



## **SABBATICAL PROJECT REPORT – LETTER OF TRANSMITTAL**

### **Serious Games: The Confluence of Virtual Reality, Simulation & Modeling, and Immersive Education**

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August 31, 2009

Dear Reader:

The purpose of my sabbatical leave was to expand my teaching, research and *Journal* editing horizons to include the field of *serious computer games*. I focused on bringing *computer simulation & modeling* and *virtual reality* together to support the teaching of *serious games* in higher education. The expertise that I developed as a result of this work will enable me to be able to make substantive contributions to: the study of computer simulation and modeling via serious games; Southern New Hampshire University's Computer Information Technology curriculum; the *Journal of Educational Computer Research* where I am the Executive Editor.

#### **My sabbatical activities included:**

- Literature research and study.
- Participation in serious games and virtual worlds.
- Writing a draft paper, compiling bibliographic and other Appendices, and creating a draft IT630 instructional module.

#### **The products of my sabbatical are:**

- **Part I** is a draft paper, "Discrete-event Simulations in Virtual Worlds: A Future for Serious Games," that situates the field of serious games in the constellation of games, simulation-games, simulators and highly interactive virtual environments. It clarifies the field of research, describes a conceptual framework to view some of the extant literature, contains a glimpse into work being done, and proposes augmenting traditional computer simulation and modeling education by embedding discrete-event simulation into a serious collaborative and/or cooperative game which in turn is embedded in a virtual world running on a cloud computing platform.

- **Part II** is comprised of Appendices that contain: a comprehensive annotated bibliography (i.e., includes abstracts and summaries where available) of game related articles and books; a list of game-related journals and magazines; a list of game-related conferences and proceedings; a list of virtual worlds; and a list of game engines. These Appendices contain over 1,500 entries that can be used as a resource for my future work and by other researchers.
- **Part III** is a draft of a serious games instructional module that I plan to incorporate into IT630 - Computer Simulation & Modeling, a required course in the MS Computer Information Technology major. The module would come toward the end of the course after students have sufficient experience in simulation and modeling using Arena software. The goal is to introduce these graduate students to the field by having them do pre-class readings and trying out IBM's Innov8 2.0 simulator in the context of business process re-engineering and management.

In the class session students divide into groups to explore and synthesize questions about their readings and simulator experience, receive instruction on serious games and its place in simulation and modeling. At the end, I lead the class in a brainstorming session about possible futures in the combined fields of serious games and simulation modeling. Post-module homework assignments are included. The module is in the form of PowerPoint slides with embedded notes.

#### The Process:

In order to learn more about this field and come up with new ideas, I needed to understand what others already know. This entailed a major effort to collect published literature on a number of different but related areas: games, simulators, simulation-games, virtual reality, and virtual worlds. The literature search included library data-bases, government publications, dissertation abstracts, professional association conference proceedings, books, and internet searches. I tried to avoid non-refereed popular press articles and mass-marketed trade books.

The Appendices in my report comprise 166 pages of more than 1,500 items and are meant to help me and other researchers get a head start on future research. I cannot claim to have read all of the research articles listed, but at the very minimum, I did read the available abstracts or summaries, portions of each article, or the entire article itself before including it in the list. This was a mammoth undertaking. Like all bibliographic compilations, it has a stopping point: August, 2009.

Since my work was on games, I made it a point to play various serious and non-serious games to get a feel for what I was researching. Full disclosure compels me to say that I am not a 'gamer.' In the distant past, I've played video games like the original Pong, Super Mario Brothers, Myst and SimCity 1 with my children when they were young. More recently I tried out simulations like Virtual Leader and explored virtual worlds like Second Life and Active Worlds when I considered using them in some of my courses several years ago.

During my sabbatical leave I “played” a number of games and simulations, including: Virtual Leader 2007, IBM’s Business Process Management simulator – INNOVA8 2.0, SIMS 3, SimCity 4, NeverWinter Nights 2, World of Warcraft, and America’s Army 3. I also re-explored the virtual worlds of Second Life, and tried out Active Worlds and There. I test drove two commercial game engines: the NeverWinter Nights 2 Aurora Engine (via Mask of the Betrayer) and Game Maker. And I utilized a number of computer programming languages to create my own games from scratch: Greenfoot, Alice 2.2, Alice 3, Scratch, and StarLogo TNG. This sabbatical leave gave me the opportunity to advance my knowledge in a number of discrete-event simulation software packages: ProModel and Arena.

As you can see, I immersed myself in the gaming and simulation culture to get a personal feel for them and to appreciate how games and simulations can be used in educational environments. I think that games are hard to describe in a meaningful way if one does not have any gaming experience to draw upon. It would be similar to trying to tell someone what it’s like to ride a bicycle without ever having ridden one.

Shortly before and during my sabbatical period, I attended a number of professional society conferences and workshops where games research was presented and discussed: Boston Digital Media Summit: Enabling the Age of Immersive Education in 2008; Winter Simulation Conference in 2008; Duke University Alice Symposium and Media Computation Workshops in 2009; ACM’s Innovation & Technology in Computer Science Education Conference (ITiCSE-Paris) in 2009. I personally experienced virtual reality at Duke’s immersive virtual environment (DiVE) in 2009 where I went for a 15 minute ‘walk’ with a virtual character and experienced a fall from a bridge into a cavern below.

Just prior to my sabbatical leave I co-authored a workbook that teaches how to use the Alice programming language to create 3D virtual world games (Seidman, Funk, Isaak, Lewis, 2009). This led to a number of game-related presentations at the Duke University Alice Symposium (Seidman, 2009a) and ITiCSE- Paris (Seidman, 2009b) during my sabbatical leave.

I had the privilege to speak personally with two of the leading figures in the serious games field: Christopher Dede, the Timothy E. Wirth Professor of Learning Technologies at Harvard, and with Clark Aldrich who is a simulation designer, researcher, and analyst. Aldrich’s definitive work, *The Complete Guide to Simulations and Serious Games* (2009) will be published in October 2009 – sadly, too late to be included in my sabbatical studies.

With a field this broad, there are undoubtedly things that escaped my view. And, of course no matter how hard one tries to be current, this sabbatical project can only be a snapshot of the field at this point in time. Work is moving very rapidly and one never knows whether or when a ‘killer app’ may appear that will be a ‘game’ changer (no pun intended!).

My sabbatical research greatly expanded my teaching, research and editing horizons. I am grateful to Southern New Hampshire University for supporting my sabbatical which gave me the time to focus my attention and to expand my scholarship and expertise.

Sincerely,

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#### References

Aldrich, C. (2009). *The Complete Guide to Simulations and Serious Games: How the Most Valuable Content Will be Created in the Age Beyond Gutenberg to Google*. NY: Wiley.

Seidman, R. (2009a). Alice via Interactive Game Programming. Duke University Alice Symposium 2009. Durham, NC.

Seidman, R. (2009b). Alice First: 3D Interactive Game Programming. *Proceedings of the 2009 ACM-SIGCSE Annual Conference on Innovation & Technology in Computer Science Education*. Universite Pierre et Marie Curie. Paris, France.

Seidman, R., Funk, P., Isaak, J. & Lewis, L (2009). *Fluency with Alice*. Boston: Pearson-Addison Wesley. Retrieved August 31, 2009, from [http://media.pearsoncmg.com/aw/aw\\_snyder\\_fluency\\_3/alice/index.html](http://media.pearsoncmg.com/aw/aw_snyder_fluency_3/alice/index.html).