MARIA C.R. HARRINGTON

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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), Associate Professor, Information Sciences**
- Dr. Marek J. Druzdzel, Associate 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, Associate Professor, School of Education

Specialization:

- Virtual Reality and Environments used as Educational Simulations (Field Trips)
- Virtual Environments for Informal Learning and the 3D Web
- Video Games and Internet Metaverses used for Knowledge Acquisition
- Human Computer Interaction and Human Factors in System Design for the Child
- Video Games and Internet Metaverses used for 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

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

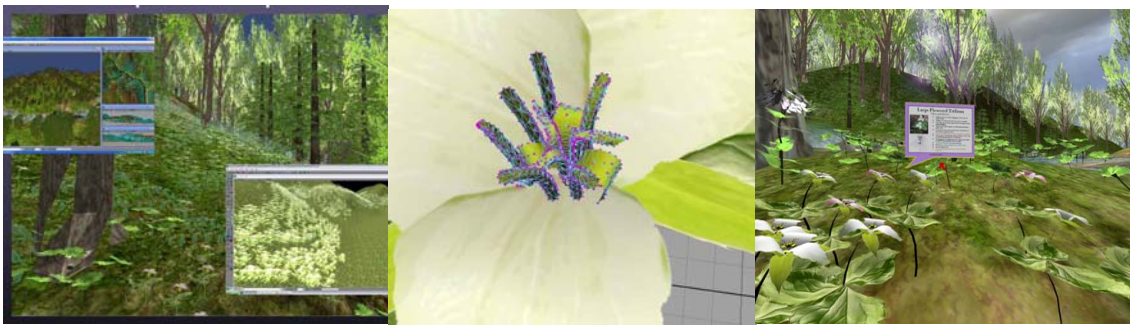
RESEARCH PROJECTS:

Virtual Trillium Trail Project: Virtual Reality for Elementary School Informal Learning in Real and Virtual Field Trips in 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 informal learning environments, both real and virtual. Future work will be in the development of search and navigation tools that support children in 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.

The research consisted of real world activity studies, tests in classrooms and tests at home in informal learning environments. The research was conducted in 2007, and three journal articles are published or under review. This research should be of high importance to funding agencies. The next steps are to understand the impact on the brain, in-situ, with data collected with fMRI output given different virtual world paramaters as input.

Generating Virtual Ecological Environments from Biological Data Sets.



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.

RESEARCH STATEMENT

The main direction of this research is theoretical and firmly framed in the intersection of three domains: virtual reality, learning sciences, and 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," was an empirical investigation into the interplay of virtual environments, and the mental model of the child, and the search, navigation, augmentation, annotation possibilities of the user-interface. Future work will investigate qualitative and quantitative methods, and causal models to explain the role that ecological context has in the dynamic interaction with cognitive models. This is an aggressive research program that requires collaboration between computer scientists, psychologists, educators, and biologists. The 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.

COLLABORATIONS

Audubon Society of Western Pennsylvania (ASWP) 2003 - Present

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.

Department of Biological Sciences 2004 - Present

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.

YMCA of Pittsburgh, PA, 2009 - present

The YMCA of Pittsburgh have held a kick off meeting to start the planning process to bring the software into their after school and summer programs, pending funding.

TEACHING EXPERIENCE

Twelve years of successful teaching, instruction, mentoring, and curriculum development is brought to the classroom. Excellent student recommendations and evaluations give evidence of success and independent teaching ability. Is comfortable in a wide range of classes, styles and demographics, as is evidence from teaching as few as 10 students to 150 students per class, as few as one class per term to as many as four per term, in-class, lecture, in lab project based learning, blended, to 100% distance mode. Is an established, competent, and independent instructor in designing, developing, and delivering the highest quality classes for undergraduate and graduate students.

ADJUNCT PROFESSOR & VISITING LECTURER OF ART & DESIGN. (May 2009 – *Present*)

Art & Design Division, Chatham University, Pittsburgh, PA

Designed class and curriculum, and independently taught MFA class on *New Media*, and taught undergraduates on *Media Literacy.* The issues surrounding technology convergence and impact on humanity, society, economics, and the Earth's ecology is covered in the theory, practice, and project.

FACULTY OF COMPUTER SCIENCE. (January –May, 2009, January 2010 - *Present*)

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

Temporary faculty teaching introductory courses in computer science, *Computer Concepts* and *Productivity Software*. Combined lecture notes with online demonstrations, labs, interactive tutorials, and multi-media to enhance learning experience in computer information systems and technologies. ***Official evaluations ranked higher than department average, reaching 90% student satisfaction.***

ADJUNCT PROFESSOR, VISITING LECTURER & TEACHING FELLOW. (2000-2008)
School of Information Sciences, University of Pittsburgh. Pittsburgh, PA.
Over 25 sections independently taught, with over 1,000 students.
Designed class and curriculum, and independently 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 when directly compared to the department in undergraduate Information Science and Technology***. 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.

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.

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 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.

ACADEMIC SERVICE

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

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ORGANIZATIONS

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

VOLUNTEER

- **Board Member of the Fox Chapel Borough Parks Commission.**

INDUSTRY EXPERIENCE
Professional experience includes financial, strategic, information technology and human-computer interaction activities for global corporations and institutions. 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.

Principle Founder, CEO & CTO
VIRTUAL FIELD TRIPS, INC.
Pittsburgh, PA 2009 – *Present*
Software development and publication of educational simulations for learning.

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

PEER REVIEWED PUBLICATIONS:

Harrington, M.C.R. (*under review 2009*). The Virtual Trillium Trail and the Empirical Effects of Freedom and Fidelity on Discovery-based Learning.

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

Harrington, M.C.R. (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. (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* 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*.

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, USA.

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, USA.

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 & INVITED TALKS:

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 USA.

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

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 USA.

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 USA.

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 USA.

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 USA.

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 USA.

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 USA

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*. October 24, 2007 Pittsburgh, PA, USA.

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, USA.

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, USA.

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, USA.

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, MA, USA.

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.