SERIOUS GAME REPORT

Adaptive Thinking & Leadership Training for Cultural Awareness and Communication Competence

Elaine M. Raybourn

Sandia National Laboratories*, USA

Email: emraybo@sandia.gov

This paper presents a report on a new multiplayer simulation game for government and/or non-government interpersonal and intercultural communication training that launched in December 2004 and was designed expressly to serve as a non-violent virtual sandbox in which multiple players practice communication skills, mental agility, and hone cultural awareness acumen. The game is currently being used in leadership training programs.

Keywords: multiplayer, simulation, computer game, training, interpersonal communication, cultural awareness

1. INTRODUCTION

Computer games provide an environment for active, critical learning. Through games one learns to appreciate the inter-relationship of complex behaviours, sign (images, words, actions, symbols, etc.) systems, and the formation of social groups (Gee, 2003). Games are not only used for entertainment purposes. Games and social simulations are often used for training and teaching in management science, economics, psychology, sociology, intercultural communication, political science, military strategy, interpersonal skill development, and education. Games open up possibilities for simultaneous learning on multiple levels; players may learn from contextual information embedded in the dynamics of the game, the organic process generated by the game, and through the risks, benefits, costs, outcomes, and rewards of alternative strategies that result from decision making (Raybourn & Waern, 2004b).

Complex problem solving approaches and novel strategies employed by first responders, emergency and catastrophe managers, or the military are often best learned experientially. Although live action exercises can be costly, advances in simulation game training technology offer exciting alternatives. Since 2003 Sandia National Labs has led a team in the design, development, and deployment of non-violent multiplayer simulation games that foster cultural awareness, adaptability, flexible problem solving, and leadership development.

The objective of Sandia National Laboratories' initiative in simulation game training is to create immersive digital environments in which participants share lessons learned via experiential training that hone their critical thinking, mental agility, interpersonal adaptability, cultural acumen, and observational skills. It is our goal to create interactive environments that sharpen participants' focus by unleashing their cognitive abilities, and compelling them to make critical decisions. We carefully consider the efficacy of technology-enhanced training in the context of existing training programs and focus on training participants to think on their feet while confidently and consistently making good decisions—especially when

faced with stressful settings, novel situations and ambiguous phenomena.

Figure 1. ATL Single-Player Level Student Interface

2. ADAPTIVE THINKING & LEADERSHIP PROJECT

Non-governmental organizations (NGO) and government organizations such as the military are confronted with uncertain times and resources to operate in a perplexing geopolitical world. These uncertain times are characterized by vague and ambiguous situations across a broad spectrum of activities. An essential element to meeting this challenge is the development of the appropriate leader competencies. Leaders at all levels and across different disciplines or agencies require specific competencies to succeed such as languages, regional and technical expertise, cross-cultural communications, interpersonal skills, and adaptive thinking. In this paper, adaptive thinking is defined as consisting of competencies such as negotiation and consensus building skills, the ability to communicate effectively, analyze ambiguous situations, be self-aware, and think innovatively and critically. Each of these competencies is an essential element of leader development training for the U.S. Army Special Forces.

In 2003 Sandia National Laboratories was sponsored by the U.S. Army Special Forces to lead and assemble a team to develop interactive, non-violent leadership training technologies. The team consists of Sandia National Laboratories, The Army Game Project Government Applications Team, and the University of Central Florida. The Army Game project is best known for its development of an internet-based multiplayer game called *America's Army: Operations* that currently enjoys over 4 million registered users worldwide and has won numerous computer gaming awards (Wardynski, 2004).

In nine months, a single-player tutorial and multiplayer computer game was created for adaptive thinking & leadership (ATL) training and skill development in intercultural and interpersonal communication among teams and in cross-cultural settings with host nationals. Sandia provided the project approach, theoretical perspective, research, and culturally relevant content design. We drew upon previous experience with designing simulation games for interpersonal and intercultural communication and intelligent multicultural, collaborative groupware systems (Raybourn, 2001, 2003, 2004a).

The ATL training simulation game consists of a scripted single-player and an immersive multiplayer environment for classroom use which leverages both Epic's Unreal Tournament game engine and America's Army Game Platform (Figures 1-3). Instructors and students are provided an initial set of scenarios and may also build their own and/or modify scenarios easily in real-time.

An After Action Review (AAR) of individual or team performance was informed by 5 years of research conducted by the Army Research Institute and the University of Central Florida (Knerr et. al., 2002). An AAR allows instructors and students to critically review the actions taken in the game.

Figure 2: ATL Multiplayer Instructor Interface-Student view

3. PROJECT APPROACH

During the first 3-month phase of project work, Sandia conducted an in-depth study of the organization's training program in order to best reinforce existing efforts with innovative approaches. Research methods included observing experiential field exercises and classroom training, focus groups, interviews with instructors and subject matter experts, and surveys.

The second phase consisted of designing and developing a training simulation game and AAR for use in the classroom which was based upon the learning principles mentioned in previous sections and various stories from subject matter experts that reinforce the need for adaptive thinking. The game design efforts included working closely with subject matter experts and incorporating lessons learned into a virtual environment that facilitated participant experimentation with novel techniques and ideas in a relatively safe setting. Our goal was that participants hone their ability to anticipate the ramifications of different courses of action to problems that may not have a "right" answer by role-playing in a dynamically changing environment.

The design of the multiplayer simulation game involved content storyboarding, creating single-player and multiplayer levels, motion capture, animating cross-cultural nonverbal gestures, incorporating culturally relevant sounds and voiceovers, scenario scriptwriting, and developing student and instructor interfaces (Figures 1-3).

The third phase of the project (currently underway) involves a formal evaluation of the efficacy of the multiplayer simulation game and its deployment and use in classrooms at training facilities.

4. SYSTEM DESCRIPTION

The Adaptive Thinking & Leadership Training (ATL) Simulation Game currently supports classroom training for up to 14 players and one instructor (includes players and observer roles—although observer roles may easily be increased to accommodate the size of the class). The goal of the ATL environment was to serve as a virtual sandbox within which participants can role-play and practice the content they learn from classroom instruction and related activities throughout their training program. The ATL system consists of the following interfaces:

Instructor Interface (Figure 2-3). From the instructor interface one can assign students to different roles of the multiplayer session as well as set a time limit for the scenario role-play. The instructor client initiates and sets the ATL game server, manages the training session, and operates the AAR playback. The instructor is able to communicate with each team privately, broadcast to all on a public channel, or participate in text chat with students who are observing the session. The instructor may alter or introduce certain events in the game scenario in real-time (such as initiating a helicopter flyover, etc.) that are designed to impact the rapport building and negotiation role-playing. The instructor is also able to monitor the role-playing session from ten different fixed camera views (including student view). The instructor's view points are

3

recorded and serve as the AAR playback. The instructor may bookmark events that occur during role-play with text or an icon in order to facilitate reference during the AAR.

Student Interfaces. Each student is equipped with a Student client on a laptop along with a mouse and headphone/microphone set. Students may participate in a self-paced single-player tutorial where they learn multiplayer game navigation and operation of the nonverbal gesture menu (Figure 1). In the multiplayer session, students play the roles of either Special Forces soldiers or host nationals. In either case, they learn about cultural expectations and how to be more self-aware. Students may communicate to others on their team on a private VOIP channel, or communicate to all on a public channel. They also communicate using nonverbal gestures selected from a pull-down menu. Some students do not role-play, but instead observe the game play from fixed camera views that they can switch between. They are able to listen to all communications on the VOIP channels, but not speak. They may also text chat with other observers and the instructor.

Figure 3: ATL Multiplayer Instructor Interface-Student view

5. FUTURE DIRECTIONS

The ATL system is currently designed to support classroom training. Massively Multiplayer Online Role Playing Gaming (MMORPG) support is among the number of options under consideration for future phases of the ongoing project. Game enhancements such as expanding the levels, and introducing puzzles are also planned. Additionally, the game software may be used in virtual or augmented reality systems as needed. Currently the simulation game is part of the curriculum for a course in Adaptive Thinking & Leadership and the Special Forces school has plans to incorporate the simulation game in Civil Affairs courses that are concerned with developing interpersonal communication and rapport-building skills.

6. CONCLUSIONS

The ATL multiplayer simulation game training environment is aimed to assist the participant through its focus on problem-solving in open-ended, culturally relevant settings which can help build awareness of the problem domain, internalize strategic thinking and hypothesis building, develop cultural recognition skills, and hone the perceptual sensitivity to confidently navigate complex phenomena. Now that we have completed the careful development of the system we can begin a formal evaluation in cooperation with the Special Forces training school. We will evaluate whether our careful design of unobtrusive reasoning principles in computer games may help guide participants to have "aha" experiences in context.

REFERENCES

Gee, J. P. (2003) *What Video Games Have to Teach Us About Learning and Literacy*, Palgrave MacMillan, NY.

Knerr, B.W., Lampton, D.R., Martin, G.A., Washburn, D.A., & Cope D., (2002) *Developing an After Action Review System for Virtual Dismounted Infantry Simulations.* I/ITSEC Conference. Orlando, FL.

Raybourn, E. M. (2001) *Designing an Emergent Culture of Negotiation in Collaborative Virtual Communities: The DomeCityMOO Simulation.* In E. Churchill, D. Snowden, & A. Munro (Eds.) Collaborative Virtual Environments: Digital Places and Spaces for Interaction, Springer, London UK, 247-64.

Raybourn, E. M. (2003) *Design Cycle Usability and Evaluations of an Intercultural Virtual Simulation Game for Collaborative Virtual Learning.* In C. Ghaoui (Ed.), Usability Evaluation of Online Learning Programs, Information Science Publishing, 233 -53.

Raybourn, E. M. (2004a). *Designing Intercultural Agents for Multicultural Interactions.* In Sabine Payr & Robert Trappl (Eds.), *Agent Culture: Human-Agent Interaction in a Multicultural World*, Lawrence Erlbaum, 267-285.

Raybourn, E. M., & Waern, A. (2004b) *Social Learning Through Gaming.* In Extended Abstracts of CHI Proceedings 2004, ACM Press, 1733.

Wardynski, C. (2004) *America's Army Project Briefing.* Presentation given at Sandia National Laboratories, January 19, 2004.