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Simulation-based Learning: Workshops for Researchers and Educators in the Western United States, and the Pacific Rim

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Introduction

GOAL:

1. To develop a community of researchers and educators in Simulation-based Learning (S-b-L);
2. To explore fundamental issues and barriers to S-b-L, including integration into professional curriculum;
3. To promote evaluation of S-b-L in clinically-related learning environments;

ABSTRACT:
A series of eight workshops about Simulation and Game-based Learning were conducted during a two-year period. Speakers from the game industry, academia, and e-learning organizations discussed a wide range of topics. The programs and the attendee evaluations are summarized in this report. URL’s are provided for individual presentations.
Figure 1. Representatives images, from the first workshop, of the audience, a speaker, and a discussion panel.

Project Rationale:
The geographic constraints of travel time and cost, and reduced population density with fewer academic institutions in the Western Regions of the U.S. significantly limits active participation by West Coast researchers and educators in TATRC’s East Coast projects and activities focused on SBL in medical environments. Community-building activities in the Western Region are expected to develop a western region community, and to make such a community more visible to TATRC’s headquarters, and to researchers around the country and the world. We proposed that we would organize and hold quarterly workshops in the area of simulation and game-based learning, with planning, publicity, recruitment of guest speakers and participants, post-workshop publication and evaluation. SUMMIT (Stanford University Medical Media and Information Technologies) was awarded a competitive contract from TATRC (Tele-medicine & Advanced Technology Research Center) to conduct a series of workshops on these topics.

Workshops Held:

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**Simworkshops Website (http://simworkshops.stanford.edu/):**

A project web site was created with separate web sites for each workshop. The following pages show the home page for the project, indicating the key functionality available. The world map indicates the global reach of the workshops.
Figure 2. The home page for Simworkshops. During the project, the home page presented an overview of the next workshop. After project completion, the home page provides information about the vast range of content available on the site. Specifically, the About menu goes to project information; the Workshops menu gives access to each of the eight workshops, their slides, transcripts and videos, and the biographies of the speakers; the Readings menu accesses an organized reading list; and the Index menu is a list of all the
talks presented. An Attendee map was developed for the workshops, and a summary map is presented on this Home page.

Workshop Programs and Speakers:

Workshop 1: 1/25/05
Gaming & Simulation Based Learning: Applications in Medicine
Goal: Introduction of concepts and examples for S-b-L.
http://simworkshops.stanford.edu/05_0125/1_25.html

- Greg Mogel & Carla Pugh
  TATRC-West's Goals for the SBL project
- LeRoy Heinrichs, Parvati Dev
  Visions for the Future of Simulation Based Learning
- Michael Zyda, USC
  Perspectives on Gaming for Learning-America's Army
- Noah Falstein, Inspiracy Inc.
  Are we having fun yet? Designing a hit game
- Craig Brannon, Legacy Interactive
  Design of Real Life Games
- William Swartout, USC
  Games for Military Combat Training
- Kay Howell, The Learning Federation
  Research Roadmap for Simulation in Learning
- Ben Sawyer, Digital-Mill, Inc.
  Games for Health
- Panelists
  Game Design
- Panelists
  Game Environments
- Panelists
  Business Models
- James Rosser
  Games and Surgical Skills

Workshop 2: 6/14/05
Medical Surgical Education with Video Games
Goal: Extending the concept of Games and S-b-L to surgical training:
http://simworkshops.stanford.edu/Second_workshop.html

- Parvati Dev
  Overview, Games & Simulations- The Current Reality
- LeRoy Heinrichs
  Surgical Simulations as Games- Games as Preparation for Surgery
- Pat Youngblood
  Framework for Evaluation a Surgical Simulator or a 3D Virtual World

Workshop 3: 10/7-10/8/05
Designing Compelling Medical Games
Goal: Examining the different gaming platforms, the methods of procedure for game design and development.
http://simworkshops.stanford.edu/Third_workshop.html

- LeRoy Heinrichs
  State of the Art
- Bryan Bergeron, Harvard
  Game Design for Knowledge, Skills & Attitude Transfer
Byron Reeves, Stanford  Game Design for Engagement
Pauline Brutlag, Stanford  Game Genres-with Demonstrations
Bryan Bergeron, Harvard  Authoring Tools for Game Design
Chris Darken, Naval Postgrad School  Beyond America's Army- New Directions
Matt Kaufman, Forterra  Designing MORPGs (Multiplayer Online Role Playing Games)
Pat Youngblood  Testing Games that Teach
Sowmya Ramachandran, Stottler-Hencke  Artificial Intelligence
Walter Greenleaf, Greenleaf Medical  Applications in Rehabilitation Medicine

Workshop 4: 12/14-5/07
SUMMIT/TATRC Internal Workshop: Progress Assessment
Goal: To review the workshops of the past year and to assess progress towards research goals
http://simworkshops.stanford.edu/san_diego_workshop.html

Parvati Dev  Welcome & Overview
Carla Pugh, TATRC  Review of SUMMIT-TATRC Goals
Pat Youngblood  Evaluation of Workshops: Summary
Group Leaders  Analysis of January, June & October Workshops
Pauline Brutlag, Stanford  Design a Game: Session 1
Group Leaders  Group Presentations
Parvati Dev, LeRoy Heinrichs  Future Directions of a Framework for Research on Game-based Learning
LeRoy Heinrichs  Brainstorming of Research Projects
Pauline Brutlag  Design a Game: Session 2
Group Leaders  Group Presentations

Workshop 5: 1/23/06
Creating Games & Simulation for Learning
Goal: Comparing games and simulations; and understanding funding options
http://simworkshops.stanford.edu/Fifth_workshop.html

Carla Pugh & Harvey Magee, TATRC  TATRC Update
Joe Henderson, Dartmouth Univ.  Creating a Compelling Game
Noah Falstein, The Inspiracy  Deconstruction of a Game
Anders Larsson, Surgical Sciences  Deconstruction of a Simulator
Fred Kron, Univ. of Wisconsin  Medicine and Technology
Grace Huang, Harvard  From Virtual Reality to Realty: What next?
Laura Kusumoto & LeRoy Heinrichs  Massively, Multi-player, Online, Simulation MMOS
Harvey Magee, TATRC  Funding
David Shorrock, Forterra  Government Funding Initiatives and how to use them

Workshop 6: 8/24-8/25/06
Designing Case-based Learning for Virtual Worlds
Goal: Creating on line learning using the power of multiplayer games
http://simworkshops.stanford.edu/Sixth_workshop.html
Jeremy Bailenson, Stanford  Learning & Teaching among Virtual Humans
Pat Youngblood  Serious Games for Health
Pauline Brutlag, Stanford  Design Ideas from Commercial Online Role Playing Games
James Scarborough, Stanford  Windows into other Realities
Mike Korelenko, N. Ontario Sch. Med.  Half Life-2
Jeremy Kemp, Fielding Grad Univ.  Second Life
Laura Kusumoto, Forterra  OLIVE
LeRoy Heinrichs  Story Development for Modeling Virtual Patients
Parvati Dev  "Intelligent" characters in Virtual World
Lou Halamek, Stanford  Debriefing- After Action Review

Workshop 7:  8/28-8/30/06
Prototyping of Surgical Simulators using Open Source Simulation Software
Goal: To bring together surgeons and developers for a detailed discussion of surgical simulation software, the needs and the issues.
http://simworkshops.stanford.edu/Seventh_workshop.html

SUMMIT team  Welcome & Workshop Goals
Raj Aggarwal, Imperial College  Managing Expectations
David Gaba, Stanford  Realism in Simulation in Healthcare
Anders Larsson, Surgical Sciences  Realism in Surgical Simulation
Mika Sinanan, Univ. of Washington  Haptics in Simulation
Pat Youngblood  Framework for Evaluating Simulators
Kevin Montgomery, Stanford  Spring Simulation Platform
Yoshihiro Kuroda, Kyoto University  Virtual Reality Aided Surgical Simulation (VRASS)
Chris Sewell, Stanford  Overview of CHAI and Using the Haptic Device
Jeremie Allard, Paul Neuman, CIMIT  SOFA Development of an Open Framework for Med Simulation
Cenk Cavsoglu, Case Western Reserve  GiPSi Development framework for Surgical Simulation
Laura Pierce, Stanford  3D Imaging at Stanford

Workshop 8:  10/18/06
Panel on Simulation & Game-based Learning in Medicine
Goal: To bring together a global team of speakers and a global audience via Internet
http://simworkshops.stanford.edu/06_1018/program.html

Kay Howell, FAS  Simulation & Game Based Learning
Ross Horley, MedicVision  An Asian-Australian view of simulation
James McGee, Univ. of Pittsburgh  Case Based Learning with Virtual Patients
LeRoy Heinrichs & Pat Youngblood  Medical Teams in Virtual Worlds
Pamela Kato, The GameRx  Learning Games for Patients
Raj Aggarwal, Imperial College  Embedding Simulation into Curricula
Nabil Zary, Karolinska Institutet  Simulations for Assessment
Carla Pugh, North-Western Univ.  
Next Generation Surgery Simulation  
Jeremy Bailenson, Stanford  
Impact of Digital Avatars  
Parvati Dev  
Wrap-up
Results

The workshops were evaluated using three different assessment tools:

- Questionnaires distributed at the workshop, to attendees, asking for feedback about the quality of the workshop, (Formative Evaluation)
- Questionnaires distributed at the workshop, to attendees, asking for demographic information, about their knowledge of simulation and game-based learning, their familiarity with research in the field, and their own level of activity in the field. (Research)
- An Email survey, sent at the end of each project year, to all prior attendees, probing the impact of the workshops on their knowledge and activities. (Impact Evaluation)

Formative Evaluation of the workshops

These results are extensive, and are available on the SimWorkshops web site, linked from each workshop. The questionnaire is attached in Appendix A.

Research results

Our original research hypotheses were:
1) Researchers and educators who participate in regional workshops and receive the written reports will gain greater knowledge of simulation-based learning and of the research and development activities in the western region.
2) Professional networking among the researchers and educators at the workshops will generate increased collaborative projects and research in the western region.

We evaluated these hypotheses through questionnaires distributed to attendees at each workshop. The results are presented as summaries of our Year 1 and Year 2 investigations in Appendix B.

Impact Evaluation

E-mail Surveys of all Attendees:

We designed and implemented an email survey to assess the impact of these workshops on the participants’ knowledge, skills and productivity in this area. The brief survey was sent to all who attended the SUMMIT-TATRC workshops. The first survey was sent after the first five workshops to 200 participants (received 47 returns, a response rate of 24%). The second, identical, survey was sent after all eight workshops and a capstone session at MMVR 2007, to 166 participants (received 45 returns, a response rate of 27%). A summary of the results is presented in Appendix C.

Discussion

The responses to our research questionnaires and to our impact survey email demonstrate a high level of interest and learning among the participants over the two years of the project. The tables on page 20, for example, show that self-reported increase in knowledge changes by 2 points (on a 10 point scale) over the course of a year. Hands-on experience and working with colleagues score highest as a preferred way to learn a new area. The SUMMIT/TATRC workshops were rated as the next best approach in our first survey, and as comparable to some of the new, well-regarded conferences that have been started recently (Games for Health, Serious Games).
Creating and delivering the eight workshops was an exhilarating learning experience. The feedback on workshop quality was excellent. Specific suggestions on further community development, and on the need for more how-to workshops, indicates that there is considerable scope for training and conference sessions in simulation and game-based learning. We have worked closely with the management of the MMVR conference to create a new track on game technology and game-based learning, and hope that the baton will be passed to the program management of MMVR. We will continue to remain involved in that conference.

Acknowledgments: The superb management of the workshops was the work of Madhu Khanna, aided by Margaret Krebs and Mari Kieft. The technical support by Robert Cheng (computers), Kingsley Willis (webpages and videos) and Margaret Krebs (web pages), assured the success of Stanford workshops. The support of the Staff of Wallenberg Hall at Stanford enabled ready access and operations. James Westwood and Karen Morgan of the Aligned Management, Inc. organization and Lou Winant greatly facilitated the workshops at MMVR. We gratefully acknowledge the confidence and partial funding by TATRC.

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References

http://summit.stanford.edu
http://simworkshops.stanford.edu
Appendices

Appendix A

Evaluation of Workshop Quality

Questionnaire

SIM Workshop Evaluation
January 25, 2005

Please give us your honest feedback to help us plan for our next workshop.
1. What did you find most interesting about the workshop sessions you attended today?

2. What did you find difficult or unclear?

3. Did you feel actively involved in the sessions? Why or why not?

4. What have you learned that you think you can use in your work?

5. What follow up questions do you have?

6. What other feedback do you have for the workshop leaders?

Thank you for your participation!

Results
Results for each workshop are available on the SimWorkshops web site.
http://simworkshops.stanford.edu/