Integrating Writing and Computer Graphics to Improve Technical Communication Across Disciplines

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Part 1: Background and Research Question

In the course, *Fundamentals of Computer Graphics*, and in our research lab, we teach many talented students who aspire to apply their technical skills to exciting multi-disciplinary projects. These students want to develop computer games, make movies for companies like Pixar, work on art installations with new media artists, develop medical imaging applications, and visualize cutting-edge scientific data. Currently, our computer graphics and visualization program does a good job of preparing students for the technical challenges they will face beyond the classroom, but to succeed in these multidisciplinary projects, students also need a solid understanding of how computer science intersects with the goals of other disciplines, and they need to draw upon this understanding to communicate effectively with visual artists, storytellers, business managers, scientists, and engineers. This is something that is not as well supported by our current teaching, and we believe a re-envisioned role for writing in our discipline can dramatically improve student learning in these areas.

Writing in our field has a special relationship to visual communication. Our conferences include poster sessions where student authors are expected to present professional quality custom (often 3D) graphics integrated with textual descriptions explaining their research. (See Figure 1.) Presentations and talks in our field almost always include images and video captured from a computer monitor or showing a user interacting with our tools. We also have a tradition of live “demos” (interactive demonstrations of our software, as in Figure 2). These are critical for disseminating our work and for securing funding in both research and industry; mastering the art of giving a good demo is a highly coveted skill. We think of each of these modes of communicating our work across disciplines as fitting under a broad definition of writing within computer graphics.

Despite their importance, to date, we have provided only minimal opportunities and no supporting resources for students to engage with writing via posters, talks, and demos. In the computer graphics course, after each programming assignment we ask several students to demo...
Can utilizing new visual-writing resources and a new writing-focused approach to teaching improve the abilities of computer science students to communicate their work to broad, multi-disciplinary audiences using specific forms of writing (posters, talks, and demos) that are important to our field?
Part 2: Project Description

To address this question, we propose two main activities:

First, we propose to build a multimedia website and wiki to act as a central repository for instructional material relating to writing. We will link to this site from both Computer Science and the Center for Writing web pages. The new site will include examples of posters, 1-2 page extended abstracts that often accompany these posters, and demos and talks that have been recorded via video. In addition to computer graphics-specific information, we will also link, for example, to graphics from the New York Times art department, which traditionally does an exceptional job of integrating visual and written information. Beyond acting as a central repository, a key feature of this website will be the ability to annotate the material (in a wiki style) to provide instructional comments on the writing. Specific feedback on examples will be linked to summary pages that provide checklists and guidelines for preparing talks, posters, and demos. Students will be able to create their own pages on the website to report on their experiences with demos, posters, and talks. We envision, for example, a useful web resource could evolve from online student reporting and discussion of the issue of how a demo should change depending on the audience, which, in our lab, could be anyone from technical computer science collaborators, to medical doctors, to visiting high school students, etc.

The second proposed main activity is to utilize the new writing resources in our teaching, both in the classroom and the research lab. In the Fundamentals of Computer Graphics course, we will change the class structure to provide time for each student to prepare and present demos of his/her work using the new online resources. Through both class discussion and use of online resources, our teaching will emphasize strategies such as using writing to reflect upon the challenges, successes, and failures of the work to be presented and using writing to identify the appropriate audience, content, and organization for the demos. We expect this to be the first targeted instruction, discussion, and feedback centered on writing for demos that the students will have ever seen.

In our research lab, students will also draw upon the web-based resources to prepare better demos, talks, and posters. In addition to the many demos and poster sessions that are part of our usual approach to research, we will also hold special “peer response” demo sessions, where we will run demos for each other and then provide written feedback to each other. Building on our previous collaborations with Mitch Ogden, we will work closely with the Center for Writing staff to refine our approach to these critique sessions and determine how best to capture the insights that result from these sessions to make them available to future students via our new online tools.

In order to evaluate our work, we will quantify the impact of the tools via measures such as the number of times particular materials on the website are accessed, the number of student-entered comments on the website, and the areas of study of the students participating on the website.

Funding this grant would provide the necessary salary support for a graduate research assistant, David Schroeder, to assist in meeting the objectives described above. David is a particularly good candidate for this work because of his background; he was an editor for his college
newspaper and he has twice served as the “writing TA” for a writing intensive course in our department. David is also an expert web developer and has the necessary expertise to address the technical challenges involved with preparing the proposed online materials.

We plan to accomplish our objectives via the following schedule. We have planned for devoting the most significant time to the project, supported via a 25% RA appointment for David, during the summer of 2010 and early in the Fall of 2010. After this, we believe the project will be largely self-sustaining in the sense that the web-based tools will continue to live on, students will continue to add content, and the integration into the computer graphics course will be complete. In the late Fall and into the Spring of 2010, we have several dissemination activities planned, which we will be able to continue without additional C4W salary support for David.

| June 2010 | • Do literature searches, reading/evaluation to identify initial categories of instructional materials for website.  
• Prepare paper prototypes to explore website design, critique and seek feedback from C4W staff.  
• Create web space on CSE research servers, discuss and identify best web/wiki software for our needs. |
| July 2010 | • Web authoring (with light programming as necessary) to put an initial website online for internal use and critique; use existing software tools as much as possible.  
• Test the framework by uploading initial content to make sure it supports wiki-style comments by users and content in several forms, including videos of talks and demos. |
| August 2010 | • Test website by uploading demos, weekly talks, and research posters from our research group that were completed over the summer.  
• Integrate links to external material, for example Jim Blinn’s session, “How to Give a Good SIGGRAPH Talk”. (SIGGRAPH is the annual graphics conference.)  
• Begin formulating pages on higher-level ideas, e.g. the “Before you give a demo” checklist.  
• Do a “test run” with graphics graduate students of using the web materials for teaching – introduce the topic and website in a talk at our weekly seminar. |
| Fall Semester 2010 | • Based on test run experiences with grad students, integrate web materials and discussion into the Fundamentals of Computer Graphics I course.  
• Maintain momentum on adding new material to the website by using weekly talk series, demos, posters, etc. created in our group as a driving force for content and peer response.  
• Design (with C4W staff) and do a first peer response demo session. Document feedback and methodology taken on the website. |
| Spring Semester 2011 | • Participate in writing-oriented lectures/workshops on campus, e.g. LRS series, working with grad student writers workshop.  
• For best exposure to the community, prepare and submit an abstract for a talk at the graphics conference, SIGGRAPH.  
• Consider a second venue for a written account of work.  
• Maintain momentum / develop a culture of continuing to add new material to web. |
Part 3: Relevance and Plans for Dissemination

This project promises to contribute to our understanding of how writing fosters learning both within computer science and, in particular, across disciplines that increasingly require collaboration with computer science. Posters, demos, and talks are traditionally important modes of technical communication in our field, but we offer no support for teaching these modes of communication. One reason for this may be that, until now, we have not conceived of these activities as forms of writing that should be taught and practiced as writing is. We have been inspired by our previous interactions with the C4W staff, and even by the call for proposals for the ISW program, to rethink our approach, conceiving of writing quite broadly so as to incorporate the modes of communication that are perhaps most critical in our discipline. We think this not only makes this proposal relevant to the goals of the ISW program, but it also has the potential to help us, as computer scientists, better understand how the many forms of writing can relate to our discipline. Too often in our field writing is conceived of only as a way to report results (e.g. term papers, research papers, design documentation). This doesn’t need to be the case. Demos are fun; posters and talks are visual and can be very dynamic. Engaging with writing at these levels may offer a very different (and important) view to our students of how writing can be used to effectively communicate across disciplines.

The results of this work will be freely available to the university community and beyond via our website. To make the work known to others, we plan to participate in writing-oriented lectures and workshops on campus, e.g. the LRS series and the working with graduate student writers workshop. Finally, we believe the broader computer graphics community will be interested in our findings, thus, will submit a proposal to the widely attended ACM SIGGRAPH conference to present the work via a talk at the conference.