenge in a project like the May Massee VR Experience. While VR design can be learned and accomplished without a high level of technical knowledge, it is still a major task that requires good project management skills. Task organizers like Trello that allow individuals to list task details and check them off as they are completed are highly recommended for keeping the project moving smoothly and meeting its timeline.

## Results

The virtual reality experience transforms the May Massee Collection from passive to engaging. The experience reflects our recognition of an expressed need to overcome geographic challenges with engaging archival learning experiences. It also makes changing how the information is shared based on user feedback. Using analytical features of the virtual reality software can further transform the experience to become proactive, recognizing user needs or preferences before the users do themselves. InstaVR, for instance, provides a heat-mapping feature that indicates where user gaze is focused. This can reveal to designers what aspects of the collection are intriguing to users and those that are less so. By connecting the program to Google Analytics or other web



**FIGURE 3.** VR experience with “hotspot” interactive feature selected

analytics tools, designers can see where users are located and what time of day they are viewing the experience. This might, for example, indicate that the primary audience for the experience comprises daytime viewers (probably schools) in the northeastern United States, allowing the designers to better shape the experience for that audience.

We put this information to work in refining the May Massee Experience. From its first trial run, we determined from the analytics that users gravitated toward audio elements and, on average, spent enough time interacting with the hotspots to view the image but likely not to read the text. Based on this information, we were able to incorporate more audio elements, including narration for each hotspot that reads the text to users as well as an interview with May Massee herself, recorded in the early 1960s. Based on Google Analytics, we were able to identify the midwestern and northeastern United States as well as Asia (particularly Japan and Korea) as the locations of primary users. Interest in Asia likely stemmed (according to user feedback) from an interest in the publishing process by several academic and citizen researchers (the May Massee Collection has many in-progress manuscripts and sketch books). Most of the access occurred during the work week in (local) daylight hours, which may suggest individuals were viewing at work or school, or were retirees. This information may inform the evolution of experience elements to be more accessible to children and researchers alike, and possibly to be made available in languages other than English.

Massee’s office and story are now available worldwide, 24/7 via a web-based virtual reality experience embedded in the university’s website and a free mobile

application available for Apple and Android devices. The virtual experience has been “visited” by users from across the globe, something that was not feasible with the physical collection alone. Visit rates in general rose dramatically in the months following the release of the VR experience. Table 1 shows the trend in visit statistics before and after the launch of the experience. The average visitor to the experience spends twenty-four minutes exploring, which is slightly longer than the average in-person group spends in the physical office.

**Table 1. Visits (In-person and Virtual) in Years Preceding and Following Launch of May Massee VR (June 2018)**

	2016	2017	2018	2019 (Jan.–April Only)
Number of In-Person Visits	69	233	186	81
Number of VR “Visits”	0	0	241	132
Total Number of Visits	69	233	427	213

The May Massee VR Experience has been used to introduce several groups of students to the May Massee Collection and the process of literature production and publishing. The VR experience was used in several classroom settings, particularly in arts and language lessons in K–5 schools in Kansas and Missouri, to present information about book publishing and illustration. Feedback provided by five K–5 instructors in contact with one of the project’s creators reveals that, while the experience has some quirks (lighting and layout), the students found it engaging, and many formulated new questions about writing and illustration following the use of the VR experience that could serve as a springboard for discussion about literature and art.

Discussion

The May Massee Virtual Reality Experience has been a tremendous boon to Emporia State University’s Special Collections and Archives, without necessitating an excessive amount of learning new technical skills. Virtual reality experiences for an archives or special collection can be accomplished using graduate assistants, practicum students and interns, or student workers in the arts, history, library and information science, museum studies, or related fields, with the support and direction of an archivist or archives assistant. This makes the design of these experiences feasible for many academic and public settings. The low cost and great value of modern virtual reality design makes it an affordable and worthwhile venture for any archives seeking to engage broader audiences.

This virtual reality project provides an excellent opportunity to engage students in a classroom, in a departure from the traditional methods of bringing

objects to the classroom or sharing a slide show or video. It allows students to virtually engage with the collection. From the perspective of the subject-area instructor, this experience provides an engaging and cost-effective alternative to a field trip to the archives.

Emporia State University's Special Collections and Archives created several new VR experiences following the conclusion of the May Massee project. These projects expanded from using VR as an educational tool in a classroom setting to using VR for a general public experience. We create VR experiences for displays physically located in the archives' Exhibit Hall, which, in 2018, included two exhibits: *The Literary World of William Allen White* and *Circles of Influence: William Allen White in His World and Ours*. The assistant archivist also helped create an intern project that benefits the William Allen White Community Partnership Inc. This local organization serves as the "friends" group for Red Rocks, a Kansas State Historic Site that includes the homes of William Allen White and his mother, Mary Ann Hatten White. These projects have taught us that lighting and arrangement are important for creating an engaging VR experience. The ease with which spaces can be staged varies greatly, and staging the space so the quality will be sufficient for the audience exercises one's problem-solving skills. Emporia State's Special Collections and Archives benefits from its relationship with university marketing and instructional design, which can assist with these challenges, but, for independent organizations or universities without these resources, the inconsistency in lighting quality and autonomy in staging are important factors to consider.

## Conclusion

This case study illustrates one implementation of virtual reality technology for promoting a special collection to students. Virtual reality may not be appropriate for all collections (it requires a physical space for display, and so is not as appropriate for displaying documents alone), but for archival and museum collections that include a physical space (office, room) and artifacts, it can be an excellent way to engage audiences, particularly students who enjoy engaging with new technology. The design likely will not be perfect, professional photographers can account for many little details that archivists perhaps cannot. The focus, however, need not be on producing crisp, beautiful images, but on simply creating new forms of meaningful engagement with the collection, for which image quality is secondary. Virtual reality does not rival a physical visit to the archives, but it does give a taste of the collection to those who otherwise could not experience it. As archives and museums expand how they engage the public, VR offers a way to reach the public where they are and draw them into a collection.

## NOTES

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