



Immersive Approaches to Medieval Iberia: an Example of Effective and Accessible Integration of XR in a University Course

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Abstract. The greatest barrier to adoption of immersive media in education today is the challenge of bringing XR resources into the classroom in an accessible and practical way. *Immersive Approaches to Medieval Iberia* is an on-going collaborative project designed to integrate immersive media into a course about the literature of the Iberian Peninsula, ca. 900-1500 – a period rich in cultural exchange between Islamic, Jewish and Christian cultures. Using a combination of free resources (3D models, 360° photos/videos, VR) and purpose-built assets, the students experienced the objects and places from this remote time and place in VR, and collaborated on a virtual exhibition of historic objects. The students, many of whom are first-generation college students from low-income families, described the experience as “transformative” and “life-changing.”

Keywords: Immersive Learning, Virtual Reality (VR), 360° Photos, 360° Videos, Free Assets, Practical Applications, Accessible, Literature, History, Medieval, Virtual Exhibition.

1 Background and Introduction

Our project grew out of the “Digital Humanities with XR Institute,” a workshop for humanities faculty organized by the Extended Reality for Learning (xREAL) Lab at California State University, San Bernardino (CSUSB) and led by Dr. Guendalina Ajello Mahler in the Spring of 2024. The purpose of the Institute was to explore practical options for faculty to include immersive media in their research and teaching. While a number of the faculty members were interested in the idea of incorporating immersive materials in their work, they were daunted by the prospect of doing so because they felt they lacked technical expertise, or were generally unfamiliar with the landscape of XR. As part of the workshop, participants were invited to propose ideas for an immersive media project to be conducted in collaboration with the xREAL Lab. The Lab offered further support in the following areas: concept-development, 3D modeling, video-editing, game-design, motion capture and VR equipment. Despite the availability of these more sophisticated resources, the workshop also emphasized the effectiveness of using free, easily accessible immersive media options as well.

Immersive Approaches to Medieval Iberia was one of the projects to come out of the workshop. It was proposed by Prof. Jerez-Gómez, Professor of Spanish and Humanities at CSUSB; Dr. Ajello Mahler, the Institute leader and digital humanities advisor to the xREAL Lab, took the lead on the collaboration. The idea behind the project was to address the challenge of teaching medieval literary texts, and the complicated political and cultural dynamics that informed them, to students who had no prior knowledge of the historical or geographic context – particularly in a university in which a majority of students are from low-income families, first-generation college students, and for whom English is often a second language [1]. Our goal was to use immersive technology to render this fascinating but complex subject more accessible and comprehensible to the students, and to make this remote place and time in history feel vividly real and relevant to them. The idea was partly inspired by Prof. Jerez-Gómez’s previous experience incorporating museum visits in his courses, combined with the emotional impact of experiencing the ‘Anne Frank House VR’ app during the Institute. Our approach built on previous collaborations between the xREAL Lab and CSUSB faculty, including several mini-exhibitions created with Prof. Jordi Solsona-Puig, Assistant Professor at the Watson College of Education, CSUSB, and his students [2]. Our approach was also informed by experiences and evaluations in immersive pedagogy described in recent literature [3-7].

2 Implementation

We approached the project in the following stages: Groundwork, Orientation and Practice, Digital Museum Pieces, VR field trip and Virtual Exhibition.

2.1 Groundwork

We dedicated a session at the beginning of the course to introducing the students to immersive media. Our definition of immersive media was very inclusive, covering any media which convincingly convey a sense of three-dimensionality – from simple 3D models to full virtual reality. We offered a brief overview of how different media are produced, addressed the challenges of research in the context of visual and immersive materials, and discussed options for academic presentation that would support immersive formats.

2.2 Orientation and Practice

We created a media-rich orientation resource and study aid in the form a StoryMap. We used the main background text for the course, Maria Rosa Menocal's book *The Ornament of the World*, as a framing device. Within the StoryMap we assigned representative images to the chapters covered in the course, and placed them in a timeline and related map [3-7]. The chapters were thus established as sign-posts in place and time, against which the primary texts read in the course could be understood. The chapter sign-posts were also placed in a separate experimental 3D Time-Map (it included a time-line and a map), with markers indicating the date and place of the chapter sign-posts, along with the primary texts, and other cultural artifacts covered in the course.

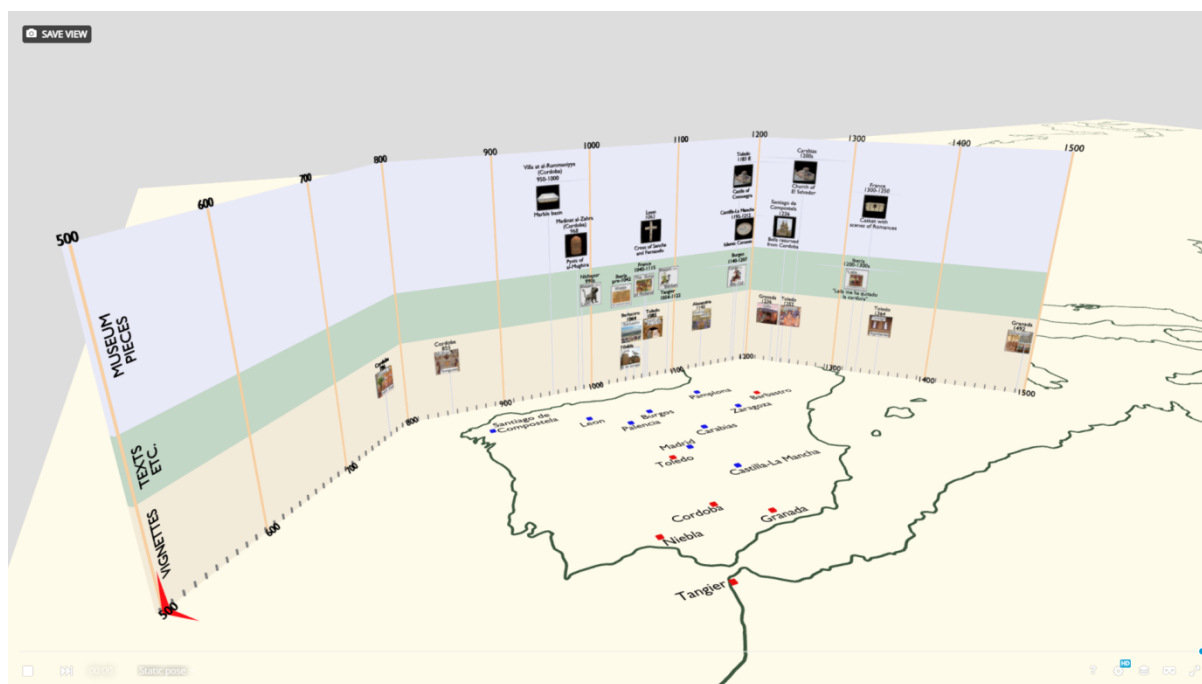


Fig. 1. Experimental 3D Time-Map (by author, Blender model viewable in Sketchfab, screenshot).

In an effort towards a continued orientation and familiarization with immersive media, when using supporting materials to illustrate the context of the readings, we tried as much as possible to use ones that were immersive, such as Google Earth, 360° photos and videos and Google Arts and Culture resources.

2.3 Digital Museum Pieces

The students were asked to create personal projects in which they chose a "Digital Museum Piece" – a model of a three-dimensional object or building connected to medieval Iberia – to research and present. Students were provided with a series of resources to facilitate finding appropriate objects, and we worked with them to ensure that their choices were authentic, historically relevant and came from reliable sources.



Fig. 2. Pyxis of Subh, 10th century, Museo Arqueológico Nacional, Madrid, free downloadable 3D model (Sketchfab, screenshot).

Students were then asked to write an essay relating their chosen objects to the course readings, and considering them in light of the analytical criteria they were learning. They shared their objects and drafts of their essays in preliminary oral presentations. For their final presentations, students were encouraged to turn their essays into StoryMaps, which could include not only their digital museum pieces as embedded models, but could also offer context via a variety of immersive media, including maps, timelines, images and video (2D and 360°), audio, and additional 3D models for comparison. Traditional essays were also accepted.

2.4 VR Field Trip

About two thirds of the way through the course, the students were invited to the xREAL Lab for a VR Field Trip to Medieval Spain. Dr. Ajello Mahler, an architectural historian, introduced them to Google Earth VR and gave them a tour of the Great Mosque in Cordoba, the Alhambra in Granada, and other sites discussed throughout the course. Students were then invited to explore the spaces in VR independently. They were also able to see their digital museum pieces in VR. Lab staff assisted the participants individually.

Students were also able to explore in VR the experimental Time-Map that had been evolving since the beginning of the class. As the class read new texts, markers for these were added to the time-line, and eventually the digital museum pieces were also included in a separate band. In VR the time-map was the viewable at roughly the scale of a basketball half-court, making it less of a diagram or an object than an explorable space.

2.5 Virtual Exhibition

At the end of the course all the students' Digital Museum Pieces were assembled into a Virtual Exhibition, with their essays serving as catalogue descriptions. StoryMaps created by the students were accessed via embedded linking "portals" in the exhibition. The Virtual Exhibition was created in Spatial.io, allowing multiple participants to visit the space simultaneously. A custom gallery space was created for the exhibition, with museum pieces displayed inside, and architectural structures viewable in the area outside the building.



Fig. 3. Virtual exhibition, exterior view (exhibition space created by Guendalina Ajello Mahler in Vectorworks, with models imported from Sketchfab and original models created in Blender, assembled in Spatial.io, screenshot).

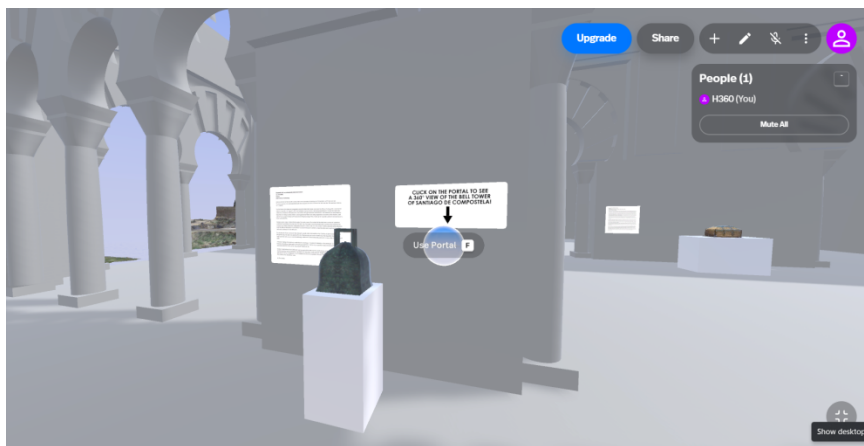


Fig. 4. Virtual exhibition, interior view (exhibition space created by Guendalina Ajello Mahler in Vectorworks, with models imported from Sketchfab and original models created in Blender, assembled in Spatial.io, screenshot).

3 Assessments

We have completed the first semester of implementation of the *Immersive Approaches to Medieval Iberia* project. At the end of the term, students were asked to provide reflections on the course and its immersive components. As we enter the project's second semester with a new group of students, we are in the process of conducting a thematic analysis of student reflections [9], as well as conducting a self-evaluation of what worked and how to apply our approach in future courses.

3.1 Student Reflections

As a final assignment, students were given the following prompt: "Reflect on what have you learned this semester through the Digital Humanities XREAL Lab Project." The students' reflections on the course were overwhelmingly positive. The following excerpts are representative:

"I had a remarkable and life-changing experience working on displaying a 3D museum artwork utilizing virtual and extended reality (XR) technology...Because medieval Iberia was a complicated and multidimensional era, we were able to dynamically display historical artifacts, locations, and events by utilizing virtual reality. ...To sum up, my involvement in the Digital Humanities xREAL Lab Project expanded my knowledge of how cutting-edge technology may transform historical research and instruction. The study demonstrated how XR technology may be used to produce more immersive, interactive, and captivating experiences that improve historical learning and enjoyment."

“Participating in the Digital Humanities xREAL Lab Project was an exciting and transformative aspect of this course...Working with XR technology not only enhanced my understanding of the period but also challenged me to think critically about how digital tools can be used to present history in more interactive and engaging formats...It also highlighted the importance of accessibility and inclusivity in educational tools; by creating a 3D museum piece, we could bring the historical narratives to life in a way that was both engaging and informative for a modern audience. Overall, the Digital Humanities xREAL-Lab Project deepened my understanding of Medieval Iberia by allowing me to engage with the material in an innovative, experiential way.”

3.2 Self-evaluation

For the second semester we will work to improve the following aspects of the project.

- We need to dedicate more time to training the students to conduct academically sound research in non-textual media, and especially with immersive resources. The world of on-line immersive media resources is a free-for-all of materials ranging from high quality captures of museum pieces to amateur fantasy creations. There is no magic bullet for this challenge, but we are developing a series of strategies to guide students as they search.
- Evolving software and obsolescence is an ongoing and seemingly intractable challenge. Two of the key resources that made this project possible (Sketchfab and StoryMaps) are in the process of being discontinued or transformed. While we try to stress the value of underlying assets as relatively stable elements that can be repurposed, the instability of the technical environment is a discouraging and frustrating factor in the adoption of immersive media in education.
- While the project was successful and repeatable, we recognize that aspects of it may be too time-consuming for immediate adoption without some outside support.
- To strengthen our assessment tools, in our second semester we have added an initial reflection, and we are in the process of creating more measurable our goals for future iterations of the project.

3.3 Future Applications

We feel that the model we have developed for integration of immersive resources into a literature course was simple, practical and effective. It could also be applied to other courses. While we had at our disposal a dedicated Lab, we feel that the approach is scalable for schools with fewer resources, though some technical support would be advisable. We are also in the process of developing shareable materials which would make it easier to implement this approach more widely.

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