Cindy Grimm: Teaching aspirations 2005

It is important for students to take an active role in their education, and to be pushed beyond what they think they can do. All of my classes are designed with this in mind. I provide multiple options and extras on assignments, both in problems and solution methodologies, and let the students pick and choose what interests them. I make the assignments and exams difficult, but also provide many opportunities to re-do or make-up work they perform poorly on, so any one who is willing to work does well in the class. I also reserve a number of lectures for student-picked topics. This, combined with a very interactive teaching style (I rarely make it through more than ten minutes of lecture without some form of student interaction) and inherently interesting material means most of the students are focused on learning as much as they can.

It is also important to provide opportunities to students beyond what they learn in the class room, especially at a place like WU where there are so many bright and motivated students. The following are two areas where I can make a substantial impact in student life beyond what I have currently achieved.

Education beyond the classroom

Every year at Siggraph, the Brown University graphics group holds a reunion dinner which typically has over 60 people attending. These people range from current students to graduated students now working in industry (many in leadership positions) to students who have gone on to get PhDs and form graphics research groups of their own (the majority received their undergraduate or masters degree from Brown). This sense of continuity and community has always inspired me, and has been a major factor in shaping the culture of the Media and Machines lab. I and my fellow faculty have made every effort to encourage our students, both undergraduate and graduate, to work together and help each other, especially across disciplines. As a consequence, our lab environment is very supportive (a comment I hear frequently from visitors) and students usually remain in contact long after they have left the lab. For example, one of our earliest students, Kevin Goodier, will be returning this fall to speak in our Alumni series.

Brown and WU undergraduates are very similar in their caliber, their well-roundness, and their educational experience. I believe that, in time, the undergraduates from WU can have a similar impact in the field, both in continuing doctoral studies, the computer graphics industry, and the gaming industry. These areas are all very competitive; there is no shortage of students trying to get into them. Helping WU students succeed involves more than just giving them a good classroom education — it involves:

Identifying research and class projects that are well-structured and suitable for undergraduates and masters students. These projects must have both a strong technical component and visually compelling results for inclusion in a portfolio. It is increasingly important for students to have a concrete demonstration of their skills, and evidence of their willingness to work on their own (or in a group) on self-motivated projects

Sending as many students as possible to conferences, in particular Mid-graph.[1] The mid-west is geographically isolated from the graphics research community and our lab is relatively small. Conferences give students a chance form ties with other students and to experience different research environments.

I also encourage students to work on joint projects with faculty at other universities, and have hosted students from other universities in my lab. For example, David Feng of Northwestern (Bruce Gooch's student) spent this summer incorporating our camera models into Bruce's Architecture Reconstruction project (submitted to the Interactive 3D Graphics conference). Collaborations formed at Mid-graph have already

[1] I started Mid-graph, along with Bobby Bodenheimer (Vanderbilt), to address the problem of isolation of graphics groups in the mid-west. Every student has the opportunity to present their own work and review work of other students in a very informal, relaxed setting.

resulted in several publications, such as the "Table-top Lighting" published this year at the Eurographics conference.

Curriculum development

One of the reasons I was drawn to WU is that it has a very strong School of Art, and there is a strong interest on the part of both Dr. Roman and Dean Pike to develop educational opportunities for students who have interests in both Art and CS. Although we have made some progress in this area, there is still a great deal more to be accomplished. I would like to see both a thriving cultural exchange and increased *structured* opportunities for students. To date we have accomplished the following:

1) In my first year at WU I organized (informally) a set of projects that paired engineering students with students from art and architecture. We ended the semester with a one-evening gallery show, which had around thirty attendees. 2) School of Art faculty Sarah Spurr, Richard Krueger, and Heather Cochran, and CSE faculty Ken Goldman and I, put together a syllabus for a new major in the art school that has a substantial technology (particularly computer science) component.

Although I have been unable to continue structured joint projects (due to the time constraints of all involved), I have actively sought out faculty at other universities who have successfully run art and engineering courses and had long discussions about what makes this sort of joint class successful. I believe that now is a good time to return to course development for two reasons. First, the computer science department has hired a new faculty member in the field of computer graphics with whom I can share my current teaching commitments. Second, the Sam Fox School of Design and Visual Arts is under way, and there is a movement to bring technology into the curriculum, and the building itself will provide more space and equipment. I have been in contact with Ken Botnick and we both agree that, in addition to top down approaches, such as the joint major, that small, local efforts can help. I propose two directions:

Specific projects which draw on the expertise in the art school to shape research goals. Much of my own research involves using artist's skills to simply or make novel computer interfaces. While I have a degree in art, that does not begin to touch the body of knowledge available in the School of Art.

Develop cross-disciplinary courses. This is extremely challenging — art and engineering students speak two very different languages. Also, it is difficult to balance conceptual progress design with engineering progress. The challenge is to create structured projects that let both types of students contribute at all stages of the project. From discussions with faculty at other universities, the best way to achieve this is to use the traditional critique-style method of teaching.

There are several universities which have formally (CMU) or informally (Northwestern, Calgary) put together joint curricula. WU is uniquely situated to succeed in this area, both because of the strengths of the two departments and because so many WU students are interested (and gifted) in both areas.

Summary of Teaching Evaluations

I have taught CSE 241 (Algorithms and Data Structures), CSE 452 (Computer graphics) CSE 450/451 (Video Gaming I and II) and CS 552 (Advanced Graphics). The following is a summary chart of the "Overall Course Evaluation" scores in the student evaluation compiled by the university. The "Teaching Evaluation" scores are substantially similar.

	Poor ..... Excellent									
Rating:	1	2	3	4	5	6	7	8	9	AVG
CSE 241, SP 2004	2	1	1	4	7	5	5	3	1	5.4
CSE 452, FA 2000	0	0	0	0	0	0	2	3	3	8.1
CSE 452, FA 2001	0	0	0	2	1	4	8	9	1	7.0
CSE 452, FA 2002	0	2	1	1	3	3	9	1	3	6.2
CSE 452, FA 2003	0	0	2	0	2	3	11	4	6	7.0
CSE 452, FA 2004	0	0	1	0	0	1	4	10	18	8.2
CSE 450, FA 2004	0	1	0	0	1	2	3	3	0	6.4
CSE 451, SP 2005	0	0	0	0	0	1	0	2	6	8.4
CSE 552, SP 2001	0	0	0	0	0	0	2	4	6	8.3
CSE 552, SP 2002	0	0	0	0	0	2	0	5	3	7.6
CSE 552, SP 2003	0	0	0	0	0	2	12	2	6	7.5
CSE 552, SP 2004	0	0	0	0	0	1	3	3	1	7.5

The following quotes are selected from student course evaluations (evals.wustl.edu).

Data structures and algorithms

> "Its very hard and a lot of work but there is a feeling of satisfaction when you get the labs done and as long as you put in effort, it is not hard to get a decent grade."
>
> "This course is definitely worth taking, it is very useful."

Video Games

> "It provides an excellent opportunity if you are serious about becoming a game developer (or just very interested in game development). It will help you improve your coding, design, and team skills."
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> "It is a ton of work, but if you are willing to do it, it is also a lot of fun, and a great learning experience."
>
> "If you have an interest in video games and you have a wide range of knowledge in CS, this course would be perfect for you."

Computer Graphics

> "This is one of the few classes where I have actually wanted to start the labs as soon as they are handed out. The material was interesting, and I found myself extremely motivated all semester."
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> "It will consume your life. Orders of magnitude more work than any course, graduate or otherwise I've taken in my academic career. At the same time, this was probably the most satisfying and educational course I've had. In short, it will ruin your life for a semester, but at the end, you'll be a better person for it. No one should graduate without it."
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> "It is very time-consuming and involves a lot of linear algebra. However, you will learn a lot."