Designing Collaborative Interdisciplinary CG Experiences in the Curriculum

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1 Introduction

In the last twenty years, computer graphics has evolved as a field and become a staple in many educational institutions. However the disciplinary silos of academia have often made it difficult to approach this medium from its strongest advantage, via interdisciplinary collaboration. In addition, off-the-shelf software packages have made it seem as if the disciplines don't really need each other. Often our teaching focuses on skills because the software remains complex. As a result, our students miss out on experiencing the contextual richness that evolves from working collaboratively across disciplines.

At the *Advanced Computing Center for the Arts and Design*, we have been pioneers in building new ways of learning by seeking connections that once again require interdisciplinary expertise and knowledge. In the early 1970's Ohio State professor and computer graphics pioneer Charles Csuri conceived of computer graphics as a field that would require a unique and powerful collaboration between the sciences and the arts. From the technology point of view it was a logical necessity that scientists would write it into existence. But Csuri's foresight and background as a painter told him that this was an important medium for artists too and that science + art = a lot more than one without the other. From this ideal, a research center (CGRG/ACCAD) blossomed and fostered, not only the best of computer science but also accomplished artists and designers from the arts disciplines (dance, design, theatre, art). In the following years, production companies modeled themselves around the paradigm of artistic expression and scientific development, working side by side.

At OSU we have created a series of academic experiences for our students that integrate disciplinary expertise, formulate new research questions, and require both faculty and students to reach beyond their knowledge domain to formulate new ways of thinking about technology, the arts, and interactivity.

2 Courses

This panel will present content and results from four courses that are designed around the concept of interdisciplinary collaborations. Additionally the panel will describe methodologies and strategies, successful and unsuccessful, for fostering an infrastructure that supports interdisciplinary endeavors, engaging students from varying disciplines, avoiding the silo structure inherent in academia, and creating experimental and evolving content. Our panelists will share their experiences and results of interdisciplinary teaching collaborations from four courses within our curriculum.

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New Ground: Topics in the Body, Performance, and Interactive Technologies (Zuniga-Shaw/Lewis)
The *New Ground* cycle is an advanced seminar that seeks to foster innovation and the creation of new knowledge in the engagement of the body with emerging technologies and interactive performance. Students read the work of leading critical theorists, philosophers, and scientists and put these theories into action via weekly collaborative creative studies. Frequent contributions to a class blog add another layer of exchange to in-class discussions, workshops, and showings.

We will discuss our strategies and experiences jointly developing, teaching, and evaluating new course material drawn primarily from the very different worlds of computer science and dance. The challenge of engaging students from variable and initially unknown backgrounds will be examined. Finally, we will consider the ongoing process of developing facilities, policies, and resources appropriate for disparate undergraduate, graduate, and faculty research and performance.

Digital and Physical Lighting (Palazzi/Tarantino)
Digital + Physical Lighting is an introduction to the basic principles and concepts of lighting as used in theatre and computer graphics. Topics include common and contrasting principles, the historical development of theatre and digital lighting, terms and concepts, physics of light, lighting style, lighting for related media (such as dance and opera, film and television) and professional practice.

Course projects provide students with collaborative, multidisciplinary team experiences in which they develop digital or physical lighting schemes in the theatre and in the virtual. The final project is an installation that includes both physical and digital lighting. To develop an analytical eye, students view a live theatre performance and a recently released computer animated feature film and critique the application of lighting in their respective forms. Panel discussion will feature course project results as well as the issues of establishing a common vocabulary by integrating technical and artistic knowledge. The use of specialized laboratories and integrating technology into course content, presentation and documentation will also be addressed.

Procedural Animation (Palazzi/Parent)
Procedural Animation provides a collaborative production experience for Computer Science and Art/Design students. Students from each of these disciplines form small groups that produce an animated film which features programmed procedures. The Computer Science students write software that explores procedural approaches to physics, particle systems, flocking, behavioral animation, etc. The Art/Design students model, light, texture, rig and animate as well as direct the creation and production which must integrate the procedural elements.

The process and product produced as a result of this interaction will be explored in this panel. Discussion will cover practical matters such as coordinating technical and artistic expertise, identifying common creative tools, communication across disciplines and the value of experiencing the production process from each discipline.

Animation Production (Palazzi)
As a methodology for introducing contemporary topics to our students, ACCAD has established a group studies course that provides a collaborative opportunity for participants. Course content is constructed around projects that require interdisciplinary expertise to realize an outcome. The openness of the content allows faculty to develop applied research with partners both inside and outside of the university system and to engage students in these team-based learning opportunities.

Projects such as *Jane, Diary of a Dinosaur* with the Burpee Museum of Natural History, Rockford, IL and *A Master Class with Dreamworks Animation, SKG* will be featured as applied examples of building course content around interdisciplinary relationships.

3 Presenter Bios

Matthew Lewis is a member of the graphics research staff at The Advanced Computing Center for the Arts and Design (ACCAD) at The Ohio State University. Dr. Lewis has taught graduate level courses in the College of the Arts on interactive performance and installation technologies, virtual environments, 3D animation, digital lighting, and procedural animation. He has presented research work on interactive evolutionary design at conferences in Switzerland, Italy, and Portugal. His artwork has appeared on the cover of the journal Leonardo, has been shown in New York, Korea, Japan, France, Australia, and the UK, and has been mentioned in Wired magazine and USA Today.

Maria Palazzi is the Director of the Advanced Computing Center for Art and Design (ACCAD) and an Associate Professor of Design at The Ohio State University. Professor Palazzi received her Masters Degree in Art Education, specializing in Computer Animation, and a BSID in Visual Communication Design from The Ohio State University. From 1983 to 1987 she was a senior animator for Cranston/Csuri Productions, a pioneer in commercial applications of computer animation. Palazzi joined Rutgers University as an Assistant Professor of Art and Coordinator of the Art Department's Computer Graphics Lab in 1987. In 1991 she accepted a position at Ringling School of Art and Design as Department Head where she developed and implemented a new BFA program in Computer Animation. In her current position, at ACCAD, she fosters research and instruction of computer graphics and animation. The Center provides campus leadership in computer graphics, visualization, motion studies and animation to support instruction and research in the arts and the sciences. Palazzi's recent collaborative research projects include *Jane, Diary of a Dinosaur* with the Burpee Museum of Natural History, Rockford, IL and *A Folk Dance Model of Digital Assets for a Cultural Movement Resource Prototype* with OSU professors Mockabee (Dance) and Bender (East Asian Language and Literature). Palazzi also leads ACCAD's summer program *Digital Animation: A Technology Mentoring Program for Young Women*.

Rick Parent is an Associate Professor in the Computer Science and Engineering Department of Ohio State University (OSU). As a graduate student, Rick worked at the Computer Graphics Research Group (CGRG) at OSU under the direction of Charles Csuri. In 1977, he received his Ph.D. from the Computer and Information Science (CIS) Department, majoring in Artificial Intelligence. For the next three years, he worked at CGRG first as a Research Associate, and then as Associate Director. In 1980 he co-founded and was President of The Computer Animation Company. In 1985, he joined the faculty of the CIS Department (now the Department of Computer Science and Engineering) at Ohio State. Rick's research interests include various aspects of computer animation with special focus on animation of the human figure. He is the author of Computer Animation: Algorithms and Techniques, published by Morgan Kaufmann in 2001. Currently, he is working on facial animation and on using model-based techniques to track human figures in video.

Mary Tarantino is the resident lighting designer and director of Theatre's graduate studies program. Her professional credits include lighting designs for music and opera: the Virginia Arts Festival/Buffalo Philharmonic Orchestra, A Midsummer Night's Dream (2005), Columbus Symphony Orchestra/OSU School of Music, Peer Gynt (2001), and ProMusica, Passion (2000). Designs for theatre companies include: Karamou House (Cleveland), Archipelago (Chapel Hill, NC), the Children's Theatre of Massachusetts, Players Theatre Columbus (199194), and ongoing work with the Contemporary American Theatre Company (since 1997). Mary has worked as an architectural lighting consultant for residential and commercial projects in Ohio, Massachusetts, Vermont, and Hong Kong, most recently lighting a Plant Conservatory and research spaces for Ohio State's Department of Biological Sciences. Mary is the director of the Theatre Department's Moving Lights Laboratory, established with support from the College of the Arts, a University Seed Grant, and a Battelle Grant. Her ongoing research involves applications of moving lights design and technology for theatre productions, movement-theatre, and architecture, and seeks ongoing partnerships with manufacturers to enhance training opportunities for students.

Norah Zuniga-Shaw is an Assistant Professor in the Dance Department of Ohio State University. She is a mixed media choreographer working in the U.S. and Latin America. Professor Zuniga-Shaw is a founding member of the EMMA (experimental media and movement arts) Lab, a collective of artists and scientists concerned with real-time engagements between the body, site, and technology. Zuniga-Shaw has created performances for numerous spaces including public television (PBS), the UC Migratory Bird Reserve, and The Los Angeles County Museum of Art (LACMA). Current research includes generative interdisciplinary processes at the interstices of dance and computer science, interactive performance, and innovation in dance documentation. Zuniga Shaw is the director for dance and technology. She teaches courses in interdisciplinary composition and critical theory.

Figure 1: Digital + Physical Lighting class project. Students: Russ Blain, Shana Burns, Esther Palmer. Left: concept sketch. Right: production photo (image credit: Shana Burns).