

## 1 Approach to Teaching

Computer science departments across North America suffer from low retention rates. Undergraduate students cite two main reasons for leaving the major: the failure to establish social networks and the failure to become academically involved in classes. However, students who work together on projects and course work are better able to form social networks, are more likely to be actively involved in the academic community, and, hopefully, will be more likely to graduate from computer science departments. My teaching and mentoring efforts focus on establishing a computer science culture that encourages peer-supported education and integrates research experience into the undergraduate curriculum.

### **Teaching Goal: Integrate Research into the Undergraduate Curriculum.**

An innovative new team based undergraduate program, Research Teams: Fundamentals and Management (RTFM), lays the groundwork for a healthy and constructive undergraduate community in the University of Victoria's Computer Science department. The students in the course devise solutions to problems presented by real clients. For example, Microsoft and the San Diego Zoo are recent RTFM clients. These problems, like much research, cross disciplinary boundaries and do not have easy answers. The major reward for me is to see the RTFM students take ownership of their project and to begin to grow into independent investigators.

I try to demonstrate to the RTFM students how complex, abstract ideas grow from accessible beginnings. For example, instead of relying on textbooks for material, I integrate fundamental research papers into the required reading. These papers show that the first path to an important idea is often not the one presented in the textbooks, and the original authors words may reveal surprisingly different goals and unusual reasoning. Textbooks are more efficient, but may mislead students into thinking that scientific progress is beyond their reach and is made in huge unified leaps. My students learn instead that scientific progress a boiling cauldron of smaller ideas from which larger patterns eventually emerge.

RTFM is geared toward students with multiple computer skill levels. For instance, novice students write simple functions, intermediate students write more difficult and challenging functions, and skilled students serve as team leaders. What I love about RTFM is that it gets students into the process that might never get in the process. In fact, one of the hallmarks of RTFM has been the participation of students from the arts, humanities, and social sciences as well as students in science and engineering. RTFM affords students the opportunity to work cooperatively with a group to solve problems collaboratively while completing complex, open-ended projects.

The relationships that I develop with the students are fantastic. RTFM is an intense teaching relationship, being a mentor and seeing groups come together as the individuals develop as a scholars while becoming excited about learning and working together with their new team mates. The RTFM program has taught me how well collaboration on meaningful research enriches the undergraduate experience of our students.

## 2 Teaching Responsibilities

### Courses

University Courses Taught by Dr. Bruce Gooch					
Number	Term	Title	Enrollment	TA	Original
CSC 167	2008 Fall	Game Strategy, Interaction and Design	102	Yes	Yes
CSC 485/585	2008 Summer	Topics in Systems: Anamatronics	12/4	No	Yes
CSC 167	2008 Summer	Game Strategy, Interaction and Design	12	No	Yes
CSC 485/585	2008 Winter	Non-Photorealistic Rendering	2/10	No	Yes
CSC 225	2007 Summer	Algorithms and Data Structures	24	Yes	No
CSC 485/585	2007 Summer	Perception and Graphics	1/4	No	Yes
CSC 212	2007 Winter	The Practice of Computer Science	62	No	Yes
CS 395	2006 Spring	Graphics Technology for Games	12	No	Yes
CS 130	2005 Fall	Tools and Tech. of the World Wide Web	30	Yes	No
CS 495	2005 Fall	Research Reporting	12	No	Yes
CS 395/495	2005 Winter	Perception and Graphics	6/6	Yes	Yes
CS 130	2004 Fall	Tools and Tech. of the World Wide Web	29	Yes	No
CS 311	2004 Spring	Data Structures and Data Management	37	Yes	No
CS 395/495	2003 Winter	Non-Photorealistic Rendering	7/6	Yes	Yes
CS 130	2003 Fall	Tools and Tech. of the World Wide Web	24	Yes	No

Every term that Professor Gooch has taught at the University of Victoria he has introduced an new course or redesigned an existing course. (5 new courses) In the cases were he redesigned an course he published papers about the work and gave talks about it during departmental "Teaching Buffet" seminars. Enrollment is reported as n/m were n and m are the number of undergraduate and graduate students respectively. The original column entries are, yes, if Professor Gooch designed and developed the course.

### Undergraduate Directed Group Studies

Undergraduate Directed Group Studies Led by Dr. Bruce Gooch		
Term	Topic	Enrollment
2008 Fall	RTFM-11: Educational Games	10
2008 Summer	RTFM-10: Games and Exercise	9
2006 Spring	RTFM-9: Future Web	8
2006 Spring	RTFM-8: Gesture-Control Applications	16
2006 Winter	RTFM-7: Animation Studio	9
2005 Fall	RTFM-6: Social Computing II	10
2005 Fall	RTFM-5: Illustrated Worlds II	14
2005 Spring	RTFM-4: Pervasive Computing II	5
2005 Spring	RTFM-3: Illustrated Worlds	8
2004 Fall	RTFM-2: Pervasive Computing	8
2004 Spring	RTFM-1: Visual Toolkits	9

Professor Gooch developed the RTFM concept and has received three grants to work on the project. Undergraduates in small research teams participate in peer-learning while receiving practical experience in the field. The results of the students work have been demonstrated to over 250,000 visitors at venues including the ACM Siggraph conference, the IEEE National engineering competition, the Singapore Science Museum, the UNESCO Culture Forum in Monterrey Mexico and departmental open houses.

## Practicum Supervision

Undergraduate Honors Students Advised by Dr. Bruce Gooch			
Name	Year	Project Topic	Course
Greg Leah	2007	The Future of Exercise	Software Engineering 499
Susan Perkins	2007	The Future of Exercise	Software Engineering 499
Ronald Negrych	2007	The Future of Exercise	Software Engineering 499

*Professor Gooch supervised one software engineering practicum at the University of Victoria. The project won the IEEE Telus award and was invited to the national IEEE competition. The project was the source of two television news stories, two radio interviews and three newspaper articles.*

## Undergraduate Research Advising

Undergraduate Research Projects Supervised by Dr. Bruce Gooch			
Name	Year	Project Topic	Program
Rhett Dobson	2008	Hardware Device for Dance Exercise	NSERC USRA
Wes Alcock	2008	Networked Game Bikes	NSERC USRA
Ryan Williams	2008	Networked Game Bikes	NSERC USRA

*Professor Gooch has supervised three NSERC USRA research projects. The networked game bikes were invited to be demonstrated at Microsoft Techfest. Microsoft Techfest is currently the top computer technology demonstration event in industry. Of the hundreds of technology exhibits we were one of only three invited from academia; including Brown and Columbia Universities.*

## Undergraduate Directed Studies

Individual Undergraduate Directed Studies Supervised by Dr. Bruce Gooch (Table 1)			
Date	Name	Topic	Publication
2008 Summer	Javier Alfaro	Crystallography Visualization	Yes
2006 Spring	Sharla Rent	History of CS	Yes
2006 Spring	Sara Renberg	Multi Touch Interfaces	Yes
2006 Spring	Michael Smathers	History of CS	Yes
2006 Spring	Whitney Young	Digital Music	No
2006 Spring	Alan Diec	Multi Touch Interfaces	Yes
2006 Spring	Brandon Grill	Web Based Databases	No
2006 Spring	Paul Bork	Computer Game Modding	No
2006 Spring	Robert Kotz	Multi Touch Interfaces	No
2006 Spring	Sara Salahi	History of CS	Yes
2006 Spring	Jay Zeschin	Productivity Interfaces	Yes
2006 Spring	David Ferris	Multi Touch Surfaces	Yes
2006 Spring	Tyler Louie	History of CS	Yes
2006 Winter	Dian Meechai	Social Networks	No
2006 Winter	Brandon Grill	Web 2.0 Development	No
2006 Winter	Christopher Britt	Digital Art	No

*Professor Gooch has supervised 56 directed study courses with undergraduate Students. Thirty-five of these directed studies have led to publications. Undergraduates who have worked with Dr. Gooch have gone on to top graduate programs including; MIT, Brown, Yale, UBC, UNC Chapel Hill, UC Berkley UC Davis and the University of Utah. Two have been awarded NSF graduate fellowships.*

**Undergraduate Directed Studies**

Individual Undergraduate Directed Studies Supervised by Dr. Bruce Gooch (Table 2)			
Date	Name	Topic	Publication
2006 Winter	Zachary Baharov	Computer Animation	Yes
2006 Winter	Andrew Dragstrem	Computer Game Modding	No
2006 Winter	Vani Oza	Social Networks	Yes
2006 Winter	Matthew Modaff	Game Modding	No
2006 Winter	Sara Renberg	Multi Touch Interfaces	Yes
2006 Winter	Robert Kotz	Multi Touch Interfaces	Yes
2006 Winter	Paul Bork	Game Modding	Yes
2006 Winter	Whitney Young	Web Development	No
2005 Fall	Jay Zeschin	Productivity Interfaces	Yes
2005 Fall	Matthew Modaff	Game Modding	No
2005 Fall	Andrew Dragstrem	Computer Game Modding	No
2005 Fall	Andrew Kaufman	Computer Animation	No
2005 Fall	David Feng	Perception and Graphics	Yes
2005 Fall	Brandon Grill	Web 2.0 Development	No
2005 Fall	Nathan Matsuda	Computer Game Modding	No
2005 Fall	Sara Renberg	Multi Touch Interfaces	Yes
2005 Fall	Robert Kotz	Multi Touch Interfaces	Yes
2005 Fall	Vani Oza	Yinx Display System	Yes
2005 Fall	Samuel Rossoff	Yinx Display System	Yes
2005 Summer	Dian Meechai	Web Development	No
2005 Spring	Bob Adolf	Yinx Display System	Yes
2005 Spring	Jay Zeschin	Yinx Display System	Yes
2005 Spring	Brian Cornell	Yinx Display System	Yes
2005 Spring	David Feng	Perception and Games	Yes
2005 Spring	John Mark Nickels	Database for Archeological Reconstruction	Yes
2005 Spring	Vani Oza	Yinx Display System	Yes
2005 Winter	Vani Oza	Yinx Display System	Yes
2005 Winter	Brian Cornell	Yinx Display System	Yes
2005 Winter	Kate Solinger	Online Pet Center	Yes
2005 Winter	Bob Adolf	Yinx Display System	Yes
2005 Winter	Jay Zeschin	Yinx Display System	Yes
2004 Fall	Kate Solinger	Visual Toolkits	Yes
2004 Fall	Louis Terry	Computer Graphics	No
2004 Fall	Alexis Hillman	Web Development	No
2004 Fall	Brian Cornell	Yinx Display System	Yes
2004 Fall	Bob Adolf	Yinx Display System	Yes
2004 Spring	Daniel Schmidt	Infrared Multi-flash Photography	No
2004 Winter	Sanna Bengali	Interactive Computer Graphics	No
2004 Winter	Nathan Matsuda	Computer Animation	Yes

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### Graduate Directed Group Studies

Graduate Directed Group Studies Led by Dr. Bruce Gooch		
Term	Topic	Enrollment
2008 Fall	Research Reporting	14
2004 Fall	Research Reporting	12
2002 Fall	Research Reporting	9

*Learning to report research findings is an essential skill for graduate students. Professor Gooch has led three group studies on this topic. Three papers resulting from the 2004 section won "Best Paper" awards.*

### Graduate Directed Studies

Graduate Directed Studies Supervised by Dr. Bruce Gooch			
Date	Name	Topic	Publication
2007 Spring	Vani Oza	Animating Swimming Fish	No
2007 Winter	Vani Oza	Computer Animaiton	No
2006 Fall	Vani Oza	Fluid Dynamics for Graphics	No
2006 Summer	Sven Olsen	Image Vectorization	Yes
2006 Spring	David Feng	Human Visual System	Yes
2006 Spring	Sven Olsen	Vector Graphics	Yes
2006 Spring	Yolanda Rankin	Games and Graphics	Yes
2006 Spring	Holger Winnemoeller	Human Visual System	Yes
2006 Winter	Ryan Buterbaugh	Web 2.0 Programming	No
2006 Winter	Yolanda Rankin	Foundations of Digital Games	Yes
2006 Winter	Sven Olsen	Digital Video	Yes
2006 Winter	David Feng	Perception Analysis	Yes
2006 Winter	Holger Winnemoeller	Perception Analysis	Yes
2005 Fall	Sven Olsen	Fluid Dynamics	Yes
2005 Fall	Yolanda Rankin	Computer Graphics Education	Yes
2005 Fall	Holger Winnemoeller	Motion Perception	Yes
2005 Summer	Holger Winnemoeller	Video Motion Analysis	Yes
2005 Spring	Leon Zhao	Motion Perception in Projected Video Games	Yes
2005 Spring	Sangwon Lee	Computational Geometry	Yes
2005 Spring	Sven Olsen	Digital Image Synthesis	Yes
2005 Spring	Winnemoeller,Holger	Dimensionality Reduction	No
2005 Winter	Sven Olsen	Image Compositing	Yes
2005 Winter	Holger Winnemoeller	IsoMap and LLE	No
2005 Winter	Sangwon Lee	Computational Fluid Dynamics	Yes
2004 Fall	Sangwon Lee	Spline Lines and Surfaces	Yes
2004 Fall	Sven Olsen	Digital Painting Algorithms	Yes
2004 Spring	Andrea Tartaro	Creating Quilts from Digital Images	No
2004 Spring	Sangwon Lee	Fluid Dynamics for Computer Graphics	Yes
2004 Winter	Vidya Setlur	Digital Image Compression	Yes
2003 Fall	Thomas Lechner	Procedural Image Generation	Yes
2003 Fall	Vidya Setlur	Image Processing	Yes

*Professor Gooch has supervised 31 directed study courses with graduate Students. Twenty-three of these directed studies have led to research publications.*

### Supervision of Post Doctoral Students

Post Doctoral Students Advised by Dr. Bruce Gooch				
Name	Date	Research Topic	Fellowship	Current Position
Dr. Saeko Takagi	2004	Visual Communication	Japan	Wakayama University
Dr. Marc Nienhaus	2005	Perception and Graphics	DFG	Mental Images
Dr. Jan Fischer	2006-8	Programable Rasterizer	DFG	University of Victoria

*Dr. Gooch has advised three Post Doctoral students. All three were awarded prestigious Fellowships in National competitions in their home countries allowing them to study with Dr. Gooch.*

### Supervision of Ph.D. Students

Ph.D Students Advised by Dr. Bruce Gooch			
Name	Year	Dissertation Topic	Current Position
Dr. Vidya Setlur	2005	Optimizing Computer Imagery for Communication	Nokia Research
Dr. Holger Winnemoller	2006	Perceptually-motivated Non-Photorealistic CG	Adobe Research
Dr. Sangwon Lee	2007	Reconstructing 3D Models from Line Drawings	Intel Research
Dr. Pin Ren	2007	Data Stream Visualization in Network Security	Hong Kong Bank
Dr. Yolanda Rankin	2008	Video Games as Spaces for Language Acquisition	IBM Research
Sven Olsen	Expected	Video to Vector via Abstraction	Ph.D. Student
Deidra Mortensen	Expected	Visualization for Decision Making	Ph.D. Student
Jean-Luc Duprat	Expected	Parallel Texture Synthesis	Intel/Ph.D. Student

*Professor Gooch has supervised the Ph.D. studies of eight graduate students. Five of these students have completed their degrees and gone on to positions as Research Scientists or Senior Research Scientists at top industry laboratories. Sven Olsen and Jean-Luc Duprat are students at the Univeristy of Victoria, the others are students at Northwestern University.*

### Supervision of Masters Degree Students

Masters Degree Students Advised by Dr. Bruce Gooch			
Name	Year	Thesis Topic	Current Position
Ed Wang	2005	Baysian Prediction on Graphics Hardware	ECM Capital Management
David Feng	2006	NPR and the Human Visual System	Ph.D. UNC Chapel Hill
Vani Oza	2006	Numerically Simulating Freely Swimming Fish	Deloitte
Tom Lechner	2007	An Ontological Basis for Scientific Visualization	Goldman Sachs
David Whitaker	2009	Video Games and Cognition	UVic Student
Sam Rossoff	2009	Exertion Interfaces	UVic Student

*Professor Gooch has supervised the Masters degree studies of six graduate students. Three of these students have completed their degrees and gone on to industry positions. One, David Feng, went on to pursue a Ph.D. in the top graduate program in the world in computer graphics. David Whitaker and Sam Rossoff are students at the Univeristy of Victoria, the others are students at Northwestern University.*

### Supervision of Honors Students

Undergraduate Honors Students Advised by Dr. Bruce Gooch			
Name	Graduation Year	Thesis Topic	Current Position
Nathan Matsuda	2008	Computer Generated Special Effects	Pixar

### 3 Efforts to Improve Teaching

#### Consultations on Teaching / Workshops Attended

**Course Redesign Workshop**, at the Learning and Teaching Centre, University of Victoria. The Course Redesign Workshop provides extensive support for instructors to design a new course or to redesign a current course. Over the five days of the workshop instructors; identify the intended outcomes of their course, plan instructional methods for increasing student engagement and learning, and design assessment methods congruent with their intended outcomes.

**The Web as a Procedural Sketchbook**, at the ACM Siggraph conference. Ideas that effectively integrate new technology with new visual design can be quickly developed and published on the web, using only Java applets. This course uses a selection of applets as illustrative examples to show how you can rapidly develop and publish new ideas on the web. Attendees learn to use Java applets to quickly disseminate visual and procedural ideas (animation, modeling, design, gameplay paradigms, etc.)

**Faculty Workshop: Beyond CTECs: Developing Meaningful Course Evaluation**, at the Searle Center for Teaching Excellence, Northwestern University. This workshop is designed to help faculty create and use a variety of course evaluation techniques. With a particular focus on the different purposes of evaluation and its impact on student learning, the workshop will engage and support participants in; examining the relationship of course evaluation to student learning, acquiring a variety of ways of approaching course evaluation, learning how to use feedback to support teaching strategies, designing alternate evaluation methods.

**Faculty Workshop: Using Assessment and Grading to Improve Student Learning**, at the Searle Center for Teaching Excellence, Northwestern University. Traditionally, grading has served to communicate to students how well they have performed in the course. By thinking creatively and strategically about how to integrate it into a course, however, faculty members can use assessment as a means for improving student learning. In this workshop, participants learn how to: link course objectives, teaching methods, and assessment; effectively use alternative forms of student assessment; develop and use grading rubrics; use formative assessment to improve student learning.

**Faculty Workshop: Developing an Effective Pedagogical Component for Your Grant Proposal**, at the Searle Center for Teaching Excellence, Northwestern University. Many funding agencies (e.g., NSF) now require grant seekers to include a solid educational plan, as well as a plan for evaluating it, in the proposal. This workshop offers participants; detailed information on how to structure an educational plan and evaluation within a grant proposal, tips on avoiding common mistakes in educational grant-writing, information on additional resources at Northwestern and elsewhere that can provide grant-writing support.

**Faculty Workshop: Connecting with the Crowd - Lecturing Effectively in Large Classes**, at the Searle Center for Teaching Excellence, Northwestern University. Many faculty members find lecturing to a large group among the most challenging of teaching tasks. Students may seem anonymous or uninterested, and its often difficult to tell how engaged they are in the class. This workshop is designed to help participants; create lectures that capture learners attention, design activities that can complement lectures in large classes, critique and begin to enhance their own lecturing styles.

**Faculty Workshop: Setting Your Students Up to Succeed - Designing a Learner-Centered Course**, at the Searle Center for Teaching Excellence, Northwestern University. this hands-on workshop helps instructors design a course that focuses on student learning. Participants; develop and refine student learn-

ing objectives, align teaching methods and assessments, and identify connections between pedagogy and achieving learning outcomes.

**New Faculty Workshop**, all-day at the Searle Center for Teaching Excellence, Northwestern University. The Searle Center for Teaching Excellence leads an interactive workshop to the Northwestern teaching community. The workshop focuses on; student learning, teaching methods, academic technology, and other resources to support educational effectiveness.

## 4 Contributions to Teaching and Accomplishments

### Curriculum Development

**Computer Games Option** Professor Gooch has designed an option in Computer Games for undergraduate students majoring in Computer Science at the University of Victoria.

### Graphics Seminars

Dr. Gooch has led a popular weekly series of Seminars at the University of Victoria and at Northwestern University to encourage careful reading and discussion of recent research papers in computer graphics. Each week a volunteer discussion leader presents a concise summary of the paper, and then group members work together to clarify difficult or confusing passages. We list the key contributions and new ideas in the paper, and debate how the paper could be improved and extended. Readings often become valuable brainstorming sessions about new research ideas. Over 200 students and faculty have participated in these seminars.

### Course Development

Professor Gooch has designed, developed, taught and assessed five new courses at the University of Victoria.

**CSC 167: Game Strategy, Interaction and Design** In this course, students study the technology, science, and art involved in the creation of computer games. Students review current trends in computer game programming and build their own games on top of available game engines. We study a variety of software technologies relevant to games including algorithms, programming languages, compilers, operating systems, file systems, networks, simulation engines, and multi-media design systems. We also study some of the underlying scientific concepts from computer science and related fields including: simulation and modeling, graphics, artificial intelligence, real-time processing, and game theory. Finally, we study the design principles for developing useable and engaging games including: software engineering, human computer interaction, thematic structure, graphic design, choreography, music and sound effects, and aesthetics.

**CSC 299: Undergraduate Directed Project** Under the supervision of faculty, students participate in research projects that include both their particular areas of interest and other aspects of Computer Science.

**CSC 395/495: Perception and Graphics** This course provides students with: a general background knowledge of the human visual system (HVS), ethical and legal instruction for studies involving human subjects, Institutional Review Board (IRB) policies and procedures, how knowledge of the HVS can be used to create more effective computer graphics and visualizations, and task based evaluation of computer graphics.

**CSC 395/495: Non-Photorealistic Rendering** In many applications, a non-photorealistic (NPR) image has advantages over a photorealistic image. NPR images omit extraneous detail, focus attention on relevant fea-

tures, clarify, simplify, and disambiguate shape, and show hidden parts. This course covers current research in the area of NPR and gives students an opportunity to work on an NPR application.

**CSC 395/495: Research Teams: Fundamentals and Management** The Research Teams: Fundamentals and Management (RTFM) courses provide undergraduate students with an opportunity to participate in and contribute to their research community in a peer-oriented educational setting. The educational motivation is based on the notion that one learns best when directly engaged in experimentation and reflection. The research motivation and course topic varies with each seminar.

### **Implementation of Innovative Teaching and Assessment Practices**

**Engaging Students in critical discourse utilizing an online forum:** While teaching CSC 212 Spring term of 2007 Dr. Gooch created an inclusive learning environment to engage in critical discourse utilizing an online forum. Critical discourse gives students the opportunity to practice their critical thinking skills. Students post solutions for assignments and proceed to critique their peers work based on inconsistencies identified in the proposed solution or suggestions for improving the solution. He evaluated the online forum to determine the level of student engagement in critical discourse. Finally, he established criteria that transform an asynchronous learning network into an inclusive learning environment where computer science majors can succeed. The results of this work were reported in an ACM Special Interest Group Computer Science Education (SIGCSE) conference paper and in a departmental *teaching buffet*.

**Open topic assignments:** In CSC212, Dr. Gooch developed assignments that have a basic set of premises, but require students to use creativity in coming up with the material for the assignment. In addition, the structure of the assignment is such that every student can see the solution of every other student following the studio model of programming instruction. The results of this work were reported in a SIGCSE paper.

For example, Assignment#4 asked them to write pseudo code for an algorithm using 7 computational statements, 2 I/O statement, and 2 control statements. Assignment #5 asked them to describe a real-world deadlock problem and give a method for solving the problem, either by avoiding, recovering, or a combination of the two. Then give a brief description and pseudo-code for the scheduling algorithm used. For all assignments, the students are each required to post a unique problem and solution with no overlap, all students can see postings even before they post their answer, there is no need to worry about cheating.

Examples can be found at:

<http://www.csc.UVic.ca/courses/csc212/200709/>

particularly on the forum:

<http://www.csc.UVic.ca/courses/csc212/200709/forum/>

Examples of deadlock assignment #5:

<http://www.csc.UVic.ca/courses/csc212/200709/forum/viewtopic.php?t=304>

<http://www.csc.UVic.ca/courses/csc212/200709/forum/viewtopic.php?t=303>

Additionally, students have the ability to get extra points by performing critiques on other students projects to spot errors or suggest simplifications. Example of critiques pointing out error (Assignment #4):

<http://www.csc.UVic.ca/courses/csc212/200709/forum/viewtopic.php?t=258>

<http://www.csc.UVic.ca/courses/csc212/200709/forum/viewtopic.php?t=176>

### Research on Teaching and Learning

1. Rankin, Y., Traagen, C. and Gooch, B. (2008). *Computer Science Students Engage in Critical Discourse*. In Submission SIGCSE.
2. Rankin, Y., McNeal, M., Shute, M., and Gooch, B. (2008) *User Centered Game Design: Evaluating Massive Multiplayer Online Role Playing Games for Second Language Acquisition* ACM Sandbox Conference on Gaming.
3. Rankin, Y., Gooch, A., and Gooch, B. (2007). *The Impact of Game Design on Students' Attitudes about CS*. In Conference Proceedings of Microsoft Academic Game Days SIGCSE Conference.
4. Rankin, Y., Lechner, T., and Gooch, B. (2007) *Extended Game Platform for Novice Programmers*. In Conference Proceedings of Eurographics Education Program 2007.
5. Rankin, Y., Lechner, T., and Gooch, B. (2007). *Team-based Pedagogy for Object-Oriented Game Design*. In Conference Proceedings SIGGRAPH 2007 Educator's Program.
6. Rankin, Y., Gooch, B., and Gooch, A. (2007). *Interweaving Gaming into Core Curriculum*. In Conference Proceedings of Microsoft Academic Days Game Development Conference.
7. Rankin, Y., Gold, R., and Gooch, B. (2006). *3D Role-playing games as language learning tools*. In Conference Proceedings of EuroGraphics 2006 Educator's Program, Vol. 25.
8. Rankin, Y., Gold, R., and Gooch, B. (2006). *Evaluating interactive gaming as a language learning tool*. In Conference Proceedings for ACM SIGGRAPH 2006 Educators Program.

### Activities to Support Teaching in Your Academic Unit and/or University

Dr. Gooch has started a lecture series in cooperation with Microsoft Research to bring distinguished scholars to the University of Victoria. In 2007 two Microsoft researchers gave computer science education talks.

### Presentations on Teaching and Learning

1. Gooch, B. and Rankin, Y. (2007). *Anchoring Object-Oriented Programming to Game Design*. Microsoft Faculty Summit. July 15 – 17. Seattle, WA.
2. Rankin, Y. and Gooch B. (2007). *Game Design: Recruiting African American Students to Computer Science* Journal of Urban Learning Technology Conference, October 19, 2007, Baltimore, MD.
3. Rankin, Y., Lechner, T., and Gooch, B. (2007). *Object-Oriented Programming in the Context of Game Development*. Annual Conference of the National Society of Black Engineers, Columbus, OH.
4. Rankin, Y. and Gooch, B. (2006). *Gaming as a Second Language Learning Tool*. Annual Conference of the National Society of Black Engineers, Pittsburgh, PA.
5. Rankin, Y. and Gooch B. (2005). Embodied conversational agents as role models for mainstream literacy. Northwestern University Black Graduate Student Association 9th Annual Research Symposium Oral Presentation April 2005, Evanston, IL.

### Awards Related to Teaching

Northwestern University, Robert R. McCormick School of Engineering, *Best Teacher of the Year 2006*

## Grants Related to Teaching

Dr. Gooch has received \$405,300 (funds, hardware and software) to support teaching and research in teaching at the University of Victoria. Dr. Gooch is one of the only *males* to receive more than one grant from the Computing Research Association's Committee on the Status of Women in Computing Research Collaborative Research Experience for Undergraduates program (CRA-W CREU).

- Collaborative Research Experience for Women (CRA-W CREU), \$9,500: *Save the Frogs: Entertaining Educational Games for Zoo Exhibits*
- Microsoft Research, \$80,000: *The Future of Exercise*
- University of Victoria Teaching and Learning Center, \$6,000: *Research Teams: Fundamentals and Management*
- Microsoft Research, \$80,000: *Game Development on Multiple Hardware Platforms*
- Collaborative Research Experience for Women (CRA-W CREU), \$3,500: *Visualizing Uncertainty in Archeological Reconstruction using Non-Photorealistic Rendering*
- Microsoft Research, \$11,000 (MSDN Pro Software): *The Future of Exercise*
- Life Fitness, \$7,800 (3 recumbent Lemond Fitness bikes): *The Future of Exercise*
- Sony-Online, \$7,500 (20 seats for Everquest): *Interactive Gaming as a Tool for Learning French*
- Valve, \$200,000 (20 copies of the Steam Engine Software): *Interactive Gaming for Object Oriented Software Development*

## 5 Additional Teaching/Supervisory Activities

Professor Gooch is involved in two types of outreach activities, scholarly and community outreach.

### Scholarly Outreach

Dr. Gooch currently co-maintains a Non-Photorealistic Rendering (NPR) web page that contains links to all of the people and institutions currently involved in this research. The webpage also serves as a computer model and research paper repository for this subfield of computer graphics. In addition he has distributed computer code for silhouette extraction, computer painting, human perception, and provide fMRI data for volume visualization. This data and code is used in graphics and visualization courses around the world.

### Community Outreach

**Anamatronics Workshop:** Dr. Gooch is working with Dr. Paul Deitz of Microsoft to create the curriculum and software to introduce grade school students to Engineering through Animatronics. Animatronics is the art and science of making robotic characters that appear to be alive. The best known examples are the many robotic creatures found in Disney theme parks. In the Animatronics Workshop, grade school students create their own animatronic shows from scratch. In 2008, 17 grade school students participated in the program at the University of Victoria.

**Computer Graphics in Local Schools:** Traditional college students are a subset of our broader audience. Therefore, Dr. Gooch has created a multimedia presentation on computer graphics which he shows at local senior high and junior high schools. He has also shown this presentation to "at risk" sixth graders with good results. He created a six-page booklet on computer graphics and the people involved for these younger students to take home.