Training Healthcare Providers to Confront Diversity in Clinical Settings

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ABSTRACT

The military healthcare system serves personnel from diverse ethnic and demographic backgrounds, who face diagnoses that at one level are equalizers: coronary disease is coronary disease, breast cancer is breast cancer. Yet the differing expression of disease in individuals from different backgrounds, and individual patient experience of disease as a particular illness vary enormously, and thus so do interactions between patients and providers in any given encounter. Clinicians, in fact, vary greatly in their understanding of individual and cultural variability issues, as traditional training in these areas relies on a system of apprenticeship and exposure over time to multiple populations. Consequently, providers are often thrown into situations where clinical communications falter through inadequate direct experience, making patient diversity a critical variable in the encounter outcome. Recent research suggests that experiential training virtual environments can compensate for the randomness and length of the traditional approaches to learning clinical communication skills relating to individual and cultural differences. A training system based on this approach has been developed to improve skills in delivering culturally sensitive care to African-American women with breast cancer. The system, called TEACH (Training to Enable/Achieve Culturally Sensitive Healthcare), was developed to enhance healthcare provider skills in delivering culturally sensitive care to African-American women with breast cancer. The system uses a population of virtual patients who incorporate underlying models of differing individual and sub-cultural beliefs about breast cancer that can affect the patient's communication with the clinician as well as the patient's approach to treatment. Users (clinicians or medical students) interact with these synthetic patients at virtual clinical encounters representing different stages of the disease progression. The cognitive and cultural models that drive the synthetic patient behavior are discussed, along with the instructional model and (generalizable) system design and architecture.

ABOUT THE AUTHORS

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WAYNE ZACHARY is an internationally recognized leader in applied cognitive science, specifically in the development and application of novel instructional models for computer-mediated learning, and the development and application of cognitive architectures for intelligent training system uses. He pioneered the use of cognitive-model based avatars for team and soft-skills training in virtual and constructive synthetic environment, as well co-developed the intelligent guided practice instructional model, which integrates the use of synthetic instructors, synthetic characters, and scenario-based curricula to provide individualized tutoring with guided practice and objectives-based pacing and student feedback. He received a B.A. *summa cum laude* from the Cleveland State University, and an M.A. (anthropology), an M.S. (computer science), and a Ph.D. (cognitive anthropology) from Temple University.

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BACKGROUND

The practice of all forms of medicine is heavily reliant on the communication skills of the clinician. The success of the communication between doctor, nurse, technician, etc. and patient has large and direct consequences on the quality of information elicited, diagnosis and treatment plans, patient behavior, and ultimately clinical outcomes. When cultural or subcultural differences exist between practitioner and patient, the communication can be and often is negatively affected if the clinician is not sensitive to the cultural/subcultural beliefs, attitudes, communication styles, norms and/or fears of the patient (or patient surrogate). As societal diversity increases, these issues become more significant in terms of the magnitude of their impact.

American society is one of the most diverse in the world, and the active duty population in the US military mirrors this diversity. The military medical establishment faces this problem even more so than other areas of the military, because it cares for not just active duty personal, but their families and dependents and (through the Veterans Administration) for separated and retired personnel on a long term basis as well. Military health-providers, like their civilian counterparts, emerge from a training system that gives short shrift to communications skills in general, not to mention those particular "soft skills" requisite to effective clinical management of the many ethnically- and gender-diverse subpopulations that make up the U.S. military healthcare population.

This state of affairs is not unappreciated. Particularly in recent years, there have been a series of clarion-calls to rectify it from professional organizations and medical thought-leaders (e.g., Hodge, et al., 1998; Kundhal 2003). Virtually every medical specialty represented within the military and without, including important surgical subspecialties responsible for the care of battlefield-wounded (AAOS 2009), have called for specific, measurable improvements in providers' ability to confront diversity, partly for purposes of improving the care of specific patients, and partly for purposes of reducing larger sociocultural disparities (Betancourt 2003). Unfortunately, and for myriad reasons including the sheer lack of time for appropriate communication (Fiscella 2008), the response of the medical-training community has been partial at best: position papers, conceptual models (Brach 2000), or programmatic statements of ideal outcomes and of needed interventions. Specific training approaches to meeting these now widely recognized needs have been noticeably pallid and conventional, such as brief lecture-style interventions followed by posttest assessments. At the same time, emerging science of learning results on learning of teamwork, interpersonal, and/or communication skills (Federation of American Scientists, 2003; Salas & Cannon-Bowers, 2001; Matuieu et al., 2000) that argue in favor or experiential learning in a deliberative, guided practice context, have been un-mined resources in addressing the development of clinical communication skills for patient population diversity. The research reported here sought to address this deficiency by exploring how these approaches could be applied to this training problem.

The general subject of cultural sensitivity in clinical communication is by itself too broad to be addressed in a single example or single curriculum. Rather, a representative case is needed in which to frame and study and evaluate the results. The representative case chosen here was that of breast cancer and African American women. Breast cancer is the most common form of cancer and the second leading cause of death among African American women (American Cancer Society (ACS), 2003). African-American women have a 28% higher death rate compared with white women. There are many barriers that ethnic minority women face to successful cancer prevention, treatment and palliation. In particular, it has been found that differences in beliefs and communication styles can pose significant obstacles to illness management and

quality of care (see Ashing-Giwa, Padilla, Tejero, & Kim, 2004; McDonald, Thorne, Pearson, & Adams-Campbell, 1999; Mathews, 2000). The inability of healthcare providers to take into account cultural and language differences and variance of health beliefs, values, and practices impedes their ability to deliver responsive healthcare to these populations (Guidry, Mathews-Juarez, & Copeland, 2002). On the other hand, culturally sensitive providers can ensure that ethnic minority women, generally, and African American women, specifically, receive care that is compassionate and empowering for them. Thus, this diseases-specific and subculture-specific problem represents a bounded yet highly substantive case within which to explore the broader issues of new training approaches for clinical communication skills. In specific, his research sought to create a realistic, high-fidelity training system that embodies not merely didactic descriptions of cultural expectations or norms observed in ethnically- and gender-diverse populations, but also the actual interactive interpersonal experiences known to exist when physicians confront diversity in such populations. Called TEACH (Training to Enable & Achieve Culturally Sensitive Healthcare), this system takes a general and extensible approach to improving diversity-oriented clinical skills training, built with an initial panel of interactive clinical cases that explore all aspects of the appropriate care of female African-American breast cancer patients (AABCPs).

TRAINING APPROACH

We approached this training problem with a hypothesis that skills involving person-to-person communication, teamwork, understanding of human behavior and other broad types of interpersonal skills, require extensive experiential practice before they can be reliably and independently applied by the learner in a broad range of everyday situations. However, providing *only* experiential training via a game-based virtual clinical encounter is likely to be just as limiting and ineffective as providing *only* lecture-based presentation of abstracted information on cultural sensitivity or on a specific (sub-)culture. This is because the game-based experiences address only one aspect of the skill- and knowledge-development process – that of experiential application or practice. While essential to learning, practice must be combined with three other broad functions to achieve effective training. Specifically, practice must be:

- supplemented with didactic instruction such as demonstration, lecture or presentation;
- guided with individualized scaffolding to provide coaching and/or feedback and that directly or indirectly promotes deliberative learning (Ericsson et al., 1993) and introspection; and
- managed through formative and summative assessments that provide standards-based evaluations of the learner's progress toward the learning objectives.

The last function above points out the purposiveness of training, in that it is based on explicit learning objectives. In TEACH, the learning objectives drive not only the assessment process, but also the sequencing and management of the didactic instruction and practice process as well. The learner is systematically paced through a cyclic curriculum of instruction, practice, and assessment in a way that takes the learner systematically (if individually) toward the goal of achieving and demonstrating competence in the specific objectives of the training. Thus, the learning objectives strongly constrain the design of the practice environment (i.e., the game—the two terms are used interchangeably here) to ensure that it provides clear opportunities for practice and assessment of the various actions and knowledge that the trainee must acquire.

The development of this system therefore began with the creation of the instructional content via:

- instructional objectives,
- information to be provided through the didactic instruction,
- scenarios or problems that are presented to the learner in the game (including the synthetic patients that populate those scenarios), and
- assessments used to measure and pace the learner's progress.

This content development aspect is discussed in the following section. In parallel, the content is implemented as a training system; this aspect discussed after content development.

Content Development

Training for culturally competent communication requires not only knowledge of relevant cultural beliefs, barriers, and coping strategies, but also skill development in the art of communication. Thus, the overall learning objective was stated as follows:
"Upon completion of TEACH, the learner will be able to assess the patient's perspective as it relates to her cultural beliefs and be able to use effective listening, questioning, and response skills to match the patient's concern at that particular point in the clinical progression, leading to a patient who is assured of her

doctor-patient relationship and empowered to address her medical situation and outcome."
(The feminine form reflects the fact that the system addresses only female African American breast cancer patients, although about one in a thousand are in fact male).

To identify subsidiary training objectives, the literature on models of culturally competent communication and provider communication training in cancer care was reviewed and synthesized. A number of organizations published reports containing models or frameworks for training cultural communication (e.g., U.S. Department of Health and Human Services Office of Minority Health and Agency for Healthcare Research and Quality). Models that were determined to particularly support communication with African American Breast Cancer patients were: Stuart and Leiermann's (1993) BATHE model; Carillo, Green, and Betancourt's (1999) Eliciting Patient Information and Negotiating Model; Levin, Like, and Gottleib's (2000) ETHNIC model, and Betancourt, Carillo, and Green's (1999) ESFT model for communication and compliance. (Limited space here precludes a full discussion the subordinate, enabling, and terminal objectives in TEACH.)

Didactic Instructional Content

In addition to the culturally competent communication literature, the content used in the didactic instruction on communication skills also relied on literature relevant to physicians who are working with patients who have chronic and sometimes fatal conditions (Buckman 1992). Oncologists in particular face difficult encounters due to the patient's perspective of fears about physical illness, fears about psychological affects, fears about death, fears about treatment, fears about friends and family, and fears about finances, social status, and job. Furthermore, when the illness is fatal, oncologists face more specific areas:

- Facing the Threat (Initial Stage),
- Being ill (Chronic stage), and
- Acceptance (final stage).

Doctors also face their own fears in these situations: fear of causing pain, fear of being blamed, fear of therapeutic failure (no pill to cure the ill), fear of eliciting a reaction, fear of saying, "I do not know", fear of expressing emotions, fear of one's own death or illness, and fear of medical hierarchy (Buckman 1992). Seemingly, when both these patient and the doctor's perspectives are combined, behaviors are complex. In our case, these perspectives are also compounded by the cultural beliefs of the patient.

The didactic instruction component of this system focuses on engendering communications skills that elicit information about the patient's fears, attitudes, and beliefs. A main part of this aspect of the training is teaching the clinician to avoid communication strategies that can actually hinder culturally sensitive communication, such as:

- Asking closed questions to gather information quickly
- Utilizing judgmental responses, as it is in the nature of a professional to be judgmental
- Using assuring responses but before the patient's concerns were even heard
- Using empathic responses but as shortcuts before knowing how the patient really feels
- Inadvertently making assumptions about which fears are the most important for the patient.
- Determining a patient's reaction is characteristic only of the phase he or she is passing through or of a patient who does not seem to grasp what has been told to her.
- Not considering the patient's agenda for the meeting / consultation.
- Not exhibiting appropriate listening skills such as repeating, reiterating, or reflecting etc.

The interpersonal and communication skills learning objectives of the system are thus based on the clinician exhibiting the opposite (that is, aligning their own with appropriate) behaviors after the training is completed. For example, the clinician emerges from this learning phase asking open instead of closed-end questions in order expose the concerns of the patient.

Practice Scenario Design

The use of experiential practice to strengthen learning underlies the entire field of simulation-based training and has very recently been extended to game-based training as well. However, in the case of communications skills, the experiential practice involves interacting with other human beings, not just simulations of devices or systems. And, in this case, the simulated human beings involved had to reflect both the physical, linguistic, and cultural/cognitive characteristics of individuals from a specific cultural reference group. The development of practice scenarios in TEACH was therefore linked to the elicitation and modeling of specific cultural beliefs about breast cancer and of the ways in which these beliefs affect clinical communication.
These cultural communicative models are based on the work of Krashen (1981), who wrote extensively about

Second Language Acquisition. Krashen hypothesized what he called an "affective filter" or blocking mechanism in communication which involves variables of motivation, self-confidence, and anxiety. Krashen asserted that people whose affective filter was high, meaning, they possessed a negative attitude towards language learning with low levels of motivation and self-confidence and high levels of anxiety, would acquire less language and achieve less than those with a low affective filter. His theory, although not completely proven, has gone largely unchallenged.

For the purpose of developing a "patient profile," a parallel was made with the Krashen's "affective filter". This is termed the "patient-doctor filter effect". Patients in TEACH present with several possible filters, and they can be on the low end or the high end of the filter. A filter in this case is defined as viewing the world through a specific lens. This lens drives how one will communicate and interact with people. Patients on the low-end of a filter are not consumed by preconceived notions about how a conversation will flow and generally have a positive attitude. Patients on the high-end of a filter, on the other hand, have a perceived negative expectation about what type of interaction will ensue, and the conversation is shaped by this expectation. The higher a filter is, the more difficult it is for the physician to achieve a successful interaction.

As TEACH is aimed at instructing clinicians (not the patients), the learners are taught in the didactic instruction how to strategically recognize what filters, if any, are in play. In the experiential practice, they gain experience and feedback in attempting to use specific communication and conversational techniques to recognize and deal with patients with various filters. They can then reframe how to interact with the patient, leading to a successful clinical interaction.

Seven such filters were synthesized from the published literature; these could singly or in combination in any single patient. These filters drive the patient's expectations of the conversation, their behaviors, and their decoding of messages from the physician. The filters are:

- *Health Care Coverage equates with Quality of Care* – This patient may believe she is not going to get the best care due to either no or very little health insurance coverage.
- *Breast Cancer Equates with a Death Sentence* – This patient may not want to discuss tests since she is afraid they will discover late stage cancer. She seems unaware that cancer can be treated.
- *Breast Cancer Equates with Treatment causing Hair Loss and Loss of Sexuality* – This patient may think that she will need chemotherapy no matter what type or stage of breast cancer. She may also seem overly concerned about other effects on her physical appearance, as she is afraid to lose her spouse or significant other.
- *God Works Through Doctors* – This patient may place a lot of trust in the physician who is caring for, as she sees the physician's care as equal to the hands of God. Her belief that God will take care of it does not equate with a fatalistic view of her outcome but rather that God will see her through this.
- *Discrimination* – This patient believes from the onset of the conversation that she is being discriminated against due to her race. She is on the defensive and worries about not getting the best care.
- *Culturally Indispensable Roles as Caregivers* – This patient may deny having cancer or wanting to tell anyone about having cancer, since she feels that she is the head of the family.
- *In tragedy, preferred coping method is "Positive Reappraisal"* – This patient may view her cancer diagnosis with positivism and rely on spiritual support. She may also seem unaffected by the diagnosis, as she feels she has lived through worse things.

Practice scenarios are designed such that the clinician is provided several opportunities to react in different ways to a patient's question or statement. One of those ways leads to the most successful interaction, whereas the other ways lead to either continued worry or even anger on the part of the patient. For example, a patient with the Positive Reappraisal Coping Strategy states, in a calm voice, that she can handle whatever the physician has told her. The physician has a choice to either comment on her strength or to ask if she really understands the gravity of her situation. The former will lead to a successful interaction, whereas the latter may even anger the patient. This example demonstrates how TEACH combines both the filter concept and effective physician communication skills.

In addition to covering the range of belief-based communication filters, practice scenarios also had to span a full clinical progression for a given patient. In reduced form, the progression begins with an initial

clinical encounter at which a problem (such as a lump found on breast self-examination) is introduced. That encounter will lead to additional tests, that may lead to an initial diagnostic encounter. In this encounter the patient is first told of her diagnosis, going to discuss its meaning, possible outcomes, and treatment plans. Additional encounters occur during the treatment process, in which progress, problems, and the patient's concerns are discussed. Following treatment, whether successful or not, additional follow-up encounters take place to monitor progress, changes, and (again) patient concerns. Figure 1 depicts the interaction between belief filters and stages of the clinical progression.

Considering that the approach to deriving learning objectives was based on the filter concept and on identified relevant communication skills, the system lends itself to transference of communication skills from one set of filters to another. In other words, other minority populations and clinical contexts could also be analyzed in the same way, through literature review and subject matter expertise, in order to develop a set of filters related to that particular minority group.

IMPLEMENTATION OF INSTRUCTIONAL CONTENT

Our system was implemented using a game-based cultural training architecture VECTOR (Deaton et al., 2005) previously created by the research team. The system includes a didactic learning component implemented using the commercial product Toolbook, and a game-based practice component. In the practice game, the learner or player will progress through a series of scenarios, each of which involves interacting with a specific physical avatar or Non-Player Character (NPC) that possesses a specific belief filter and that is at a specific stage in the clinical progression. The interaction in the scenario is organized into transactions, in which each party (synthetic patient NPC and the trainee/clinician) each produce a discrete utterance. For the trainee, each utterance or turn is represented by a pre-defined set of utterances, from which the trainee must select one. The progress through the scenario depends completely on the trainee's choices; the synthetic patient will react differently on each path based on her belief filter.

In considering the range of characteristics which would need to be accounted for in the believability of the synthetic patient avatars, a range of dimensions affecting visual appearance and linguistic behavior were identified.

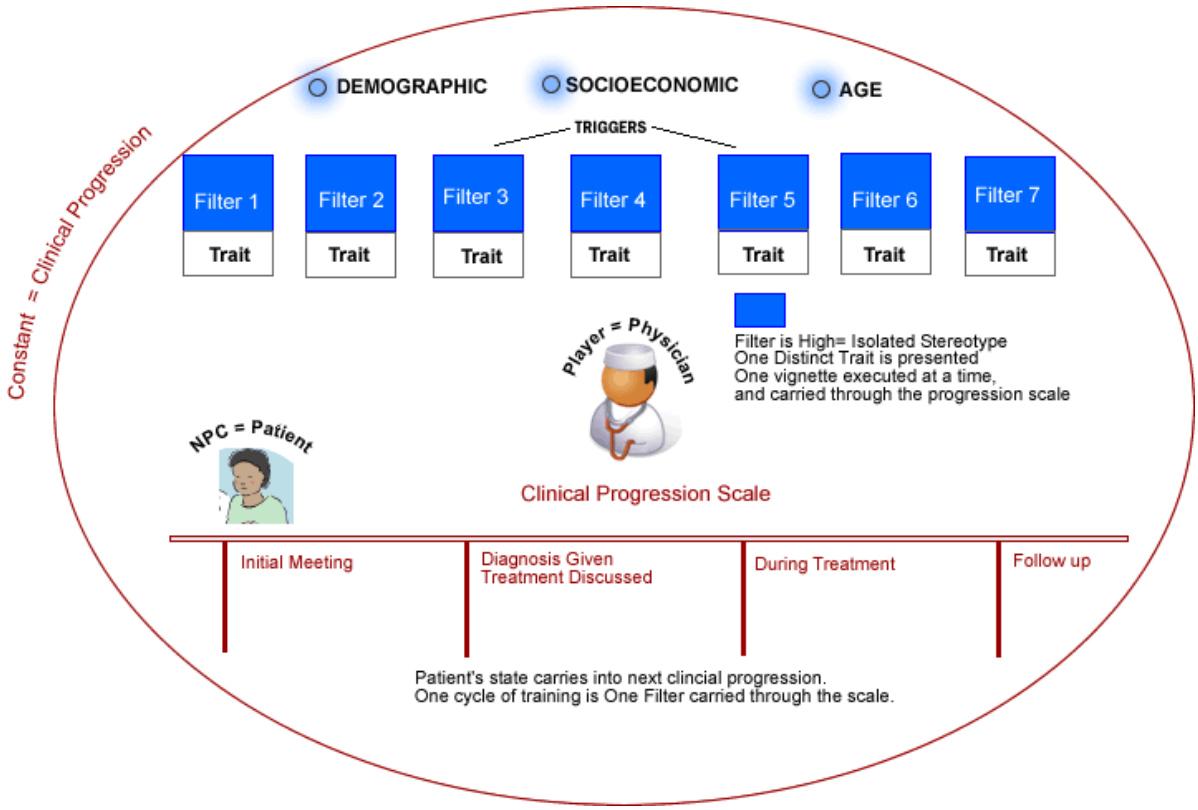

Figure 1. Instructional Model.

It was important to be able to vary the avatars along these dimensions in order to develop a range of representative patients. The core visual variables on which the set of avatars was developed were body-mass-index (segmented initially into lean and heavy prototypes), then age (divided between the two main age-groups of breast-cancer onset), then socio-economic status (evidenced by clothing, hair style, jewelry, etc.). Two prototype avatars were created and modeled in the 3ds Max graphics modeling environment – one each for high and low BMI conditions. Each of these avatar models was further bifurcated into a range of age-specific avatars, weighted more heavily towards an older demographic, representative to the typical clinical onset cancer. From this baseline set of avatars, a set of four older and two younger avatars were created. In order to accommodate scenarios across the clinical cancer-stages of disease progress (i.e., stage 1-4), a variant of each avatar was created in order to differentiate them from their "stage 1" states, typically by physically altering their appearance (e.g., wigs or scarves due to hair-loss after chemotherapy treatment).

This fidelity required of the synthetic patient avatars included a significant a range of affect and expressivity. Training requirements dictated that the scenarios needed to include voice-acted speech coupled with avatars capable of a range of para-linguistic expressivity. Because these features were not required in the creation of the VECTOR system, we were thus newly presented with a technology gap. To address this gap we integrated a high-fidelity character-animation and lip-syncing tool, FaceFX (King, 2008), in order to provide highly interactive avatars capable of conveying subtle non-verbal cues. The use of FaceFX provides a smooth pipeline for processing voice-acted wav files against avatar speech (i.e., dialog) and produces character asset files which are then used to drive high-realistic game avatars.

The TEACH synthetic patient avatars were associated with different belief filters, so that they could provide the trainee with realistic simulated clinical interactions with female African-American patients with breast cancer. During these interactions, the trainee is expected to maintain trust with the avatars by communicating in ways that show deference for the patients' cultural filters and communication expectations. The simulated patient speaks via a voice-actor while the physician-trainee selects responses via text presented on the screen. One of the forms of scaffolding and feedback provided dynamically to the trainee is a "trust bar" based on trainee responses (top left) and serving as an aggregate measure of patient trust. Additional measures of performance are calculated and stored in the trainee database for off-line use by an instructor or training administrator. Figure 1 shows a example of the dialog choices available to the trainee during an initial-meeting encounter with a specific patient named "Ava." Note that in the trust meter, Ava's trust of the physician is relatively high.

Scenario Authoring

Despite increasing interest in applying simulation and serious-games to interpersonal skills training, scenario content generation remains an obstacle to the cost-effective use of the technology. In fact, a common criticism of game-based training has been the lack of a systematic approach to linking learning objectives to scenario content. This is a noteworthy deficiency, both in cost terms and because research has suggested that if a scenario is linked with training objectives, trainees are more likely to learn the underlying content (Belanich, Sibley & Orvis, 2004).

To this end, an important challenge to the practical utility of TEACH was the inclusion of an authoring capability. Such a facility would provide two advantages:

- allow for systematic and repeatable manipulation of existing scenario in order to support experimentation within this virtual training environment; and
- provide the ability for third-party end-users of the system (e.g., med school faculty) to add content in a way that positions scenario creation in the larger context of training objective articulation, performance measure-ment, and feedback/assessment.

An existing VECTOR scenario editor component allowed for the efficient creation of new game-based scenarios and the integration of instructional design principles into the authoring process to promote more effective training scenarios (Barba et al., 2006). The authoring tool expanded the VECTOR scenario editor to support unique requirements such as voice-acting and Face-FX processing.

Figure 2. TEACH Patient-Trainee Interaction.

To facilitate consistent scenario creation, a workflow model for scenario authoring is included within the scenario authoring tool. The overall approach to make scenario authoring more accessible to a wider audience (i.e., beyond "game" engineers), was to use a cinematic metaphor to create the design of the authoring tool interface. The use of cinematic metaphors has been successfully used in similar VTE paradigms (Seif El-Nasr, 2005; Cavazza & Charles, 2002). Scenario authoring encompasses a number of training aspects, including:

- Training objective specification: Includes a library of training objectives which can also be expanded using the objective editor.
- Scenario information: This includes specifying high-level scenario information such as authorship tracking (critical when scenarios are created and maintained my multiple authors), target trainee population details, and other aspects of the overall scenario learning goals.
- Environment specification: Includes the designation of specific environment/setting within which a scenario will take place to support the identified training requirements.
- Plot organization: Involves the creation and arrangement of an overall scenario "story" which supports the selected training objectives and conveys a complete, coherent scenario to the trainee.
- Vignette creation: Encompasses the process of creating detailed dialog-based interactions and trainee response options, linking those interactions to training objectives, specifying feedback and coaching, and other measurement details.
- Scenario generation: Process for reviewing and validating the scenario before export to the game-engine "player".

EMPIRICAL STUDIES

Patient Interviews and Avatar Refinement

To refine and validate the synthetic patient models, a sample (N=10) of African American female breast cancer patients were interviewed after IRB-approved informed consent was obtained. Each interview followed a 45-minute to one hour open-ended protocol in which the subject/patient was asked to view two recorded interactions from the system, and

pictures showing different avatars. Subjects then participated in discussion and answered open-ended questions about the scenarios and synthetic patients. The interviewer elicited their inferred beliefs about cancer and avatars' perceived similarity to the subject or other real people whom they knew.

The length of each interview varied slightly as some subjects provided more data than others, while some provided more feedback regarding avatar physical appearance. With subjects who provided less information than others, the interviewer avoided pressuring them, allowing the interview to move ahead fluidly. With those subjects who spoke more and more freely about personal feelings, the interviewer allowed the interview to take more time and extrapolated data for the study. These were clearly emotional and at time difficult interviews for the subjects.

Overall, the subjects expressed general beliefs and specific responses indicating that the synthetic patient avatars were realistic and believable. No subjects remarked that the system was totally unbelievable, and all subjects remarked that the patients in the videos "reminded them of someone," whether this was physical and attitudinal or with respect to the actual conversation that either they have had with a physician or someone they know has had. Finally, based on responses, it was evident that several of the seven filters (only two of which were represented by synthetic patients in videos actually shown), represented cultural beliefs that matched the beliefs held by the subjects themselves.

The subjects also suggested specific visual additions/changes to the avatars (many mentioned the lack of jewelry and accessories), changes in avatar gestures, expressions, or movement, and environment or setting changes. The last item – change in setting – referred to the fact that in their experience diagnosis meetings had been held not in an examining room but in the physician's office. This was an example of a change that was made in the system post-evaluation, in this case a change imposed upon all diagnosis meeting encounters. Thus a final set of revisions to the avatars' behavior and appearance was made following these interviews. No changes in the underlying cultural beliefs and communication filters were necessitated by the interviews.

Medical Educational Insertion and Applicability

To determine how TEACH could be integrated with existing medical education, both pre- and post-credentialing, a sample (N=6) of medical educators from surgery, oncology, medical social work, and general internal medicine was interviewed as a group. The interview and discussion followed a one hour protocol (again approved by an independent Institutional Review Board), in which several scenarios were completed by the group as a whole. Two handouts that listed the learning objectives and the seven cultural beliefs matrix were also distributed and discussed. The interview questions focused on the face validity and clinical appropriateness of the scenarios, in broadest terms, as well as how or whether approaches such as ours could be inserted productively in the life-long medical learning pipeline.

The subjects provided detailed feedback on numerous details of the system and the scenarios, ranging from specific (e.g., noting that the mammogram shown on the wall behind the patient was inconsistent with the clinical diagnosis offered to the patient), to philosophical (e.g., noting that the time needed to complete the encounter was a major consideration and that skewing the encounter toward requiring more time in order to accommodate the cultural variable was not a practical alternative).

The subjects also provided clear suggestions on how a system such as this, whether for this cultural/disease complex or others, could and should be inserted into the educational pipeline. Evaluators noted that the target audience should not be in the pre-clinical (1st or 2nd year) stage of medical school, because students at that level did not yet appreciate the complexities of verbal interactions during the clinical encounter. Rather, they felt the trainees should be at a more advanced stage of clinical training in order to benefit from this training. For post credentialing learners (i.e., practicing physicians), the subjects agreed that limited time was available for this type of learning, despite its clear value. This part of the evaluation suggested that it be offered with continuing medical educational credits and/or be combined with re-certification programs or processes.

It was also suggested that our system could be used as an assessment rather than a training tool. Currently, medical school and training program assessment of an resident's communication skills is subjective. The subjects felt that TEACH would allow them to formally assess their interns and provide a specific score on their communication skills as opposed to simply assigning a subjective value.

CONCLUSIONS

Next steps in exploring the utility of this system will test the validity of several of our assumptions regarding the malleability (modifying virtual cases), extensibility (adding new types of virtual cases), and authorability (non-technological end-users' ability to create new cases and scenarios). Most importantly, future empirical studies will embody specific comparative-efficacy assessments, essentially as a "clinical intervention" in training health providers. We will deploy varying "doses" of TEACH, alongside traditional didactic or "paper" exposition of cultural-competency norms to trainees, in randomized controlled fashion. We will also seek to define any long-term learning retention.

Who are the appropriate target trainees for systems such as this? The simplest answer is literally, anyone on the continuum from undergraduate (pre-MD) medical education to continuing medical education. In our pilot case-panel of the spectrum of AABCPs, however, we have concentrated thus far on house staff trainees—that is, interns and residents—with particular reference to medical and surgical subspecialties most often responsible for coaching breast cancer patients through the serial ordeals of their illness, from screening to chemotherapy and beyond. Our focus groups have therefore included surgeons predominantly, but with representation from internal medicine and social work as well. Future instances of the system, as it is extended to other problems in cultural competency-training, will vary this equation considerably: for example, urology trainees confronting the beliefs of African-American men with prostate cancer; or internal medicine and endocrinology trainees confronting the beliefs of Native American and Hispanic patients with diabetes mellitus and obesity.

As TEACH has developed, empirical study subjects' (both healthcare providers' and patients') views have unanimously reflected the prevailing view of the medical education literature: that there continues to be a mismatch between the gender and—especially—ethnic diversity of clinical care-givers and that of the populations they treat. If that is the case, we then asked whether traditional medical training typically bridges this gap. Not only does the literature suggest that it does not—that the gap remains large and looming—but also the methodology of training for diversity or any other skills is patently lacking in certain key factors. The reason for this state of affairs is painfully obvious to all: the overwhelmingly prevalent method of medical training remains that of a "cognitive apprenticeship" in which habits of thought and behavior among trainees are inculcated by simple, one-on-model modeling. Trainees shadow trainers and emulate their behaviors.

Changes in this classic apprenticeship-modeling have been slow, for two reasons. The first is that "paper-exam" assessment of newly-engrafted skills—such as cultural competency—is just that. It is a sort of "paper graft" on top of the much more powerful experiential modeling of the apprenticeship demanded for "real skills" such as surgical procedures. The second is that the most successful 21st century procedure in medical training—the use of standardized patients, actors who both portray illness face to face, and assess trainees' performance in working up that illness—is extraordinarily expensive and non-scalable (Hasle 1994). In 2009, it nonetheless remains the case that these two approaches, paper testing and standardized patients, are the state of the art. The idea of using virtual environments is just beginning to seep in at the edges of training program directors' consciousness. This slow change nonetheless provides an opportunity further to validate newer technologies such as that depicted here.

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