

**Learning with games and simulations: Examples, evidence and supporting technologies**  
**Symposium coordinator: David Kaufman, Faculty of Education, Simon Fraser University, Canada**

**ABSTRACT**

Computer-based games and simulations are widely regarded in the literature as promising learning technologies. However, integrating these activities into educational programs and evaluating their impact present many challenges in design, technological support, evaluation and implementation. This symposium presents five projects that address aspects of these issues and show the impact of games and simulations on health-related learning in clinical, classroom and professional education settings. These include a multimedia Parcheesi game used to teach teenagers about sexually transmitted infections; a series of games for children managing chronic diseases including Inflammatory Bowel Syndrome; the COMPS environment for health professional education; a randomized field trial of games for student literacy skills; and the ENJEUX collaborative online play environment. All are part of the Canada-wide Simulation and Advanced Gaming Environments (SAGE) for Learning initiative.

**Introduction**

Online, handheld, and computer-based games and simulations are widely regarded in the literature as promising learning technologies. However, integrating these activities into educational programs and evaluating their impact present many practical challenges in design, technological support, evaluation and implementation. This symposium presents five projects that address aspects of these issues and provide evidence of the impact of games and simulations on health-related learning in clinical, classroom and professional education settings. All are part of the Canada-wide Simulation and Advanced Gaming Environments (SAGE) for Learning initiative ([www.sageforlearning.ca](http://www.sageforlearning.ca)).

**Background**

Pushed by their entertainment success, games and simulations are emerging as tools for learning outside and within academia. Educators and trainers reason that the popularity, engagement characteristics, and wide accessibility of digital games and simulations can provide powerful learning tools if understood and properly exploited, particularly for newer “digital native” generations of learners (e.g., see ELSPA, 2006; Prensky, 2006; Gee, 2003; Kirriemuir & McFarlane, 2004, Shaffer et al., 2004). Moreover, games and simulations would appear to be excellent learning tools because they often embody established learning theories. Their exploration, collaboration, complex problem solving, practice and feedback through “safe” failure, and learner decision making scaffold constructivist learning (Bottino et al., 2006; Vygotsky, 1978); situated cognition, cognitive apprenticeship, and experiential learning (Kolb, 1984; Vanhoucke et al., 2005); development of self-efficacy (Bandura, 1986; Kaufman et al., 2000; Goldenberg et al., 2005); and learner-centredness (McCombs and Whistler, 1997; Rafaeli et al., 2006). However, schools and other formal education seem slow in investigating their potential, facing obstacles such as instructor lack of familiarity, difficulties positioning particular games in a set curriculum, long development times for a “custom” game or simulation, and lack of specialized technology to support gameplay (Piette, 2005; Prensky, 2005a, b).

The SAGE for Learning initiative is a five-year investigation of the potential of advanced-technology games and simulations to support learning, funded primarily by Canada’s Social Sciences and Humanities Research Council (SSHRC). A bilingual team of researchers and collaborating partners across Canada are developing and testing applications in several levels of health-related learning, supported by foundational work on conceptual frameworks, evaluation methodologies and tools, and supporting Internet and handheld technologies. This project is adding to our knowledge of and experience with digital game-based learning for K-12, university, and professional learners while making available supporting tools and technologies to facilitate its adoption.

## **Symposium papers**

### **1. Playing against sexually transmitted diseases: Reaching the digital natives**

**Authors:** Louise Sauvé (Télé-université / Centre d'expertise et de recherche sur l'apprentissage à vie (SAVIE), Canada,), Lise Renaud (Université du Québec à Montréal, Canada)

**Abstract:** "Digital natives," teenagers who have grown up with technology, are said to be characterized by multitasking and short attention spans during the learning process. Inspired to learn by exploration, adventure and discovery, they exhibit strong visual and spatial skills developed in online gameplay. They first play, understand and then develop a broad view before applying their skills into new circumstances. This paper presents a case study of an online digital game in Parcheesi format that was developed to measure the impact on this audience of an online game designed to facilitate learning about prevention of sexually transmitted infections (STIs). We will precisely define the concept of educational gaming, present the design and play of the game *ITS: stopper la transmission* (STI: Stop the Transmission), and describe the principal impacts of the game on affective and cognitive learning.

### **2. Games in a health context: e-learning or just e-play**

**Authors:** Carolyn Watters (Dalhousie University, Canada), Sageev Oore (Saint Mary's University, Canada), Hadi Kharrazi (Dalhousie University, Canada)

**Abstract:** The potential of games with educational objectives for children with health problems has resulted in considerable time and effort used to build games for use in this context. Our experience building and working with games for children with long term health problems provides the background for the discussions in this paper.

The learning objectives for children with long-term health concerns differ as they progress through the stages of diagnosis, treatment, and maintenance. For example, at the diagnostic phase, the learning objectives focus on gaining mastery over relevant content and concepts related to the illness. As the child assumes responsibility for his or her own care and well-being, however, the learning objectives shift from content to skills. For example, support is needed to reinforce skills for monitoring and recognizing symptoms, maintaining new behaviors, and skills for coping with pain. For games to continue to be relevant at the different phases over long periods, the interactions of the games must reflect both the e-learning and e-play needs of the child.

### **3. COMPS: Collaborative Online Multimedia Problem-based Simulations for Distance Learning in Medical Education**

**Authors:** David Kaufman (Faculty of Education), Robyn Schell (SAGE Project), all at Simon Fraser University, Canada

**Abstract:** This presentation will describe an ongoing research and development project to create a new collaborative online computer-mediated environment for problem-based learning in medical education. We are developing a new way to dramatize and make more engaging the production and delivery of case-based simulations for distance learning. The COMPS environment is designed to allow a group or students to collaborate around a clinical scenario. The collaborative nature of our online PBL model has the potential to promote student interaction and teamwork and in the process to build socially constructed knowledge among the students in an online setting. Our model integrates a dramatic narrative into the learning process to create a more holistic approach to medical education by engaging learning in more authentic, patient-centred problems. A WebCT-CE6 version, complemented by Elluminate Live (Voice-over IP), will be demonstrated in this session.

### **4. Enhancing student literacy skills through game development**

**Authors:** Ron Owston, Herb Wideman, Natalia Sinitsky, and Christine Brown, Institute for Research on Learning Technologies York University, Canada

**Abstract:** This paper presents the results of a randomized field trial that investigated the hypothesis that when students engage in reading, research, analysis, and synthesis of information on curriculum-related topics with the goal of developing and playing games, they will increase their literacy skills more than their non game developing counterparts. Two grade 4 classes in each of 15 schools from southern Ontario (Canada) participated in the study. In each school, one class was assigned to the control group and one class to the experimental group. All teachers taught the same curriculum, a unit on Canadian social studies, over a two month period. In addition to teaching the unit, teachers in the experimental group asked students to develop and play five computer games throughout the unit. Students developed the games using game “shells” developed by the Centre d’expertise et de recherche sur l’apprentissage à vie (SAVIE) in Quebec. The shells provided electronic versions of popular board games such as Tic Tac Toe, Mother Goose, and Snakes and Ladders and did not require computer programming. Students entered questions into the shells based on their research on the social studies unit. At the beginning and end of the study students completed standardized tests containing subtests on reading, writing, vocabulary, and sentence construction. In addition, the research team visited the schools to observe implementation of the game activities. Preliminary observational findings suggest that game development was a motivating and engaging activity for students and identified implementation challenges; quantitative data analysis using multilevel hierarchical linear modeling is currently underway, the results of which will be presented in the formal conference proceedings paper.

### **5. Online gameplay: A powerful tool for developing collaboration skills**

**Authors:** Louise Sauvé (Télé-université / Centre d’expertise et de recherche sur l’apprentissage à vie (SAVIE), Québec, Canada), Wilfried Probst (Université du Québec a Montréal, Canada), Louis Villardier (Télé-université, Université du Québec a Montréal, Canada)

**Abstract:** A recent systematic review of several hundred studies of educational games concluded that online educational games increase students’ abilities to interact with their peers, negotiate, communicate, collaborate, share ideas and emotions, establish relationships, and work as a team (Sauvé et al, 2006). In order to study how this comes about in a distributed online environment, the ENJEUX advanced collaboration platform has been developed to deliver and support online games, simulations, and collaborative work. ENJEUX provides a Web-based platform for the management and experience of online games and simulations on real-time collaborative work and on synchronous communication services (videoconferencing, audio and keyboard chat) as support for a collaborative work environment between users. The paper will present the ENJEUX rationale, design, and architecture together with the results of a case study on the learning impact of this environment on a range of collaboration competencies.

### **Symposium plan and timetable (2 hours)**

**Hour 1:** SAGE project overview and motivation (10 minutes); Paper 1 (20 minutes); Paper 2 (20 minutes); Paper 3 (presentation – 10 minutes)

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**Hour 2:** Paper 3 (demo – 10 minutes); Paper 4 (20 minutes); Paper 5 (20 minutes); Wrapup discussion and questions (10 minutes)

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