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# Simulation Experience Design Method for Serious Games

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## **Abstract**

The purpose of the present paper is to briefly introduce the Simulation Experience Design Method for design and future evaluation of user experiences in serious games whose focus is communication and collaboration. The Simulation Experience Design Method extends HCI approaches to create engaging multi-player learning experiences by focusing on how dynamic game content, roles, scenarios, and assessment feedback contribute to emergent culture. Preliminary evaluations of serious games employing this design and evaluation method have been positive. The contribution of the present paper lies in describing how designers create rich systems of experiences for serious games by employing HCI principles and the Simulation Experience Design Method.

## **Keywords**

Simulation experience design method, communication, serious games, intercultural communication

## **ACM Classification Keywords**

H4.m. Miscellaneous.

## **Introduction**

A *serious game* is defined in this paper as the use of interactive digital technologies for training and education in private, public, government, and military

sectors. For example, serious games include games and simulations for exploring interpersonal development, diplomacy, governance, health, education, management, and leadership (see [www.seriousgames.org](http://www.seriousgames.org)). Salen and Zimmerman [1] define *game play* as the formal interaction that ensues when players follow rules and structures that have been designed to result in an *experience*. Regardless of the media involved, games are aimed at engendering a variety of cognitive, sensory, and emotional experiences for players. The methods, approaches, and techniques by which we create experiences are often referred to as *game design*. The purpose of the present paper is to briefly introduce a method of game experience design and evaluation developed by the author that was influenced by the human-computer interaction discipline and prior work on developing persistent collaborative virtual environments [2], [3] and that over time has been imported to the development of serious games. This approach is called the Simulation Experience Design Method [4] and is particularly useful in designing multi-player communication-based computer games. The *Simulation Experience Design Method* is a process that addresses game design as a *system of experiences that exist within an emergent, adaptive cultural context* that the designer strives to engender throughout game play, as well as before, between, and after game play has concluded. The word *simulation* in the name of the method refers to an experience in which the role of a human, environment, or both, can be simulated.

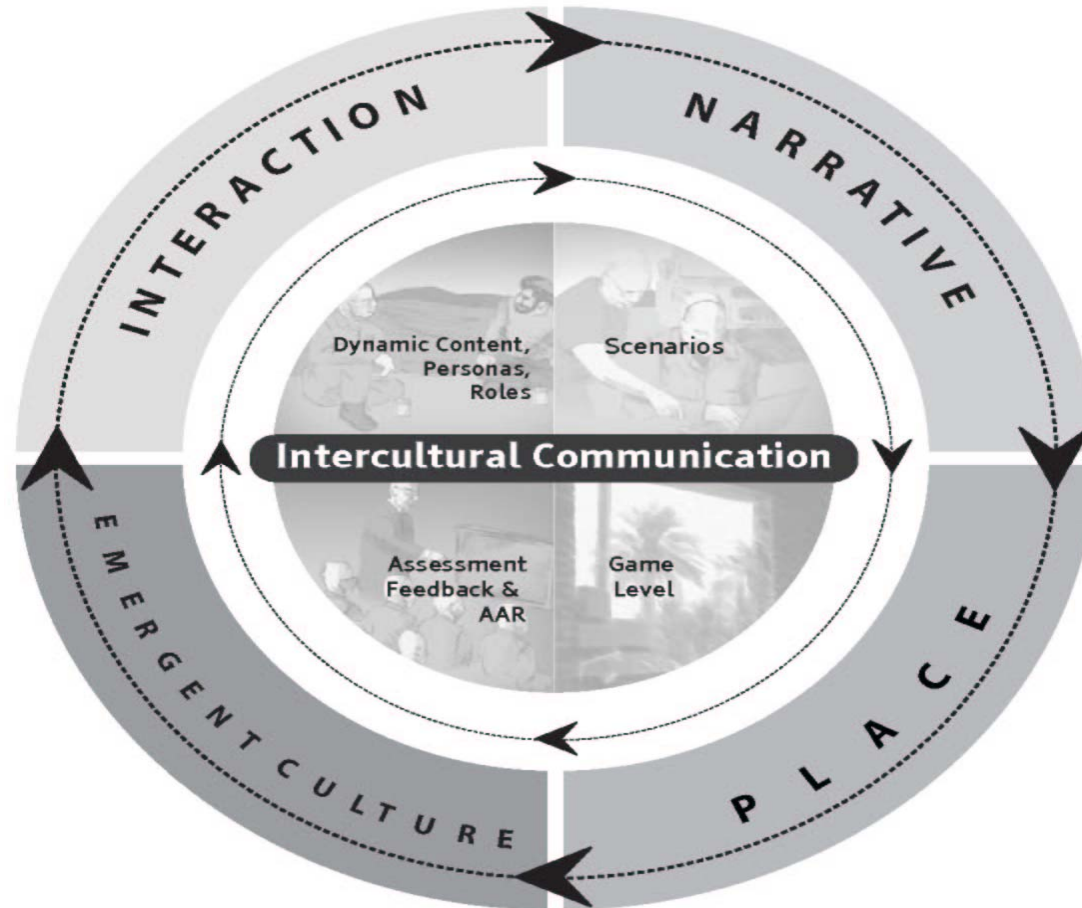
### **Simulation Experience Design Method for Serious Game-based Systems**

The Simulation Experience Design Methodology described here and that appears in greater detail in [4]

is based on HCI experience design principles that have been modified to include the design of serious games. HCI experience design solutions require that designers understand what makes a good experience first, and then translate these principles, as well as possible, into the desired medium without the technology dictating the form of the experience. Experience designers strive to create desired perceptions, cognition, and behavior among users, customers, visitors, or the audience. The Simulation Experience Design Method lies in purposefully weaving players' interactions with all entities and variables in the game environment in order to guide certain experiences [4]. The system of interactions executed in the game guides players to experience the effects or consequences of behaving and feeling in certain ways. One's game play experience is unpredictable, and has no right or wrong approach. Thus the Simulation Experience Design Method focuses on creating problem-solving opportunities in an open-ended, rich system of experiences.

The Simulation Experience Design Method (Figure 1) employed today to the design cycle of a system of experiences in serious games [4] also has its foundations in interaction design persona development [5], social-process simulation game design [6], and in a framework first introduced by the author in 1999 for the design of multicultural collaborative virtual environments, adaptive community-based intranets, and intercultural agent-based systems [2], [3]. The method focuses on designing user supports for cross-cultural discovery by way of interactions, narratives, how communication defines a place, and how user co-created emergent culture could result in more intrinsically motivating virtual environments that in turn

engendered more equitable intercultural communication [3].



**Figure 1.** Simulation Experience Design Method & Model

The Simulation Experience Design Method suggests that supporting equitable intercultural communication is comprised of several salient elements, among them 1) the type of communication, or interaction (interpersonal, group, etc.), 2) the place, or context, in which it occurs, 3) the narratives that are co-created and negotiated by the interlocutors, and 4) the culture that emerges from the communication event [4]. Following the framework, design tasks may then be considered as a cycle from interactions to emergent culture, and then on to new interactions that are spawned by emergent culture, and so on. The framework is focused on improving the quality of equitable intercultural communication in collaborative virtual environments such as serious games [4].



**Figure 2.** Screen shot of serious game to hone intercultural communication skills. Image courtesy of Sandia Labs.

### **Current Research**

Initial feedback on an earlier instantiation of a serious game for the classroom collected from 51 players has

been positive. Players reported being engaged with realistic scenarios that were grounded by credible experiences and they reported that they believed they learned more about their strengths and weaknesses by participating in the game than they would have learned had they not participated [4]. These results are preliminary, however, and further study is required.

There are several research directions on the horizon that we are currently pursuing. First, due to dynamic organizational changes characteristics of many training environments, gathering quantitative longitudinal or empirical experimental data has proven to be a challenge. Nevertheless, we would like to further measure the effects of this method on learning, and track the skill development of the players of our systems and transfer of training as they return to their work sites. We are currently in the process of a three-year project focused on creating diagnostic tools for tailored delivery of training strategies in game-based environments, based on models of an individual's strengths and weaknesses. This approach will help us measure individual learning progress. In general, learning through experience has been described as occurring either in a real situation, such as a workplace, or in role play. Kolb's Experiential Learning Theory describes learning as a process in which knowledge is created through the transformation of experience. Our studies explore the assessment of tangible constructs for creating knowledge from "grasping and transforming experience," specifically *concrete experience*, *reflective observation*, *abstract conceptualization*, and *active experimentation*. The notion of learning through experience is integral to the approach we take in designing and evaluating real time individualized training.

Additionally, while most of the current feedback we have collected is focused on player attitudes, self-report, and focus group usability feedback, we are conducting studies that gather feedback on the method itself. We are interested in determining the extent to which the methodology allows designers to create systems of experiences that foster intercultural discovery, emergent culture, and successful adaptive understanding. We only have preliminary quantitative data at this time that suggests that players felt they had learned about their strengths and weaknesses by playing a game designed with this method [4]. Further unpacking this notion to tell why players felt this way is of great interest.

The Simulation Experience Design methodology incorporates aspects of serious game design, social-process simulation, HCI experience design, and interaction design personas. Finally, by treating intercultural communication as a core value, the individual cultural backgrounds the players bring to their experiences are considered strengths, not design liabilities. As we strive to create engaging serious games, differing cultural values of designers, developers, stakeholders, and players create a myriad of complications and competing desires or expectations.

The Simulation Experience Design Model can serve as a frame of reference from which to establish a shared understanding and better ground evaluation.

## References

- [1] Salen, K. & Zimmerman, E. *Rules of Play*. MIT Press, Cambridge, MA, 2004.
- [2] Raybourn, E.M. Designing from the interaction out: Using intercultural communication as a framework to design interactions in collaborative virtual communities. Presented at Group '99, Phoenix, Arizona, November 14-17, 1999.
- [3] Raybourn, E. M. Designing intercultural agents for multicultural interactions. In Sabine Payr & Robert Trappl (Eds.), *Agent Culture: Human-Agent Interaction in a Multicultural World*, Lawrence Erlbaum, 2004, 267-285.
- [4] Raybourn, E M. Applying Simulation Experience Design Principles to Creating Serious Games for Adaptive Thinking Training. *Interacting with Computers*, Elsevier. 19, (2007), 206-214.
- [5] Cooper, A. *The inmates are running the asylum*. SAMS, Indianapolis, Indiana, 1999.
- [6] Gredler, M. Designing and Evaluating Games and Simulations: A Process Approach. Kogan Page, London, 1992.