

MARIA C.R. HARRINGTON

CONTACT INFORMATION

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EDUCATION

PhD. Information Science, 2008

Information Sciences and Technology Program, School of Information Sciences,
UNIVERSITY OF PITTSBURGH, Pittsburgh, PA.

Dissertation Title:

“Simulated Ecological Environments for Education (SEEE): A Tripartite Model Framework of HCI Design Parameters for Situational Learning in Virtual Environments.”

Committee Members:

- **Dr. Peter Brusilovsky (Chair), Professor, Information Sciences**
- Dr. Marek J. Druzdzel, Professor, Information Sciences
- Dr. Toni Carbo, Professor, Information Sciences
- Dr. Tony Debons, Professor, Information Sciences
- Dr. Susan Kalisz, Professor, Department of Biological Sciences
- Dr. Kevin Crowley, Professor, Department of Education and Learning Research and Development Center

Specialization:

- Human Computer Interaction and Human Factors in System Design
- Virtual Ecological Environments and GIS Simulations
- Knowledge Acquisition Environments
- Computer Graphics and Art

Master of Science (MS) in Information Science, 1990

Information Sciences and Telecommunications Program, School of Information Sciences,
UNIVERSITY OF PITTSBURGH, Pittsburgh, PA.

Specialization:

- Graphical User Interface Design and Development
- Data visualization
- Data exploration
- Image databases
- Multi-media applications

Bachelor of Science (BS) in Economics, 1988

CARNEGIE MELLON UNIVERSITY, Pittsburgh, PA.

- **Economics Major:** Focused on macroeconomics computer modeling systems.
- **Art Minor:** Art studies concentrated on computer 2D and 3D systems application to "electronic paintings."

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GRANTS & AWARDS

National Science Foundation, 2006:

Collaborated with Professor Susan Kalisz and Senior Research Associate Jessica Dunn, Department of Biological Sciences, University of Pittsburgh. In July 2006, they submitted a second proposal, and a part of that proposal included using their field data from Trillium Trail to develop an interactive software program for elementary school children and future development of the user-interface and system architecture of the SEEE system.

Celebration of Innovation, 2006:

University of Pittsburgh, Office of the Provost and the Office of Technology Management. An event recognizing innovated and creative individuals whose research is resulting in intellectual property for licensing and start-ups.

NSF Travel Grant Award 2006:

Travel grant to ACM Designing Interactive Systems (DIS) Conference, Pennsylvania State College, State College, PA.

The 30th Annual Honors Convocation 2006:

University of Pittsburgh. Honored as one of the outstanding students of the university.

ESRI GIS Mapping and Software Travel Grant Award 2005:

Travel grant to the Conference on Spatial Information Theory (COSIT).

Allen Kent Award. School of Information Sciences. University of Pittsburgh. 2005:

Annual award presented to a graduate student who makes an outstanding contribution to the program.

Teaching Fellow, School of Information Sciences. University of Pittsburgh. 2003-8:

A competitive and full scholarship with stipend for PhD research and study and teaching responsibilities.

Planning and Innovation Grant, Holyoke Community College, Holyoke, MA. 1997.

Develop a web-based framework for online, multimedia, course material for the delivery of curriculum. Solution generalized and shared with other faculty in the college.

IBM Grant for Education and Innovation Award, Rotman School, MBA Program, University of Toronto, 1991-1992.

Developed system that allowed for custom video-clip editing and augmentation used to enhance student learning in conflict management, meeting management, leadership and communication skills. Played key role in securing second stage funding.

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RESEARCH STATEMENT

The main direction of this research is theoretical and firmly framed in the domain of human-computer interaction. The PhD investigation, “Simulated Ecological Environments for Education (SEEE): A Tripartite Model Framework of HCI Design Parameters for Situational Learning in Virtual Environments,” is into 3D user-interfaces and the interplay of virtual environments, simulations, content, the mental model of the user, and the search, navigation, augmentation, annotation possibilities of the user-interface. Qualitative and quantitative methods and causal models are used to explain the role that ecological context has in the dynamic interaction with cognitive models, and is at the core of this research program. This is an aggressive research program that requires collaboration between computer scientists, psychologists, educators, and biologists. The dissertation research aim is to use qualitative data fitting techniques to investigate the design parameter interaction with mental models and thus evaluate the SEEE Tripartite Model. The future of the research will build on the framework and can represent different kinds of front-ends for simulations. Simulations that represent different scenarios of future realities based on decision support systems and social-environmental analysis. The capability to see the results of different parameters in a high fidelity computer graphics model will be a very powerful decision support system. Unlike the more abstract visualizations, these types of visualizations will empower policy makers to understand the environmental impacts of choices. Public outreach is an important part of this research and envisioned to be a critical component of this work.



RESEARCH EXPERIENCE

Virtual Trillium Trail Field-Trip Project: Overview of Virtual Reality for Elementary School Science, Ecology and Art Education. The work has contributed to the understanding of the complex interaction of geo-spatial exploration, inquiry, emotional reactions and learning impacts in real and virtual spatial cognitive ecologies. Future work will be in the development of search and navigation tools that support children in

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independent exploration and intrinsic, deep learning and acts of creation. The project has collaborated with the Audubon Society of Western Pennsylvania, at Beechwood Farms and students from local schools.

Generating Virtual Ecological Environments from Biological Data Sets of Ecologies, Project. This work has pioneered new computer science virtual ecology generation processes, approaches and techniques. The design and development of interest are realistic terrain modeling, automatic and semi-automatic ecological data set modeling and rendering, and plant modeling and rendering of virtual trees, plants and flowers in a statistically accurate distribution.

COLLABORATIONS:

Department of Biological Sciences

A collaboration to visualize biological data, with Professor Susan Kalisz and Senior Research Associate Jessica Dunn, Department of Biological Sciences, University of Pittsburgh. In July 2006, we submitted a second proposal to the National Science Foundation, part of that proposal includes using their field data from Trillium Trail to develop an interactive software program for elementary school children.

Audubon Society of Western Pennsylvania (ASWP)

The Audubon Society is a premier environmental education organization providing year-round nature and environmental education programming to students, children, families, adults and teachers. The collaboration with the naturalists resulted in a model of the content ontology of a real world field-trip to Trillium Trail, required to construct the virtual Trillium Trail field-trip.

TEACHING STATEMENT

Creating an environment of success and intrinsic motivation is of paramount importance. Class teaching objective is to help students to learn more, have higher retention rates, and to do so with a lower stress level. Each curriculum designed and class experience is project and problem based, drawn heavily on over ten years of industry experience and novel, exploratory research in the respective fields. The teaching goal is to make the theory interesting and relevant for each student. Classroom instruction has ranged from large introductory sections with over 100 students to small labs with 11 or so students.

The average section size has been around 45 students per class. About 30 sections have been taught and about fifteen students have been mentored and advised as independent studies. Many students have been placed in internships, and career counseling and advising for graduate work and career planning has been provided. I believe in empowering every individual and assisting them in achieving their highest potential. As a teacher and as an advisor I am in the unique position to help. My philosophy is to invent and create, as it is the fountainhead for all wealth.

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TEACHING EXPERIENCE

ADJUNCT PROFESSOR OF ART & DESIGN. (May 2009 - Present)

Art & Design Division, Chatham University, Pittsburgh, PA

Adjunct Professor responsible for teaching MFA graduate classes in new media technologies of Web, Web 2.0, Internet, 3D Modeling, Visualization, Animation, and Virtual Reality classes. The technology convergence and impact on humanity, society, economies, governments, and the Earth's ecology is covered in the theory, practice, and projects.

FACULTY OF COMPUTER SCIENCE. (January 2009 – May 2009)

Department of Computer Science, Slippery Rock University, Slippery Rock, PA

Temporary faculty teaching introductory courses in computer science. Combined lecture notes with online demonstrations, labs, interactive tutorials, and multi-media to enhance learning experience in computer information systems and technologies.

ADJUNCT PROFESSOR & TEACHING FELLOW. (2000-2008)

School of Information Sciences, University of Pittsburgh. Pittsburgh, PA.

Over 25 sections taught. Taught introductory course in Information Science, Human Computer Interaction, Human Factors in System Design, Independent Studies and User Centered Design, with official teaching evaluations consistently ranking above average to excellent. Combined lecture notes with online demonstrations, labs, interactive tutorials and multi-media to enhance learning experience and expose students to possibilities inherent in Internet systems and technologies.

ADJUNCT PROFESSOR

Holyoke Community College Holyoke, MA. (1997)

Taught introductory course in computer concepts. Utilized newly emerging Internet tools and demonstrations as fundamental component of classroom lectures and discussions. Won planning and innovation grant; developed web framework for online, multimedia course materials used by all college educators in institution.

Teaching Specialization:

- Information science
- User-centered-design
- Human-computer interaction
- Human factors and system design
- User interface design – multidisciplinary approach to design patterns
- 3D user interfaces – new user interface design for spatial navigation
- Virtual environments and simulations
- Building virtual worlds – virtual realities, environments, and augmented
- Data derived virtual ecologies and simulations
- Information visualization of dynamic data
- Software product marketing
- Web design – interactive graphic design and Flash
- Web services, service oriented architecture and mash-ups for Web 2.0
- Social and economic impacts of e-commerce in the digital rights management age
- Art with 3D computer graphics tool and technologies

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INFSCI 1052 HUMAN/COMPUTER INTERACTION (2000- 2006)

Introduces principles and programming of interactive systems. Interaction techniques surveyed and incorporated in the design in interfaces. Prerequisites: (INFSCI 0015 or INFSCI 0017) and (INFSCI 1042 or INFSCI 1044)

- **Teaching Fellow, Adjunct and Visiting Lecturer**
- ***Curriculum designed and implemented*** to cover the process of software design and development as a user centric approach. HCI theory, real world experience and exploratory research are covered. Projects designed to facilitate the application of theory and practice. Mastery of user ethnography, prototyping and web-centric interactive systems are expected.
- High-level undergraduate course.
- Project based class.
- Occasional masters student audit or enrolment with permission.
- Over 21 sections taught with average class size of 45 students per section.
- **Distance Education mode taught. (Summer 2005 and Summer 2006).**

INFSCI 1052 USER CENTERED DESIGN (2007-2008)

Part of the new curriculum. Replaces HCI. Introduces principles and programming of interactive systems. Interaction techniques are surveyed and incorporated in the design of interfaces. Prerequisites: (INFSCI 0015 or INFSCI 0017) and (INFSCI 1042 or INFSCI 1044)

- **Teaching Fellow**
- ***Curriculum designed and implemented*** to cover the main concepts and outcomes from HCI class with more of an emphasis on user profile, design and prototyping.
- High-level undergraduate course.
- Project based class.
- Occasional PhD student audit with permission.

INFSCI 1044 HUMAN FACTORS IN SYSTEM DESIGN (Fall 2005)

Examines human-machine designs with special emphasis on human-computer interaction. Topics center on how to analyze, create, and improve equipment and environment to be compatible with human capabilities and expectations. (Prerequisites: INFSCI 0010/0011 and an introductory psychology course, or permission of instructor)

- **Adjunct Professor, University of Pittsburgh Greensburg Campus.**
- ***Curriculum designed and implemented*** to cover the main concepts and outcomes from traditional human factors to exploratory research in human factors and emotion. Surveyed theoretical cognitive models from Wickens, Anderson and Ensley for situational awareness up to more exploratory research on emotion and Artificial Intelligence with respect to robot system architecture.
- Project based class.
- Undergraduate course taught.

INFSCI 0010 INTRODUCTION TO INFORMATION SCIENCE (2000-2003)

Introduction to the concepts, principles, and skills of Information Science for students with no previous programming experience. Topics include: the need for information, the use of information, data collection, coding, storage and retrieval, information processing,

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information display, and the evaluation of information. Not open to students who have taken INFSCI 0011. (Prerequisites: MATH 0031 or MATH 0032 or equivalent)

- **Teaching Fellow, Adjunct and Visiting Lecturer**
- *Curriculum designed and implemented* to cover the field of Information Science. Augmented text book with many real world examples and internet resources.
- Traditional undergraduate course with weekly readings, home-works, and exams.
- Occasional masters student audit or enrolment with permission.
- taught with class size range from 10 to 100 students per section.

INFSCI 1080 INDEPENDENT STUDY IN INFORMATION SCIENCE

Development of readings, research, practical implementation of a system, or other form of study as arranged between student and instructor. Prerequisites: at least five information science courses, 3.00 cumulative GPA, and consent of faculty advisor and faculty sponsor.

- **Teaching Fellow, Adjunct and Visiting Lecturer**
- **Advised students on independent research, application development or product development.**

INFSCI 1080 INTERNSHIP IN INFORMATION SCIENCE

Supervised work in an information environment providing a frame of reference for understanding and an opportunity to apply the skills, methodologies, and theories presented in Information Science courses.

- **Teaching Fellow, Adjunct and Visiting Lecturer**
- **Acted in the role of product manager and advisor when needed**

ACADEMIC SERVICE

- ACM SIGGRAPH 2007 – Volunteer to review papers
- Volunteer for SIS I-Fest – A school fair for prospective students, software posters, software demos, and entertainment Gaming night
- Volunteered for SIS Alumni Network to review resumes and provided interview coaching

OTHER UNIVERSITY EXPERIENCE

SENIOR CONSULTANT

Legal Studies Department and Center for Information Technology and Dispute Resolution. University of Massachusetts, Amherst, MA. 1997.

Spearheaded system design and development of web-based “Online Ombudsmen Office” that served as effective tool for conflict resolution, policy development, and issue mediation tasks.

SENIOR CONSULTANT

Rotman School, MBA Program, University of Toronto, Toronto, Ontario. CAN. 1991 – 1992.

Consulted with university administrators in MBA School to provide expertise and recommendations for technology tools to facilitate student understanding of core “soft skills” concepts. Developed system that allowed for custom video-clip editing and

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augmentation used to enhance student learning in conflict management, meeting management, leadership, and communication skills. Played key role in securing IBM grant funding for next stage of project development. Presented software at an educational and technology conference.

ORGANIZATIONS

- ACM SIGCHI (Special interest group in computer-human interaction)
- ACM SIGGRAPH (Special interest group in computer graphics)

INDUSTRY EXPERIENCE

Professional experience includes financial, strategic, information technology and human-computer interaction activities for global corporations and institutions such as: PNC Financial Services Group, The Canadian Imperial Bank of Commerce, Fidelity Investments, University of Toronto, Alias/Wavefront-Autodesk, DataViews-GE Fanuc, and Federated Investors. After more than ten years in software design and development of dynamic data visualization tools, and real time decision support tools for the international C3I and Financial markets, there is continued interest in advanced graphical user interfaces. Current interests are in models of complexity, simulation, imagination and art, virtual and real spaces of nature, especially as sources for educational applications.

VP BUSINESS DEVELOPMENT

Active Interface, Inc. Pittsburgh, PA 1991 – 2005

SENIOR PROJECT MANAGER, BUSINESS PLANNING & DEVELOPMENT

PROGRAM MANAGER, ADVANCED INFORMATION SYSTEMS / FEDERATED SERVICES, INTERNET SERVICES GROUP

Federated Investors Pittsburgh, PA 1998 – 1999

SENIOR PROJECT MANAGER, BUSINESS PLANNING & DEVELOPMENT

STRATEGIC SYSTEMS GROUP

Fidelity Investments Boston, MA 1995 – 1996

PRODUCT MARKETING MANAGER DATAVIEWS WORLDWIDE

DataViews, Inc. (Subsidiary of GE Fanuc) Northampton, MA 1992-1994

MANAGER, INFORMATION TECHNOLOGY GLOBAL MONEY MARKETS

DEPARTMENT, INVESTMENT BANK Canadian Imperial Bank of Commerce Toronto, Ontario 1991 – 1992

INTERNATIONAL RESEARCH ECONOMIST, ECONOMICS DEPARTMENT

Pittsburgh National Bank Pittsburgh, PA 1988- 1989

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PUBLICATIONS:

Harrington, M.C.R. (*under review 2009*). Empirical evidence of priming, transfer, reinforcement, and learning in the real and virtual trillium trails.

Harrington, M.C.R. (*accepted-in press 2009*). Meta-ontologies for learning in virtual and augmented realities. *ACM-SIGCHI IDC'09 The 8th International Conference on Interaction Design and Children Workshop on Children and Mobile Technology: Interface Development for Mobile Touch Devices*. June 3-5, 2009. Como, Italy.

Harrington, M.C.R. (*accepted-in press 2009*). An ethnographic comparison of real and virtual reality field trips to Trillium Trail: The salamander find as a Salient Event. *Children, Youth and Environments: Special Issue on Children in Technological Environments*, **19** (1): <http://www.colorado.edu/journals/cye>.

Harrington, M.C.R. (2008). Simulated Ecological Environments for Education (SEEE): A Tripartite Model Framework of HCI Design Parameters for Situational Learning in Virtual Environments. *Dissertation Abstracts International*. July 17, 2008. University of Pittsburgh, Pittsburgh, PA.

Harrington, M.C.R. (2006). Situational learning in real and virtual space: Lessons learned and future directions. *ACM SIGGRAPH'06*. July 30-August 3, 2006. Boston, MA.

Harrington, M.C.R. (2006). Trees of life: Models of children's creative processes. *ACM DIS'06 Doctoral Consortium*. June 28, 2006. State College, PA.

Gennari, J., Harrington, M., Hughes, S., Manojlovich, M. and Spring, M. (2003). Preparatory observations on ubiquitous knowledge environments: The cyberinfrastructure information ether. *NSF Post Digital Library Futures Workshop*. Chatham, Massachusetts.

CONFERENCE PRESENTATIONS:

Harrington, M.C.R. (2009). The Virtual Trillium Trail: An educationally effective simulation for ecology education. *The Pennsylvania Association of Environmental Educators 2009 Conference*. March 19 - 21, 2009. Entriken, PA.

Harrington, M.C.R. (2008). A demonstration of Virtual Trillium Trail, a simulation of a fourth grade field trip to a wildflower reserve for ecology education. *Open Learning Interplay Symposium 2008. Demos and Poster Session*. March 10-13, 2008. CMU, Pittsburgh, PA.

Harrington, M.C.R. (2008). A demonstration of Virtual Trillium Trail, a simulation of a fourth grade field trip to the Trillium Trail Wildflower Reserve. *The Pennsylvania Association of Environmental Educators 2008 Conference*. February 29 and March 1, 2008. Ligonier, PA.

Harrington, M.C.R. (2006). Situational learning in real and virtual space: Lessons learned and future directions. *ACM SIGGRAPH'06*. July 30-August 3, 2006. Boston, MA.

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Harrington, M.C.R. (2006). Trees of life: Models of children's creative processes. *ACM DIS'06 Doctoral Consortium*. June 28, 2006. State College, PA.

Harrington, M. (2005). Virtual Beechwood: Simulated Ecological Environments for Education. *Conference on Spatial Information Theory'05. Doctoral Consortium Abstracts*. September 14-18, 2005. Ellicottville, New York.

INVITED TALKS:

Harrington, M.C.R. (2008). Simulated Ecological Environments for Education: Past and future realities. November 7, 2008. Chatham University, Pittsburgh, PA.

Harrington, M.C.R. (2008). Tips and tricks of building Simulated Ecological Environments for Education: User centered design, activity analysis, prototyping, and techniques. Carnegie Mellon Entertainment Technology Center. October 15, 2008. CMU, Pittsburgh, PA.

Harrington, M.C.R. (2008). The Virtual Trillium Trail: The value of Freedom and Fidelity in the child-computer-environment interface. *Carnegie Mellon Human-Computer Interaction Institute Seminar Series*. September 17, 2008. CMU, Pittsburgh, PA.

Harrington, M.C.R. (2008). The poetics of games: Art, poetry, and storytelling in modern game design. The Art Institute of Pittsburgh. January 14, 2008 Pittsburgh, PA.

Harrington, M.C.R. (2007). Virtual Trillium Trail and opportunities for education in metaverses and virtual environments. Phipps Conservatory and Botanical Gardens, Phipps Education Committee. November 19, 2007 Pittsburgh, PA.

Harrington, M.C.R. (2007). Generating high fidelity, 3D computer graphic models from transects and plot population data for Trillium Trail. *University of Pittsburgh, Department of Biological Sciences: E & E Seminar Guest Lecture Series*. October 24, 2007. Pittsburgh, PA.

TECHNICAL REPORTS:

Harrington, M.C.R. (2006). Simulated Ecological Environments for Education (SEEE): A Tripartite Model Framework of HCI design parameters for situational learning in virtual environments. *Unpublished Dissertation Proposal*, May 2006. School of Information Sciences, Department of Information Sciences and Telecommunications. University of Pittsburgh. Pittsburgh, PA.

Harrington, M.C.R. (2005) Simulated Ecological Environments for Education (SEEE). *Unpublished State of the Art Literature Review Component of the Comprehensive Exam*, August 2005. School of Information Sciences, Department of Information Sciences and Telecommunications. University of Pittsburgh. Pittsburgh, PA.