Training Approaches for Honing Junior Leader Adaptive Thinking, Cultural Awareness and Metacognitive Agility

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ABSTRACT

The present paper is the third in a series that seeks to describe the theories and methods employed to create engaging learning environments for training Marine and Army junior leaders, U.S. Special Forces, Civil Affairs, and Psychological Operations teams to think adaptively. The first publication (I/ITSEC 2005) described a novel use of a first-person shooter game-based training system (in use since 2004) at the JKF Special Warfare Center and School that focuses on negotiation skills, cross-cultural communication. The second publication (I/ITSEC 2006) described the simulation experience design method used to create a "crucible" experiences that invoke trainee adaptive thinking by forcing crucial choices, and sharpening one's focus. The present paper addresses more specifically the perspectives that have inspired the development of methods (used first for the U.S. Special Forces and currently for DARPA DARWARS Ambush NK! [Non-Kinetic]) to train adaptive thinking particularly by honing cultural awareness and metacognitive agility for non-kinetic engagements.

In the full paper, we discuss perspectives from intercultural communication, social-process simulation, and metacogntion that have inspired the approach to overall training architecture and software development to train adaptive thinking, cultural awareness, and metacognitive agility for multi-player game-based systems. We describe how game-based training can be designed as consisting of a system of experiences, and how the design of a reflective role, in-game assessments & evaluation, and quantitative evaluations in after action reviews enhanced for non-kinetic engagements, present a unique blend of methods from which to enhance adaptive thinking. The paper addresses how the instantiated role functionality and methods can be used by observer controllers, peer trainees, subject matter or cultural experts, instructors, etc. to provide quantitative feedback of actions taken, (including communications) as they occur in real-time. We discuss how our approach instantiates in software a unique role that provides experience with developing the metacognitive strategies and self-monitoring skills necessary to develop adaptive, self-aware leaders.

ABOUT THE AUTHOR

Elaine M. Raybourn, Ph.D. in intercultural communication with an emphasis on human-computer interaction brings an expertise in understanding culture and communication to the design of serious games & experiential simulations, adaptive training systems, and context-aware groupware. Her research and design concern topics such as cultural awareness, real-time in-game assessment, novel after action review (AAR) systems, creative collaboration, and designing learning applications that stimulate intercultural communication, and cognitive & metacognitive agility (adaptive thinking). Elaine led the development of a game-based training system for the U.S. Special Forces in the area of Adaptive Thinking & Leadership that was successfully incorporated into the training program for Special Forces, Civil Affairs, and Psychological operations at the John F. Kennedy School Special Warfare Center and School. She currently leads a team to create non-kinetic engagement training scenarios to train Army soldiers and Marines with the DARPA game-based training system DARWARS Ambush NK! (non-kinetic). Elaine was an ERCIM (European Consortium for Research in Informatics and Mathematics) 2002-04 Fellow. She is on the advisory board for the CMP Game Developers Conference Serious Games Summit, is a principal member of Sandia National Laboratories and a National Laboratory Professor at the University of New Mexico's Department of Communication & Journalism, Institute for Organizational Communication.

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INTRODUCTION

> *The main task facing trainers and military educators in the early 21st century is how to best equip the individual junior leader both mentally and physically for the challenges of a transformed security environment. In this sense, the strategic corporal concept is about adapting the Army's ethos and older values to a range of new attitudes and codes of behaviour that today's complex battlespace demands*. Major Lynda Liddy, Australian Army, 2005.

Today more is expected from junior leaders than ever before. On October 18, 2002 Lieutenant General Peter Leahy, Chief of the Australian Army said "The era of the strategic corporal is here. The soldier of today must possess professional master of warfare, but match this with political and media sensitivity."(quoted in Liddy, 2005). According to Liddy, the term *strategic corporal* refers to "the devolution of command responsibility to lower rank levels in an era of instant communications and pervasive media images" (2005, p. 139). The term *strategic corporal* also describes the junior leader who has strategic self-awareness of the second and third order effects of her/his actions or strategic understanding the actions of others on politics, diplomacy, and the reputation of her/his country. Therefore junior leaders must not only possess superior warfighting skills but also master the arts of diplomacy, cultural awareness, adaptive thinking in ambiguous environments, and communication (including but not limited to interpersonal, nonverbal, media, persuasion, and mass). The above attributes are often characterized by the military as non-kinetic or non-lethal engagement competencies necessary for humanitarian, peace-making, and restabilization operations.

Notable efforts are made throughout the training and education community to prepare junior leaders with the non-kinetic skills needed upon deployment. There are a number of training systems or applications aimed at language learning, leadership, decision-making, negotiation, team-building, communication, and cultural awareness ranging from web-based advanced distributed learning to interactive video stories to single-player and multi-player commercial game-based training. These systems, although not discussed in the present paper, contribute to the collection of fine resources readily available for junior leader home station training and the reader is encouraged to investigate their use as each offers specific value. Additionally command training centers and schoolhouses may provide live-action, constructive or virtual simulation, and/or game-based training exercises in which junior leaders rehearse kinetic/non-kinetic missions requiring the use of adaptive thinking (Raybourn et. al., 2005). *Adaptive thinking* is defined in the present paper as "possessing competencies such as negotiation and consensus building skills, the ability to communicate effectively, analyze ambiguous situations, be self-aware, think innovatively and critically, and exercise creative problem solving skills" (Raybourn, 2006, p. 3). An adaptive thinker is also one who possesses metacognitive agility. Metacognition has been defined a number of ways over the years. A good working definition of metacognition is higher order thinking that involves active control of one's learning process to include knowledge of persons, task, and strategy (Flavell, 1979; White et. al., 1999). Thus *metacognitive agility* is defined in the present paper as possessing the ability to analyze the way one or others think, discern different tasks or problems requiring different types of cognitive strategies, and employ those strategies to enhance learning and performance.

The present paper is the third in a series published in the proceedings of I/ITSEC that seeks to further describe the realtime in-game assessment evaluation & feedback method and Simulation Experience Design employed by the author to create engaging game-based adaptive training systems that allow individuals and teams to communicate more purposefully, think more adaptively, and exercise metacognitive agility. Two game-based training systems incorporating these methods are in use by the military and DARPA today.

The first publication in the I/ITSEC series described a novel application of a first-person shooter game-based training system (in use since 2004) at the JKF Special Warfare Center and School (SWCS) that focuses on negotiation, cross-cultural communication, and adaptive thinking (Raybourn et. al., 2005). The second publication described the Simulation Experience Design method used to create "crucible" experiences that invoke trainee adaptive thinking by forcing crucial choices, and sharpening one's focus (Raybourn, 2006; 2007). The present paper addresses more specifically the inspiration for and approaches used in game-based adaptive thinking training (for the U.S. Special Forces JFK SWCS and currently for Army and Marines through the DARPA DARWARS NK! [non-kinetic]) for honing cultural awareness, intercultural communication and metacognitive agility for non-kinetic engagements.

The author's approach to Simulation Experience Design and the development of the realtime in-game assessment evaluation & feedback method is inspired by intercultural communication, social-process simulation, and metacognition.[1] In the present paper, the author discusses how these perspectives have inspired the overall approach to experience design, in-game quantitative assessment, and creation of a new, reflective evalution player role for multi-player game-based training systems that hone the metacognitive knowledge and self-monitoring skills necessary to develop interculturally competent, adaptive, self-aware leaders.

TRAINING DESIGN INSPIRATIONS

Early Intercultural Communication Training

The inception of the field of Intercultural Communication can be traced to the early 1950's when anthropologist Edward T. Hall joined the Foreign Services Institute (FSI). Whereas cultural anthropology largely focused on single-culture studies (religion, economy, kinship, etc.), Hall's applied work at the Foreign Services Institute focused on the interactions among peoples from different cultures (Rogers et. al., 2002). Out of this early work were conceived the areas of cultural awareness, culture as a nonverbal silent language, cultural relativism, and cross-cultural or intercultural communication competence that are still explored today by sociologists, psychologists, anthropologists, and communication scientists (Hall, 1959).

Hall grew up in the culturally diverse state of New Mexico and had served in WWII as a commander of an African American regiment. His personal experiences contributed to his innovative approach. At FSI he taught a course entitled "Understanding Foreign People" to American diplomats who at that time rarely learned the language or culture of the country to which they were assigned (Rogers et. al., 2002). Linguists from the WWII Army Language Program also taught language courses at FSI in compliance with the Foreign Service Act passed by Congress in 1946. The Army linguists advocated the strategic use of native speakers and cultural understanding in language instruction. Hall and others developed the curriculum of FSI which incorporated experiential exercises and participation. "Hall de-emphasized listening to lectures and reading books as a means of understanding intercultural communication…Hall and his fellow trainers at the FSI used simulation games, exercises, and other participant-involving methods of experiential instruction" (Rogers, et. al., 2002, p. 10-11).

Social Process Simulation for Junior Leader Intercultural Communication Competence Training

In general, learning through experience has been described as occurring either in a real situation, such as a workplace, or in role play. Social-process simulations are experiential instruction environments used to replicate behavioral processes that usually involve a human in a role-playing situation (Gredler, 1992). Social-process simulations focus on human interactions and communication in the pursuit of social goals. Social-process simulations may be instantiated as face-to-face live action simulations, tabletop exercises, card or board games, or computer games, etc. Key to social-process simulation is that as trainees role-play they may experience feelings of frustration, rejection, pride, acceptance, conflict, cooperation, and a host of other emotions. The opportunities to experience these emotions are artfully designed into the simulation game. Social process intercultural relations simulations are designed to allow role-players to develop self-awareness of their emotions and the impact of emotions on decisions, actions, and interpersonal communication.

Social-process simulations are also designed to challenge the assumptions that role-players bring to their roles. The designer's task is to get trainees to interact, take actions that affect others implicit assumptions and create cognitive dissonance or conflict among participants, then guide the development of self-regulating skills such as monitoring their feedback and the feedback of others (Raybourn, 2006).

The better the social-process design, the better role-players are able to conceptually connect actions and decisions in the simulated context to their everyday experiences as they build a knowledge base of behavioral skills (Raybourn, 1997). Transfer of training is an important goal of social-process simulation. According to Sisk "simulation games provide interactive opportunities to practice new behaviors and experiment with new attitudes and points of view in a nonthreatening, nonjudgemental environment" (1995, p. 81). Experimenting with new behaviors and analyzing the second and third order effects of one's new (or fully formed) attitudes exercises metacognitive agility.

Gary Shirts created an intercultural social-process simulation game called BaFa BaFa for the U.S. Navy in 1970 that was originally intended for overseas selection assessment. Before long BaFa BaFa was used instead to train sailors in cross-cultural relations (http://www.simulationtrainingsystems.com/business/articles/whats_bafa.html). BaFa BaFa is a fairly large scale face-to-face simulation (best at 40 persons) in which participants visit "foreign" cultures and experience cultural misunderstandings and culture shock. In the simulation game trainees learn to identify the feelings of frustration and alienation associated with culture shock. Instead of letting these emotions dictate actions, trainees learn to become more self-aware and understand the behaviors that triggered certain dysfunctional emotions. BaFa BaFa is still in use today by schools and organizations worldwide. BaFa BaFa is one example of a widely used game that has its roots in social-process simulation training for the military.

The debriefing, or After Action Review (AAR), is the most vital element of successful intercultural simulation game design. During the debriefing, trainees are guided to reflect on the lessons learned from the simulation game experience, by extending what was learned to "real" situations, or by identifying strategies that could have enhanced performance. Again, this guided reflection process exercises *participating* trainees' metacognitive agility. Facilitators also may use the debriefing as an opportunity to ease players out of their game roles, and all of the feelings associated with it, back to "reality" (Sisk, 1995). This becomes particularly important if some trainees are playing roles aimed at honing cultural relativism, or empathy. Care should be taken to debrief their roles and the emotions experienced during the training session.

Social-process simulation games should always be accompanied by other methods of instruction and in the context of a pedagogical curriculum when introducing *new* concepts to the junior leader. Junior leaders may come to the training experience with different backgrounds or levels of expertise. Social-process simulations are largely practice environments that require a certain level of awareness, and willingness to explore oneself. Used out of context of a sound instructional framework or in the absence of skilled facilitators, negative training could occur. For instance, the concepts explored in social-process simulation may trigger emotional responses that are deeply rooted and have remained unexplored by the trainee until surfaced by the training event.

Additionally, often in our excitement to introduce new technologies including game-based training to home station and the junior leader we designers focus on developing training solutions that are contained solely "in the box," (the "box" being the computer). We may forget that our contributions to home station junior leader training should be complementary to the existing training pipeline and should neither overshadow nor subvert the overall training goals and objectives. In the event that no training pipeline or goals exist from which we can draw, then we game-based training designers should aim to communicate challenges and risks of utilizing game-based training in lieu of other methods to military training developers. Whenever possible we should strive to leverage the training design of the program in which we intend to deploy our game-based solutions.

That said there are several benefits to using commercial game-based social-process simulations to facilitate intercultural learning. First, players practice critical thinking skills that better prepare them to rationally plan future strategies as well as spontaneously intuit the consequences of their decisions. Second, players also learn to apply the theories and models explored in the simulated situation to real-world situations. The simulation gaming process also provides players an opportunity to practice real-world behaviors associated with competition, empathy, and communication in a simulated reality (Sisk, 1995).

Third, perhaps one of the most valuable benefits for junior leaders is that a simulated reality is a safer arena for many people to confront their emotions toward cultural differences. Particularly when addressing some cross-cultural issues of potential controversy, simulation games provide a safe place to explore dangerous questions (Pedersen, 1995).

Metacognition

Honing metacognitive agility is integral to becoming an adaptive thinker and competent cross-cultural communicator. The section above described how social-process simulations and debriefings offer opportunities to explore new experiences, behaviors and attitudes, and reflect on actions.

Experiential Learning Theory defines learning as "the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience" (Kolb 1984, p. 41). The constructs for creating knowledge include *concrete experience and reflective observation* for grasping experience, *and abstract conceptualization*, and *active experimentation* for transforming experience (Kolb et. al., 2000). Concrete experiences form the basis for reflective observations. These observations form abstract concepts that provide a framework for new implications of actions that can be taken. These implications are then tested in active experimentation to guide the formation of new actions.

Recall that *metacognitive agility* is defined in the present paper as possessing the ability to analyze and reflect on the way one or others think, discern different tasks or problems requiring different types of cognitive strategies, and employ those strategies to enhance learning and performance. Knowledge is considered to be metacognitive in nature if it results in *strategic* use toward the accomplishment of a goal. Knowing one's strengths and weaknesses with respect to a task and using this information strategically (through task analysis, planning, monitoring, evaluating, and reflecting) to meet a goal or improve performance is exercising executive or metacognitive skills (Veenman et. al., 2005).

For example a junior leader could practice metacognitive skills when facing a typical non-kinetic engagement such as negotiation. She may focus on information she needs that is relevant to building a task representation of the steps she will take to reach her goals and objectives, the criteria of effectiveness by which she will evaluate her failure or success, and then monitor performance in real-time while executing her plan.

However training metacognitive agility requires instruction, practice using strategies, and experience with evaluating outcomes. According to Livingston (1996) "simply providing knowledge without experience or vice versa does not seem to be sufficient for the development of metacognitive control." Therefore in developing training to exercise metacognitive agility, designers should make the cognitive processes explicit to the junior leader so she can utilize these skills again or in diverse settings.

The combination of social-process simulation practices and stages of experiential learning provide a useful framework for developing methods to hone adaptive thinking, cultural awareness, and metacognitive agility in game-based training. The following section describes an experience design approach that has incorporated these perspectives to enhance multi-player game-based training intended to unobtrusively guide immersive, open-ended learning in training environments that are similar in look and feel to those of commercial games.

SIMULATION EXPERIENCE DESIGN: EXTENDING TRAINING OUTSIDE THE "BOX"

Game-based training offers opportunities for junior leaders to undergo stages of learning, but only if provided with purposeful concrete experiences which can be reflected on, evaluated & generalized, and subsequently applied through action as part of the game experience (Menaker et. al., 2006).

Game-based training does not need to be thought of as solely contained within the computer "box" (i.e. console, PC, etc.) or solely within the augmented or virtual reality experience. Most of the critical learning associated with game-based training may occur in side-by-side interaction with others, during debriefings, and especially in the case of dismounted infantry when the lessons learned are taken down range. Viewed within a larger context of an instructional program or training event, the game is a point of departure from which experiences are shared.

For example, Simulation Experience Design is employed in the design of an entire training experience, from the design of scenarios, roles, novel assessment interfaces, and after action reviews (Raybourn, 2006; 2007). The Simulation Experience Design method focuses on creating problem-solving, adaptive thinking opportunities in open-ended, culturally relevant environments in which users build awareness of the problem domain, internalize strategic thinking and hypothesis building, discover their own strengths and weaknesses, and apply new skills. 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 (Raybourn, 2007). Figure 1 illustrates the Simulation Experience Method by which designers may create social-process simulations that treat the AAR or debriefing as part of the game experience.

Figure 1. Simulation Experience Design Method

Intercultural communication competence serves as a core interaction goal which each of the elements support. 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. Once a designer has considered the design problem in the context of the system of experiences from interaction to narrative, to place, to emergent culture—then she begins again, as emergent culture dynamically spawns new interaction events. 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 (Raybourn, 2007).

Using this methodology, designers can create entire training experiences that begin before junior leaders engage in game-based training to the activities following and leveraging the lessons learned that are communicated during the AAR phase. Incorporating such an approach allows designers to consider how the game experience fits within a larger system, or training context. Such an approach opens the door for designing appropriate uses of other technologies to achieve blended training experiences that holistically leverage the unique strengths of diverse instructional media. A more detailed description of the Simulation Experience Design Method is available (Raybourn, 2006; 2007).

SANDIA REAL-TIME IN-GAME ASSESSMENT, EVALUATION AND FEEDBACK METHOD

In developing adaptive training systems that are deployed today (Raybourn et. al., 2005), the author instantiated a reflective observer controller/evaluator role in software for trainees to participate in multi-player learning that emerges from concrete experience, real-time, in-game reflection and evaluation of abstract concepts, and applying what has been learned in after action review debriefings. The section below describes an approach to providing in-game opportunities for honing metacognitive agility toward intercultural communication competence and adaptive thinking.

Reflective Observer Controller/Evaluator Role for In-game assessment and metacognitive training

An approach to training metacogntive agility and adaptive thinking is to give trainees concrete practice, reflective observation, abstract conceptualization and active experimentation with evaluating their own actions and those of others. As discussed in earlier sections, in order to truly foster the development of metacognitive skills, we must provide junior leaders with opportunities to both learn and use their knowledge. Non-kinetic engagement training such as rapport building, negotiation, questioning, interviewing, etc. is aimed at improving communication and cultural awareness skills. A goal of the Reflective Observer Controller/Evaluator Role then is to provide junior leaders the opportunity to reflect on communication events, speech acts, and verbal strategies that are enacted in player roles.

Sandia National Lab's proprietary method consists of providing an interface and role to provide in-game evaluations of player's actions, communications, etc. as they occur in real-time and as they correspond to expected core competencies or the unit's training objectives (Raybourn, 2007; 2006). For example, trainees learn the core competencies or criteria by which the communication is evaluated before a training session begins. During the training session, communication events are identified and the trainees perform evaluations (apply what they have learned). Their feedback is both quantitative and qualitative and corresponds to logged, time-stamped events. These

evaluations that correspond to actual events are later aggregated and statistical analyses performed on the individual and group evaluations. Team and individual assessments are displayed either in realtime or during the after action review. By training in roles that allow junior leaders to act (player roles) and reflect (Reflective Observer Controller/Evaluator Role) the trainees perform different cognitive tasks. More active experimentation takes place with player roles, while abstract conceptualization and reflection is fostered by the Reflective Observer Controller/Evaluator Role.

For example, a trainee may evaluate one of her peers on ability to clearly communicate his goals during the game-based training session. In order to give good feedback she not only has to understand what is meant by "clearly communicating goals in a cross-cultural setting," identify when her peer is attempting to communicate goals, and discern his level of success but also be able to make sound evaluations and stand by her evaluation (be accountable) during an AAR debriefing. Finally she must effectively communicate what strategies may have been employed differently with what effects. Her role has given her more practice with honing metacognitive skills. The next time she is in a player role or participating in live action role play, she can reinforce building a task representation of the steps she will take to reach her goals and objectives, the criteria of effectiveness by which she will evaluate her failure or success, and then monitor performance in real-time while executing her plan. By participating in both roles, junior leaders practice important non-kinetic engagement skills such as gauging successful interactions, paying attention to communication, providing feedback for which one is held accountable during the AAR, and identifying core competencies.
This method is very flexible and has also been used with observer controllers, peers, subject matter or cultural experts, instructors, or training cadre in the Reflective Observer Controller/Evaluator Role for introducing quantitative/qualitative in-game value assessments of decisions made, actions taken, or strategies employed. In fact, a training goal of the Real-time In-Game Assessment, Evaluation and Feedback method and role is to foster the skill development necessary for each junior leader to become his or her *own* Observer Controller, or rather develop the habit of actively evaluating his or her own behaviors and identifying strengths and weaknesses. By including Observer Controller or expert participation in training sessions, appropriate behaviors are also modeled for trainees and serve as further reinforcement.

Reflective Observer Controller/Evaluator Role Accountability during AAR

Salen and Zimmerman (2004) describe the game play outside of the game as a metagame. The time before, between, or after game play is ripe with metagame activities such as planning, reflecting on strategy, discussing in groups what happened previously during game training, sharing lessons learned, etc. These activities are components of the total training system experience. The assessment and feedback evaluation role described above is one way to guide learner in-game discovery as well as metagame reflection (Raybourn, 2007).

The after action review (AAR) process is an activity that supports metagame experiences. Players and instructors discuss alternatives not taken by the role-players that may be equally valid and serve to expand the set of solutions to update and adapt their understanding for the next game session. The Real-time In-Game Assessment, Evaluation and Feedback method and role offers quantitative and qualitative evaluations of core competencies or training objectives as a feature of the AAR for non-kinetic engagements. Reflective Observer Controller/Evaluator assessments are displayed during the AAR to focus discussion on salient events. As the events are time-stamped, the virtual AAR offers playback of the engagement and/or jumping to the bookmarked events of interest.

During the facilitated AAR, trainees in *both* player and Reflective Observer Controller/Evaluator roles can now participate in the discussion of the same communication event. Additionally, the Reflective Observer Controller/Evaluator role guides the group to discuss more than what went right, and what went wrong with the non-kinetic engagement. The core competencies become a focal point of discussion as trainees are held accountable for their evaluations and the values they have identified as being success identifiers.

FUTURE RESEARCH

We have observed in practical use and through user anecdotal feedback and preliminary data that the methods discussed in the present paper support the goals of adaptive training systems: to 1) engender communication opportunities for players to learn about their strengths and weaknesses, 2) receive real-time in-game assessment feedback on their performance, and 3) share diverse solutions and strategies during, between, and after game play in order to update and

adapt players' understanding (Raybourn, 2007; Raybourn et. al., 2005).

Due to the dynamic nature of many training environments, gathering quantitative longitudinal or empirical experimental data has proven to be a challenge. Nevertheless, opportunities to measure the effects of adaptive training system methods on learning and transfer of training are continually sought. For example, in 2008 the author will begin a 3-year investigation of the design of individualized training vectors for adaptive training systems.

Additionally, there is interest in determining the extent to which these methods allow instructional and game designers to create *systems of experiences* that foster intercultural discovery, emergent culture, and successful adaptive thinking and metacognitive agility. Readers interested in utilizing these methods in their own work are invited to contact the author.

CONCLUSIONS

The present paper is the third in a series that sought to describe approaches and methods employed to create engaging learning environments for training Marine and Army junior leaders, U.S. Special Forces, Civil Affairs, and Psychological Operations teams to think adaptively. The present paper addressed more specifically the perspectives that have inspired the development of methods (used first for the U.S. Special Forces and currently for DARPA DARWARS Ambush NK! Non-Kinetic) to train adaptive thinking particularly by honing cultural awareness and metacognitive agility for non-kinetic engagements. Inspirations from intercultural communication, social-process simulation, and metacogntion have influenced the approach to overall multi-player game-based training architecture and software development. The design of a Reflective Observer Controller/Evaluator role, in-game assessments, and quantitative measures in after action reviews enhanced for non-kinetic engagements were introduced. The paper addressed how the instantiated role functionality and methods are used by observer controllers, peer trainees, subject matter or cultural experts, instructors, etc. to provide quantitative feedback of actions taken, (including communications) as they occur in real-time. These methods are critical to developing the metacognitive strategies and self-monitoring skills necessary to develop interculturally competent, adaptive, self-aware leaders.

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Endnote

[1]It might be important for the reader to note that the author is neither an instructional designer nor a commercial game designer by training and did not intended to exclude relevant theories or approaches from the reader's domain of expertise. Rather the goal of the present paper is to introduce approaches from other fields such as intercultural communication, experience design, and psychology that are complementary. Please submit your feedback to emraybo@sandia.gov.

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