Metacognition and the Development of Intercultural Competence

H. Chad LANE
Institute for Creative Technologies
University of Southern California, USA

Abstract. We argue that metacognition is a critical component in the development of intercultural competence by highlighting the importance of supporting a learner's self-assessment, self-monitoring, predictive, planning, and reflection skills. We also survey several modern immersive cultural learning environments and discuss the role intelligent tutoring and experience management techniques can play to support these metacognitive demands. Techniques for adapting the behaviors of virtual humans to promote cultural learning are discussed, as well as explicit approaches to feedback. We conclude with several suggestions for future research, including the use of existing intercultural development metrics for evaluating learning in immersive environments and to conduct more studies of the use of implicit and explicit feedback to guide learning and establish optimal conditions for acquiring intercultural competence.

Keywords. intercultural competence, metacognition, intelligent tutoring systems, serious games, immersive learning environments, experience manipulation

Introduction

Learning and adapting to a new culture is a significant challenge. In different cultural contexts, interpersonal and communicative behaviors that seem natural may produce unexpected results. For example, simple habits such as nodding and other forms of backchannel feedback can lead to unintended agreements that may, in turn, negatively affect trust, reputation, and so on. It is certainly important for someone who will be spending time in a new cultural context to prepare and be prepared for what awaits them. This is the problem cross-cultural education programs attempt to solve.

A common approach is to provide a learner with a long list of "do's and don'ts" specific to the country or culture they will be experiencing. While straightforward and easy, this approach relies heavily on rote learning and produces little or no deep understanding of culture. It also ignores empirical evidence that to develop intercultural competence in a general way, people need to move through identifiable stages of development [3,11,13,20]. Rushing to the point of behavior adjustment with limited or no understanding of the underlying cultural reasons can be problematic. True intercultural competence requires (at least) a heightened sense of self-awareness, an ability to self-assess, enhanced perceptive abilities, and a proclivity to reflect on experience. In other words, intercultural development requires metacognitive maturity. This paper is about this process and how immersive learning environments and intelligent tutoring can be used to promote intercultural learning.

1. Metacognition in learning

Metacognition involves active control over cognitive processes during problem solving. For example, when one is solving an algebra equation, cognition refers to the activities necessary to solve it, such as identifying rules to apply, applying them, finding a solution, and so on. Metacognition refers to a higher order of thinking that operates on these cognitive activities, such as planning, analyzing, assessing, monitoring, and reflecting on problem solving decisions and performance. Metacognition also enables more effective learning. A learner who is able to accurately gauge his or her own understanding is better equipped monitor his or her own progress. This typically involves *self-questioning* and is part of the larger notion of *metacognitive regulation* [6].

Metacognitive skills can be taught. Numerous classroom studies have shown that explicitly teaching metacognitive strategies in the context of a specific domain (e.g., physics) can improve learning outcomes [5, p.19]. Strategies taught in these studies integrate metacognitive activities with cognitive and seek to make the steps of analyzing, planning, assessing, and reflection habitual in the learner. Studies have also shown that learning is more effective when learners explain worked out solutions to themselves [7]. This phenomenon, which better learners do spontaneously, is known as the *self-explanation effect*. It can also be taught [8]. More recently, computer tutors focusing on teaching metacognitive skills have shown positive effects on learning behaviors (e.g., [1]).

2. Developing intercultural competence

2.1. The Peace Corps model

Peace Corps volunteers are told to expect four levels of cultural awareness when they begin a new assignment in a foreign country [10, p.199]:

1. **Unconscious incompetence**: minimal awareness of cultural difference or mistakes made; a state of "blissful ignorance".
2. **Conscious incompetence**: basic realization of cultural difference; minimal understanding of underlying reasons or their significance.
3. **Conscious competence**: increased understanding of differences; deliberate behavioral adjustments are made to reduce cultural errors and misunderstandings.
4. **Unconscious competence**: culturally appropriate behavior is more or less automatic; one's "instincts have been reconditioned."

Peace Corps educators have therefore recognized that a certain level of metacognitive maturity is needed to become interculturally competent. For example, to move from unconscious to conscious incompetence, one must realize that what seems "normal" may be considered strange by people from another culture. It must be recognized that any peculiar observed behavior is likely in reaction to the learner. For people with underdeveloped metacognitive abilities, there is a real risk these connections will fail to be made, leading them to conclude the strangeness they perceive is inevitable and beyond their understanding.

2.2. The Developmental Model of Intercultural Sensitivity

The Peace Corps model is useful as a teaching tool, but was not designed as an explanatory scientific model. The Development Model of Intercultural Sensitivity (DMIS), created by Bennett [3], is such a model. It is intended to explain how people *construe* cultural difference

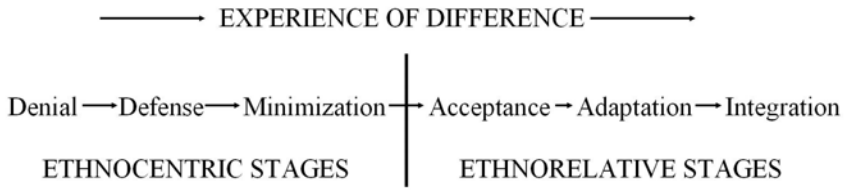

Figure 1. The Developmental Mode of Intercultural Sensitivity [3].

and how this ability becomes more flexible with time. By construe, Bennett is referring to Kelly's [16] constructivist view that experience is a function of how one assigns meaning to events that occur in their lives. It is not simply a matter of being present during some event or set of events, but rather how those events are interpreted, encoded into memory, and later remembered. An underlying assumption of the DMIS is that as one's ability to construe cultural differences evolves, intercultural competence also increases. According to Bennett, "it is the construction of reality as increasingly capable of accommodating cultural difference that constitutes development" [3, p. 24].

What constitutes a cultural difference for someone? It depends on that person's *cultural worldview*, which is defined as the set of distinctions the person draws from to construe events in the world. A monocultural person – one who has primarily experienced a single culture in his or her life – will be unable to construe perceived differences from outside that cultural worldview. On the other hand, a person with a broader understanding is generally able to understand, even assume, other cultural worldviews. Hammer and Bennett summarize: "The crux of the development of intercultural sensitivity is attaining the ability to construe (and thus to experience) cultural difference in more complex ways" [11, p.423]. The DMIS is a posits two broad worldview orientations: *ethnocentrism* and *ethnorelativism*. Each consists of three stages and are described below. The model is summarized in figure 1.

Bennett defines ethnocentrism as an assumption that "the worldview of one's own culture is central to all reality" [3, p.30]. Further, an ethnocentric person will implicitly assume that all others share this same worldview. The first ethnocentric stage is *denial of difference* in which the learner ignores or neglects differences. The next stage is *defense against difference* which includes recognition of cultural difference, but with negative evaluation. This stage is characterized by an "us vs. them" mindset and overt, negative stereotyping. The last ethnocentric stage is *minimization of difference* and includes the first signs of considering another cultural worldview. In this stage, the learner emphasizes similarities between cultures and recognizes only superficial cultural differences. Comments such as "we are all the same" are common at this stage. Guidance is especially important because some learners believe minimization is the ultimate stage of growth. When reality sets in that cultural differences are truly significant, there is a risk of withdrawal [3, p. 44].

The remaining three stages represent a shift to the ethnorelative orientation and are characterized by a basic understanding that one's culture is but one out of many valid worldviews. The first ethnorelative stage is *acceptance of difference* in which the learner recognizes and appreciates cultural differences. Cultural difference evokes positive feelings in the learner for the first time. The next stage, *adaptation to difference*, is akin to the Peace Corps "conscious competence" stage in that the learner makes an asserted effort to take the perspective of others. Because of this "frame shifting" ability, the learner can more easily interact with people from other cultures. The final stage is *integration of difference*: the learner has internalized multiple cultural worldviews and can easily assume different perspectives. Integration is an advanced stage often requiring years of experience to achieve.

2.3. Metacognition and the DMIS

Metacognitive skills are critical for advancement through the DMIS stages. Given that the model is based on how one construes cultural differences, it follows that a learner must become aware of the construal process [16], how it works and how to assess their own construal abilities. The following metacognitive skills (at least) are related to the DMIS:

- *Enhanced perceptive abilities* are needed to consciously recognize cultural differences without reacting to them immediately.
- *Self-assessment* failures on one's own interactions can hinder progress through the DMIS stages. This feeds into *self-monitoring* and tracking through the stages.
- *Cultural self-awareness*, defined as an understanding of one's own culture, is an important aspect of movement from ethnocentrism to ethnorelativism [2].
- *Self-regulated learning* is part of intercultural developmental: "Generally, people in the later phase of adaptation know how to orchestrate their own learning" [3, p. 59].
- *Planning and goal-setting* can support progression through DMIS stages, such as seeking to reach a specific stage or to understand specific cultural differences.

Bennett addresses metacognition in his discussion of the final stage, *integration of difference*. He explains how one's identity is not lost in an ethnorelative state:

> Rather, the integrated person understands that his or her identity emerges from the act of defining identity itself. This self-reflective loop shows identity to be one act of constructing reality, similar to others that yield concepts and cultures. By being conscious of this dynamic process, people can function in relationship to cultures while staying outside the constraints of any particular one. (p.60)

The risk is that some learners may feel like their culture and individuality is lost once they reach this advanced stage. Bennett's point is that the learner must also accept this redefined and more advanced understanding of self – one that relies on metacognitive maturity. Of course, reaching this is well out of the scope of any educational approach; but, it does make a strong case for nurturing an intercultural learner's metacognitive skills. The Peace Corps' approach is consistent with it [10], as are other training programs [14,18]. The rest of this paper explores how immersive learning environments may provide additional support.

3. Intelligent techniques for guided cultural learning

3.1. Immersive cultural learning environments and virtual humans

Technologies such as virtual reality and photoreal 3D graphics are particularly important when considering cross-cultural training. High fidelity simulations make it possible to create realistic portrayals of the products of different cultures, such as architecture, dress, sounds, art, and even smells. This can promote the learner's sense of immersion and provide a foundation for identifying *objective* cultural differences. Two such environments are shown in figure 2. The first is the Tactical Iraqi Language and Culture Training System (TLCTS) developed by Tactical Language Training, Inc. [15]. TLCTS teaches Arabic language and cultural skills. In the mission environment (shown in the screenshot), a learner is free to explore an Iraqi village, hear the sounds, speak to locals, and make gestures. The clothing, buildings, and surroundings are realistic and thus can give a learner a sense of what it might be like to walk around an Iraqi village. In this way, the system is already in a position to aid in the learner's identification of cultural differences.

Figure 2. Examples of immersive cultural learning environments: (left) Tactical Iraqi Language and Culture Training System [15] and (right) the Adaptive Thinking and Leadership simulation [21]. Used with permission.

The screenshot on the right in figure 2 is from the Adaptive Thinking and Leadership (ATL) simulation game [21]. ATL is a team-training system that uses human role players for both sides in intercultural scenarios. In-game assessment is performed by peers and instructors who observe play and after-action review (AAR) facilities are available to convey the outcomes to trainees. Learners are often assigned to role play as people from different cultures, with appropriate backstories and goals. Role-playing is a well-developed technique in the crosscultural training literature [18] and consistent with the DMIS with respect to the goal of understanding different cultural worldviews.

In multi-player environments, like the ATL system, inhabitants are human roleplayers. This can be costly and sometimes challenging to control from an educator's point of view. Research in *virtual humans* provides an alternative or supplement to cultural team-training in immersive learning environments. Virtual humans combine artificial intelligence (AI) research in cultural and emotional modeling, speech processing, dialogue management, natural language understanding, and gesturing, among others, to enable natural feeling communication and interaction with computer-controlled characters that listen and respond to the user. Virtual humans are driven by rich models of tasks, emotion, body language, and communication [22]. The underlying representations readily support explanation, which can be useful for learning [9]. In the case of intercultural education, it is therefore important to endow virtual humans with models of culture and the ability to explain their actions and reactions in terms of their cultural worldview. It is also important that their behavior be controllable in order to establish conditions that best promote learning.

3.2. Experience manipulation and implicit feedback

Generally speaking, computer simulations simulate real world phenomena as accurately as possible. There are circumstances when it is appropriate to consider goals other than fidelity when deciding how a simulation should behave and what events should occur. For instance, to enhance entertainment value, a popular basketball video game includes special modes that allow players to jump well over ten feet high. In this case, the goal of entertaining the human player trumps the goal of simulating basketball completely realistically. In the case of learning, the same idea applies: if a certain event or situation will promote learning, then the simulation should seek to make that event happen. We refer to this general technique as *experience manipulation* and now discuss several ways it might be used to promote metacognitive growth and cultural learning.

Figure 3. Culturally influenced expressions of anger, skepticism, and appreciation by virtual humans [9,22].

When a cultural error is committed, or when appropriate actions are taken, learners need support in (at least):

- *recognizing* that an error was committed (or that a good action was taken)
- finding a causal link between the action taken and the observed reaction
- understanding the reason(s) and culpable underlying cultural differences
- learning how to avoid the same mistake in the future (or sustain good actions)

It is important to go beyond simply concluding to avoid the same behavior in the future since this will contribute little in the learner's progression through the DMIS stages. Also, the stage a person is in impacts how cultural differences are interpreted. Someone in the denial phase may not even be willing to accept the fact that a cultural error even occurred, for example. Someone in the other two ethnocentric stages (defense and minimization) may be aware an error occurred, but unwilling to take blame or perhaps place the onus on the virtual human to be the one who should adapt. Based this understanding of cultural growth, the reaction of a virtual human to a cultural error should be appropriate for that learner.

Feedback from the simulation itself, such as the oral and gestural reactions of virtual humans, is called *implicit feedback*. To support recognition of cultural errors, there are several strategies that can be used adjust implicit feedback to promote learning. One of the simplest is to accentuate verbal responses of characters to draw more attention to anger or negative feelings, in the case of an error. Similarly, implicit positive feedback can be achieved by accentuating positive and laudatory responses to correct user actions. In some cases, it may even be appropriate for the virtual human to deliver an impassioned mini-lecture regarding the cultural issues in question. The choice of words by the virtual human can be designed to refer directly to actions taken by learner to support the pedagogical goal of linking cause and effect in the learner's mind. In addition, the virtual human might also drop hints regarding the underlying cultural differences. Body language and gestures can have a dramatic effect on the communicative power of utterances. Figure 3 shows several virtual humans in different emotional states and displaying a variety of gestures. The timing and emphasis of these gestures can be adjusted to meet pedagogical goals in a way similar to the utterance content. Aside from body language, other features that might be adjusted in virtual humans are facial expressions, speech rate, intonation, and tone, emotional state, and personality traits.

3.3. Experience management and interactive narrative

The techniques described in the previous section all focused on emphasizing specific details of interacting with virtual humans to support the learner in recognizing cultural difference and improving their ability to self-assess in an interpersonal context. Of course, explanations for why certain behaviors are culturally offensive can be very complex. They may involve fundamental differences between worldviews, varying ethical standards, social structure, historical and geographical factors, and so on. A deep understanding of culture includes these advanced notions and may enable a learner to go beyond rote learning by providing the knowledge needed to reconstruct appropriate surface behaviors later. Cultural simulations should provide diverse cultural experiences that go beyond one-on-one interactions and carefully manage how events are presented and experienced by the learner.

One such technology focusing on experience management is *automated story directing* (ASD) [23]. The goal is similar to that of a traditional tutoring system: allow users to feel as much freedom as possible, but keep them on certain paths that consist of certain experiences. The "path" in an interactive storytelling system is a storyline consisting of plots, arcs, events, and other narrative elements. Users may "break" a storyline by taking actions in the virtual world, and so ASD systems use a variety of techniques, like reactive planning, to repair storylines and re-plan when new events are deemed desirable. Often, the aim is to maximize engagement. For cultural training, the additional aim is to create situations and conditions that promote practice and learning.

Metacognition comes into play when we consider the learner's role in the narrative. She or he must be aware that the actions being taken are being observed by the AI agents in the simulation and that choices being made have observable outcomes. Just as minute details of interaction can be manipulated to highlight differences, so can story elements. For example, if a learner makes a gender-related error early in a game, the ASD may decide to propagate this knowledge through the social network to force the learner to enter future encounters with this baggage. Here the goal is not only to teach gender specific cultural differences, but also to encourage consideration of unintended cultural consequences of earlier actions. This requires the metacognitive abilities to self-assess over an extended period, reaching back further than just the most recent action, and the ability to predict (another metacognitive skill). After dealing with negative consequences of actions, it is hoped that a learner will become more likely to consider possible unintended outcomes of actions before taking them.

3.4. Guidance and feedback

Inherent risks exist in unguided environments, such as inefficient learning, the formation of misconceptions, and development of incomplete or fragmented knowledge [17]. Experience manipulation and implicit feedback can certainly mitigate these risks to a certain degree, but to adequately address the needs of novice and intermediate learners, *explicit feedback* from a human tutor, pedagogical agent, disembodied coach, or other form of intelligent tutor has the potential to greatly enhance learning (e.g., [4]). Explicit guidance can come in different forms in an immersive learning environment. A pedagogical agent who plays a role in the underlying simulation is a popular approach. The TLCTS [15] and the mission rehearsal exercise described in [22] both provide pedagogical agents in the form of a knowledgeable Sergeant who maintains an understanding of the cognitive goals and can give hints on how to succeed. Another form is that of a disembodied tutor that posts messages in a special area of a GUI or via speech. No matter what the modality, explicit feedback provides more direct and understandable guidance than implicit – this is especially important for novices [17].

Immersive learning environments can be overwhelming at times. With respect to cultural learning, explicit hinting and feedback can help learners in several ways:

1. confirm a learner's interpretation of observed virtual humans behaviors
2. explain the cultural differences in play during specific interactions
3. explain the "under the hood" reasoning of a virtual human
4. hint about ideal actions to take or warn against certain risks
5. suggest the learner identify possible outcomes and desirable end states

Explicit tutorial feedback removes a level of interpretation for the learner. Rather than guessing or inferring the cognitive and emotional states of virtual humans, a clear statement by a tutor can act as a strong scaffold for learning in immersive cultural environments. There are certainly cognitive aspects to the tactics listed above, but they also address the metacognitive demands of intercultural development. Tactics 1-3 encourage self-assessment by describing the impact of a learner's actions on a virtual human. Because this is feedback being delivered in a real-time environment, the issues of distraction and cognitive overload need to be considered. Thus, it is ideal to keep "in-game" feedback short and precise, saving the longer explanations for post-practice reflection. This is the approach taken in the ELECT Bi-Lateral negotiation game [12]). Hinting (tactic 4) can be direct (and at the cognitive level), but also can be used to encourage the learner to think about pros and cons of taking different actions – this is especially important in ill-defined domains where assessment is inherently challenging [19]. The content of tactics 1-4 are precisely the things we want the learner speculating on before acting in the environment. In other words, the ultimate aim is for the learner to self-guide in these precise ways. Such cognitive activities by the learner would constitute attempts at self-explanation. Tactic 5, identifying potential end states, is a purely metacognitive tactic that is geared towards supporting goal formation and identifying "what right looks like." Encouraging the learner to "think before acting", to engage in planning and simulate hypothetical actions, and "reflect after acting" are at the core of metacognitive maturity and a fundamental requirement for growth through the DMIS stages.

Tutorial sub-dialogues are rarely possible in real-time environments, and so there is time only for very brief periods of reflection. However, once a practice session or exercise is complete, there is time to carefully target metacognitive skill development. Immersive learning environments should therefore provide supporting tools such as video playback. Reflective tutoring is an appropriate supplement to guide the use of these tools and to fill in the gaps from feedback that was delivered during practice. The reflective tutoring system built for the virtual humans [9,12] walks the student through three questions: (1) What happened? (2) Why did these events occur the way they did? and (3) How can good performance be sustained and poor performance be improved? A promising approach here is to leverage explanation facilities of virtual humans to uncover their thinking via explanation [9] and discover what other actions may have produced better outcomes. An advanced tactic is to restart the simulation to give the learner a second chance (a "mulligan"). Reflection at this point may enhance self-assessment skills and intercultural growth.

4. Conclusions and suggestions for future research

This paper has argued that achieving intercultural competence requires strong metacognitive abilities. Although cross-cultural training programs frequently adopt metacognitive approaches to teaching intercultural competence, the connection is rarely made explicit. The Peace Corps approach is an example of this that describes growth as a continuum from unconscious incompetence (not knowing anything and being blissfully unaware of

differences) to unconscious competence (full awareness of differences and appropriate behavior is second nature). By describing these stages, the learner put in a position to self-monitor their advancement. This then requires application of other metacognitive skills, such as self-assessment, self-explanation and self-regulation, to progress through the stages. The Developmental Model of Intercultural Sensitivity (DMIS) is an empirically derived and validated model of intercultural development based on notion of how cultural differences are "construed" by a learner [3,11]. To develop intercultural competence, it is necessary to construe cultural difference in progressively more complex ways, such as from different cultural worldview perspectives. Growth here also requires mature metacognitive abilities and it may be possible to promote these skills in modern immersive learning environments through a combination of experience manipulation and explicit guidance. The DMIS suggests cultural difference as the pivot point for intercultural growth, and so careful direction of virtual humans and delivery of feedback that targets self-assessment, predictive, and reflection skills has the potential to speed the growth to intercultural competence.

Early evaluations of TLCTS [15] and the ELECT BiLAT [12] serious games have shown some promising results with respect to learning aspects of specific cultures. Most of the computer simulations built for cultural education have not undergone rigorous experimental evaluations for learning or for intercultural development. Hammer and Bennett's Intercultural Development Inventory (IDI) [11] has been used to validate the DMIS and may provide a suitable metric for determining the value-added, if any, that comes from augmenting cultural training programs [18] with immersive learning environments – especially if the IDI can be administered repeatedly and rates of change can be tracked. Other more general questions about feedback are suggested for further study. For example,

- Does implicit pedagogical feedback break immersion?
- If so, what is the cost (if any) to breaking immersion with respect to learning?
- What is the interplay between implicit and explicit feedback?
- What situations merit the use of explicit feedback?

The use of implicit feedback and experience manipulation is perhaps one of the most important open questions to address. The instructor interface to the ATL serious game [21] provides the ability to throw "curve balls" to teams during their missions, such as helicopter fly-overs. These are intended to support the development of adaptive thinking skills under stress. This is related to research in the ITS community on intelligent problem selection and finding the appropriate level of challenge for a learner. These connections need further exploration, as does the reasoning behind expert instructors' decisions to throw curve balls: What are the triggers? How do instructors decide which curve ball to throw? The answers may not always involve metacognitive skills, but as this paper has attempted to argue, manipulations of this sort in an intercultural context may be ideal to highlight cultural differences to give learners practice in dealing with them. This may enhance the development of intercultural competence, but empirical research is certainly needed to confirm this hypothesis.

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References

[1] V. Aleven, B. McLaren, I. Roll, & K. Koedinger. Toward meta-cognitive tutoring: A model of help-seeking with a cognitive tutor. *Int. Journal of Artificial Intelligence in Education*, 16:101–130, 2006.

[2] J. M. Bennett. *Intercultural communication training in cultural self-awareness for study abroad*. PhD thesis, University of Minnesota, October 1985.

[3] M. J. Bennett. Towards ethnorelativism: A developmental model of intercultural sensitivity. In R. M. Paige, Ed., *Education for the Intercultural Experience*, 21-71. Intercultural Press, Yarmouth, ME, 1993.

[4] B. S. Bloom. The 2 sigma problem: The search for methods of group instruction as effective as one-to-one tutoring. *Educational Researcher*, 13:4–16, 1984.

[5] J. D. Bransford, A. L. Brown, and R. R. Cocking, editors. *How People Learn: Brain, Mind, Experience, and School*. National Academy Press, Washington, DC, 2000.

[6] A. L. Brown. Metacognition, executive control, self-regulation, and other more mysterious mechanisms. In F. E. Weinert and R. H. Kluwe, editors, *Metacognition, motivation, and understanding*, pages 65-116. Lawrence Erlbaum Associates, Hillsdale, New Jersey, 1987.

[7] M. T. H. Chi, N. de Leeuw, M. H. Chiu, and C. LaVancher. Eliciting self-explanations improves understanding. *Cognitive Science*, 18(3):439–477, 1994.

[8] M. T. H. Chi, S. Siler, H. Jeong, T. Yamauchi, and R. G. Hausmann. Learning from tutoring: A student-centered versus a tutor-centered approach. *Cognitive Science*, 25:471–533, 2001.

[9] M. G. Core, D. Traum, H. C. Lane, W. Swartout, J. Gratch, M. vanLent & S. Marsella. Teaching negotiation skills through practice and reflection with virtual humans. *SIMULATION*, 82(11):685-701, 2006.

[10] Peace Corps. *Culture matters: The peace corps cross-cultural workbook*, 1999.

[11] M. R. Hammer, M. J. Bennett, and R. Wiseman. Measuring intercultural sensitivity: The intercultural development inventory. *International Journal of Intercultural Relations*, 27:421–443, 2003.

[12] R. W. Hill, J. Belanich, H. C. Lane, M. G. Core, M. Dixon, E. Forbell, J. Kim, and J. Hart. Pedagogically Structured Game-based Training: Development of the ELECT BiLAT Simulation. *In Proceedings of the 25th Army Science Conference*, 2006.

[13] D. S. Hoopes. Intercultural communication concepts and the psychology of intercultural experience. In M. D. Pusch, editor, *Multicultural education: A cross cultural training approach*, pages 10–38. Intercultural Network, Inc., La Grange Park, IL, 1979.

[14] D. S. Hoopes and M. D. Pusch. Teaching strategies: The methods and techniques of crosscultural training. In M. D. Pusch, editor, *Multicultural education: A cross cultural training approach*, pages 104–204. Intercultural Network, Inc., La Grange Park, IL, 1979.

[15] W. L. Johnson, H. Vilhjalmsson, and S. Marsella. Serious games for language learning: How much game, how much AI? In C.-K. Looi, G. McCalla, B. Bredeweg, and J. Breuker, editors, *Proceedings of 12th International Conference on Artificial Intelligence in Education*, pages 306–313. IOS Press, 2005.

[16] G. A. Kelly. *Theory of personality: The psychology of personal constructs*. Norton, New York, 1963.

[17] P. A. Kirschner, J. Sweller, and R. E. Clark. Why minimal guidance during instruction does not work: An analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry-based teaching. *Educational Psychologist*, 41(2):75–86, 2006.

[18] M. Mendenhall, G. Stahl, I. Ehnert, G. Oddou, J. Osland, and T. Kühlmann. Evaluation studies of cross-cultural training programs: A review of the literature from 1988 to 2000. In D. Landis, J. M. Bennett, and M. J. Bennett, eds., *Handbook of intercultural training*, pp. 129–144. Sage, Inc., Thousand Oaks, CA, 2004.

[19] A. Ogan, V. Aleven, and C. Jones. Culture in the classroom: Challenges for assessment in ill-defined domains. *In Proceedings of the Workshop on Intelligent Tutoring Systems for Ill-Defined Domains at Intelligent Tutoring Systems*. Jhongli, Taiwan, 2006.

[20] R. M. Paige, M. Jacobs-Cassuto, Y. A. Yershova, and J. DeJaeghere. Assessing intercultural sensitivity: An empirical analysis of the Hammer and Bennett Intercultural Development Inventory. *International Journal of Intercultural Relations*, 27:467–486, 2003.

[21] E. M. Raybourn. Applying simulation experience design methods to creating serious game-based adaptive training systems. Interacting with Computers, 19:206–214, 2007.

[22] W. Swartout, J. Gratch, R. Hill, E. Hovy, S. Marsella, and J. Rickel. Toward virtual humans. *AI Magazine*, 27(2):96–108, July 2006.

[23] R. M. Young. Towards an Architecture for Intelligent Control of Narrative in Interactive Virtual Worlds. *In Proceedings of the 2003 International Conference on Intelligent User Interfaces*. Miami, FL, 2006.