
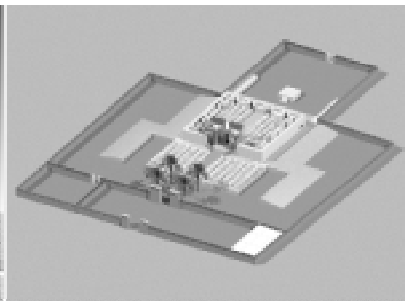

POTENTIALS AND PITFALLS: CASE STUDIES ON INCLUDING 3D MODELING IN A TRADITIONAL ARTS AND LETTERS COURSE

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Abstract

Reconstructions of ancient and modern places, whether concrete or virtual, embody dynamic and varied relationships to the physical remains they represent. Further, they are situated in a complex, fluid dialectic between the modern moment in which the reconstruction is attempted and the previous time when the buildings or spaces were actually, originally created. In this paper, we are exploring the theoretical, pedagogical and practical issues raised by implanting these sorts of reconstructions in the context of an undergraduate, arts and letters university course. In particular, we will examine one aspect of this practice relevant to all facets of the use of reconstructions in teaching: communicating the nature of the evidence on which reconstructions are based.

Resumen

Las reconstrucciones de lugares antiguos o modernos, concretas o virtuales, involucran relaciones dinámicas y variadas con los restos físicos que representan. Más aún, están situadas en una compleja y fluida dialéctica entre el momento actual en el que se intenta la reconstrucción y el momento previo en el que las edificaciones o los espacios fueron originalmente creados. En este artículo estamos explorando los problemas teóricos, pedagógicos y prácticos que surgen al implantar estos tipos de reconstrucciones en el contexto de un curso universitario de pregrado en Artes y Letras. En particular, examinaremos un aspecto de esta práctica, relevante a todas las facetas del uso de las reconstrucciones en la docencia: comunicar la naturaleza de la evidencia en la cual se basan las reconstrucciones.

Introduction

People living in landscapes dotted with ancient monuments have respected, reviled, reconstructed, and wondered about the people who lived before them. The yearning to reach across time to explore and understand the ancient past is a long-standing human experience. Four thousand years ago, powerful Egyptian kings were actively reconstructing monuments around the pyramids. In the sixth century BC, the Babylonian king Nabonidus took an archaeologist's approach to the past and excavated an ancient temple to discover which of his predecessors had built it. Until the 19th century Homer's epic poems inhabited an uncertain landscape but then Heinrich Schliemann dug into the ruins of Troy and gave the bard's words and his Trojan war a home. What a vivid partnership of narrative and archaeology! A vision of the great walls and gates awaiting their final assault and a giant Trojan horse was immediately present in the minds of contemporary men and women who read about these discoveries. Now imagine for a moment what actually was found in those excavations at Troy: scraps of ancient buildings, short stubs of broken walls, shattered pots; a far cry from the imagined state.

Reconstructions of ancient and modern places, whether concrete or virtual, embody dynamic and varied relationships to the physical remains they represent. Further, they are situated in a complex, fluid dialectic between the modern moment in which the reconstruction is attempted and the previous time when the buildings or spaces were actually, originally created. In this paper, we are exploring the theoretical, pedagogical and practical issues raised by implanting these sorts of virtual reconstructions in the context of an undergraduate, arts and letters university course. In particular, we will examine one aspect of this practice relevant to all facets of the use of reconstructions in teaching: communicating the nature of the evidence on which reconstructions are based.

The Course

Different teaching methods were explored over the course of six semesters while teaching students to construct virtual realities of ancient buildings and to document the line of reasoning and evidence that lead to the final reconstruction. The case studies presented in our presentation will specify the progress, problems, and potential we encountered as we worked to integrate digital design tools into the study of ancient architecture and archaeology.

The virtual ancient sites were created within the context of an upper division course in the humanities entitled "Archaeology of the Ancient Near East and Mediterranean." Most of the students in this course never have taken an archaeology or anthropology course before and had only the most basic understanding of ancient history of this part of the world. A majority of the students are sophomores, juniors, and seniors, while a few freshmen enroll.

The course is designed to allow students of all levels to generate an understanding of the practice and history of archaeology and to provide students with an overview of the major archaeological finds in this region. Digital modeling was adopted as a means of helping students fully conceptualize destroyed archaeological sites, so that they could experience the scale and movement through the ancient spaces more vividly than is normally possible using traditional slide lecture presentations. To do this, students needed to use the same types of critical, analytic and synthetic tools used by archaeologists when they excavate an ancient site, interpret it, and publish the results.

First Case Study

A chance meeting between two faculty members, one an architecture professor, the other an archaeologist led to a independent study project in which an architecture student modeled, rendered,

and animated an ancient site for use within an Internet-based research project undertaken by a group of students in another class. The architecture faculty member was interested in demonstrating how computers could be used to generate "realist" reconstructions (renderings); the archaeologist was pressing for "realism" based upon real archaeological evidence such as physical remains/ruins or textural descriptions of the time.

The architecture student had previous knowledge in computer graphics and for him the project was a modeling exercise in which the parameters for the building were provided by the other instructor and archaeology students. The undergraduates asked the architecture student to prepare specific views of an ancient building that were then used in mouseovers showing ruins and reconstructed buildings. There was little research overhead burden for the architecture student, and the interaction between the individual modeler and the student researchers was easy, but minimal. The architecture student learned a lot about the ancient site (and the sometimes fragmentary nature of archaeological information). In particular, the architecture student came to understand the need to model walls with approximated heights and roofs whose precise construction was vague.

The archaeology students did not take the opportunity to question the reconstruction that the modeler supplied or to test new theories supported by evidence they gathered (partly a time issue, partly a lack of archaeological background). Although the final project looked complete, it lacked the rigor of testing and critique that was envisioned in the collaboration. Although seemingly simple (assigning a computer savvy student to archaeology students), the first method was successful in only a limited way.

Second Case Study

In a second semester we established a more direct connection between the students with access to the archaeological evidence and the virtual models. This was done in the context of a regularly scheduled, upper division Arts and Letters course. Each student chose a building from an ancient Egyptian capital city, Amarna. The student term project was intended to encompass as much intellectual energy, research, and creativity as a term length paper, but not presented in an entirely written format. Instead, a 3D digital model of the building in its immediate environment was presented as a Web-based series of presentation pages, animations, fly-throughs, and other components. The buildings were modeled based on a close reading of excavation reports, plans, and other research resources. The students also provided supplementary explanatory material, a self-critique of design decisions and alternatives, and a coherent summary encapsulating all the major issues confronted during this research endeavor. Special attention was given to alternative views that may have been discarded, thereby clarifying to what extent the building is a product derived from archaeological recovery, from interpretation in modern times, or from comparisons with contemporary Egyptian buildings.

Students were directed to create a "design journal" as a record of their thinking and progress throughout the project's duration. A major goal of the design journal was to give students a locus for reflexive thinking about the archaeological data and its interaction with the virtual model they were creating. In this on-line document, students tracked problems encountered, questions raised (especially with respect to the actual reconstruction; for example, "What type of column was used in the portico?"), and resolutions incorporated in the project (for example, "The archaeological remains was the base and part of the shaft of a bundled reed column. It probably looked like this. Diagram included.")

The idea of combining the researcher and virtual modeler in the same student was excellent (and obvious). The practical nature of doing so was difficult, time-consuming, and in the context of the upper division course workload, overburdened the students dedicated to achieving a satisfactory result. The inclusion of the virtual modeling training had major deleterious effects on the amount of traditional course material that could be included. About a third of the class time was devoted to the teaching of 3D modeling, rendering, and animation; this was time taken from the teaching of the material usually included in the class.

The experience of the archaeology student learning the virtual modeling program was different from the normal experience of architecture students learning CAD where a support structure exists (most of their colleagues know the programs). Architecture students can be motivated to learn the skills quickly because they will be useful in the future in their architecture studio courses, internships, and jobs. Also, they are already familiar with certain discipline specific terms: axonometric, elevation, plan view, adobe, etc. These advantages did not necessarily exist for the Letters and Arts students, many of whom were taking the course as an elective. Using research funds from an Innovative Teaching Grant, a software-proficient teaching assistant was hired to provide additional support. A lot of extra time was provided by the instructors, tutoring students on both the software and the research concerns, which included very detailed questions about the ancient places and structures.

Although several of the projects turned out very well, the course entailed a lot of work for the students and professors. Students were often frustrated, and the intellectual content of the course was disrupted by the need to spend more time of digital skills. However, the students learned a smaller body of material in greater depth and developed reasoning and critical skills that were much more advanced than their history of archaeological coursework would otherwise suggest.

Third Case Study

The third iteration of the course occurred in Spring 2002. This class had the benefit of additional pedagogical and technical training resources. The course was adopted by the Multimedia Literacy Program (MLP) at the USC. This was a last-minute arrangement that had considerable potential in terms of scaffolding the students' use of the multimedia presentation modalities by providing them with dedicated student assistance (a peer mentor who knew the program and who had taken the class before). Hence, more computer resources were available for the students, and a teaching assistant taught an additional section on two-dimensional graphics and presentation techniques: Photoshop, Flash, Dreamweaver, FinalCut Pro, etc. Still, a lot of class time was still spent with modeling, rendering, and animation. The teaching style was modified to include the use of pre-built digital models where students could practice rendering and animation before modeling their own projects. The students also worked in groups rather than as individuals.

Overall, some of the projects turned out much better. For some of the projects, the challenge of managing the work in groups was not successfully overcome; those projects were uneven or incomplete. In general, the graphic "look and feel" of the presentations was better. The extra effort spent in teaching the two dimensional techniques and having a consultant available gave a more professional look to the Web pages developed. In the better groups, the links between evidence and reconstruction were stronger, and the students were more cognizant of the issues and decisions confronted when transforming archaeological remains and textual evidence into a three dimensional model. A sense of discovery often accompanied the exploration of the model, especially in learning about the scale of the buildings, the play of light and shadow, and

the sense of color and texture that is often missing in ruins.

Still, although the Web-based presentations had improved, it was difficult for the students to deal with the modeling and rendering of three-dimensional models while coping with the substantial research required. Students felt seriously overburdened with work in this course. In course evaluations, the majority of them reported learning a great deal, and some even confessed that, despite the enormous work burden, they enjoyed it. However, what became clear to us was that while virtual modeling could lead to substantial gains in development of critical thinking in an archaeological framework, the work required to succeed was not sustainable using this precise model in a medium-level undergraduate course. The next incarnation of the course will attempt to resolve more of these issues.

The Role of Ambiguity in Representation

Virtual reconstructions may seem viable, especially when there is no explicit linkage to an evidence corpus; and they can offer an experience that may be perceived as authoritative. Even careful scholars can be seduced by the realistic imagery, renderings and animations. For example, whereas an archaeologist may know what the columns looked like at a particular temple (having found remains at the site), have a fairly good idea of the wall construction (from comparative buildings), and be a bit vague as to the roof of the building (some indications in text resources), the rendering of this temple might look equally resolved in its wall and roof structures.

The foundation of these virtual creations is data coupled to interpretations. Therefore, virtual intellectual products can be grounded through critique and citations just as any other research. The real-world basis for a virtual world may include multiple sources of evidence, multiple bases for reconstructions. Thus, for research and educational purposes, virtual worlds and 3D reconstructions need not, and indeed should not, necessarily shed their real-world origins. Ideally, creation of a virtual reconstruction occurs in a bounded relationship to a body of evidence linked to a past reality. In practice, the bounds of this relationship are fluid and complex.

The students' use of the Web as a presentation medium allows for this type of footnoting and critiquing to take place in a graphic environment. Although the issue of ambiguity in reconstruction was presented to the students (and they made reference to it) many did not have the time to fully explore what this meant for their project. The use of the design journal was one step towards the codifying of these decisions. Yet the cognitive overload of the other aspects of digital modeling has thus far interfered with the total engagement of students in a thoughtful discussion of these issues within their own projects.

Recommendations

In a more perfect world, the students would come to our classes already equipped with the tools they needed: research methods, presentation skills (written, oral, and Web based), three-dimensional modeling and rendering ability, and a sense of inquiry and wonder. Initiatives such as our university's Institute for Multimedia Literacy may facilitate this. Yet, we rarely have the opportunity to teach students so well prepared nor can we insist they take a series of courses over multiple semesters to build skills.

Resources need to be made available to the students to overcome hardware and software problems. Consultants, teaching assistants, former students — anything to curtail the frustration often inherent at the early stages of the project. If at all possible, the technical skills needed, whether they be Web based, two-dimensional or three, should be dealt with in time separate from the teaching of the core material of the class. This is extremely difficult to do with existing classes with set times and pre-determined number of units. Unfortunately it means that some class time will still be lost to the teaching of the skills, or some extra credit needs to be offered for additional time dedicated to the coursework.

We have allowed students to work on existing virtual models to jumpstart their process. They are still required to critically examine the model and provide an assessment of the evidence / assumptions that went into it, and use this critique to make amendments and modifications to it. We cannot require a prerequisite of computer skills, and so this solution is our concession. In addition, artifact and topical studies will be allowed, alongside computer reconstructions of ancient architecture. The buildings might hold other artifacts such as pots or furniture or religious items that are the subject of inquiry. The University has a substantial teaching laboratory of archaeological objects, and students can integrate the real and the virtual.

Students need more time to explore the media. When excited, they were often so enthusiastic that they looked beyond problems and think of creative ways to solve them. Of course, the instructors can and should learn from the students. Each individual is unique, and each group brings different strengths to the class. Not all students need to achieve the same level of expertise. Group projects allow us to require subject knowledge of all the participants, but skills in Web presentations or 3D modeling or animation may reside in various individuals.

We need to continue to stress the importance of scholarship and research methods, rational arguments, and presentations that clearly present what is known, what is not known, and what might have been. In this regard, it might be beneficial to have a graduate student (in addition to a computer expert) lead each group project and help provide more content on demand; matching graduate research topics with eager undergraduates could be a great opportunity for both. Overall we wish to teach the students to combine critical thinking and computer skills to provide portrayals of the past that are grounded in research.

Conclusion

Archaeologists, architects, and artists interpret differently the ruined fragments left from past ages to synthesize some semblance of their former glory. Doing so, they create a powerful interface that provides viewers a frame of reference to a reconstructed, imagined past, allowing an audience to visualize it vividly. The point at which these reconstructions touch upon our work as educators is when they are used within a framework of teaching. Students of archaeology, design, history, and architecture often arrive in classrooms and museum galleries hoping the past will come alive in their minds. Virtual models can be central to satisfying this quest if students can be encouraged to be critical about the relationship between a reconstruction and the evidence on which the imagined version is based. Our experience as teachers shows us that as design and presentation tools become increasingly affordable and accessible, their capabilities create a host of methodological, theoretical, and pedagogical concerns, while offering expanded possibilities. If universities can create structural curricular arrangements that will help students learn multimedia presentation modalities while maintaining research rigor, undergraduate students will be able to "explore" ancient places whose realization has a link to real evidence such that student enthusiasm for the experiential feeling is a natural result.