Cultural Awareness for Military Operations (CAMO) – A Distributed Training Approach

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ABSTRACT

The Marine Corps engages in a variety of operations, many of which require the establishment of quality relationships with individuals of a foreign culture to achieve mission success. To ensure that Marines effectively learn and maintain cultural skills, it is critical to employ a flexible and engaging training environment. To this end, the Marine Corps has implemented training around "operational culture" – or how the actions taken by Marines in a foreign culture can affect operations. In this paper, we will describe an approach to training operational culture skills that uses computer-based training software (CBT), specifically designed around scientifically-valid pedagogical strategies. The CBT platform is a flexible, distributed method of training delivery that combines exploratory learning, didactic instruction, and deliberate practice in an effort to maximize the comprehension and transfer of course material on operational culture. Participants in this study were 34 Marines randomly assigned into one of two operational culture training conditions (Instructor-led vs. CBT). All participants completed a pre-training declarative knowledge test and situational judgment test (SJT) on operational culture, participated in the operational culture training, and then completed a post-training declarative knowledge test, SJT, and reaction survey. Our analyses demonstrated a positive main effect of training, regardless of training group, with scores improving on the knowledge tests and SJTs from pre-test to post-test. Our findings suggest that the CBT training was as effective as current classroom training at improving the operational culture knowledge and skills of Marines. The distributed nature of the CBT also provides additional benefits, including easier access, self-paced completion, flexible administration, and an extensible framework for modifying and authoring content. Together, these findings highlight the utility and value of this CBT as a supplemental or standalone operational culture training tool.

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INTRODUCTION

As technological advancements and globalization continue to thrust individuals into a multi-national, multi-cultural world, cultural knowledge and understanding is increasingly imperative for success. Training initiatives focused on the development of culture-specific awareness and skills have been developed, but research has shown that true cultural competence is difficult to attain (Johnson, 2009). Culture is complicated, and due to our geographic isolation and economic and military power, Americans, on average, are not particularly sensitive to other cultures, although there is considerable variance in such knowledge, experience, and capabilities among individuals.

Infusing cultural awareness into military operations (e.g., Counterinsurgency [COIN] and Stability, Security, Transition, and Reconstruction [SSTR]) is even more challenging, considering that cultural knowledge and decision-making are essential to waging a successful counterinsurgency (Department of the Army, 2006; p. 1-15). For example, the Marine Corps is charged with carrying out a diverse set of missions in a variety of foreign environments. While the focus of these missions can vary, from amphibious assaults to peacekeeping to disaster relief, most missions depend upon the Marines' interactions with local populations and other international forces. Though the Marines engage in diverse operations, one common theme of this expeditionary force is that Marines must be ready to deploy to any region at a moment's notice. Therefore, Marines face the additional challenge of needing to develop the knowledge, skills, and abilities that allow them to operate *within any given culture*. While training designed to teach students about a specific culture traditionally relies on the direct instruction of local cultural knowledge (greetings, customs, social structure, etc.), training designed to teach students how to operate within any foreign culture, in general, should be focused on the development of problem solving and critical thinking skills that can be used to interact with any given culture. That is, trainees must learn processes of "how to think," not simply "what to think," to allow them to generalize their knowledge to any culture.

Culture-specific training often conveys declarative knowledge about cultural groups. Although this training has value, it does not prepare warfighters to interact with individuals and anticipate how people will respond to them (Abbe & Halpin, 2010). Soldiers and Marines reported that formal training was not useful because, "culture" was described as a fixed reaction or behavior, often a list of dos and don'ts that could be obeyed like orders, rather than a contextual understanding (Davis, 2010). In fact, one infantry company commander described his cultural training this way: "I mean, the things that they said were important. However, there was a lot of stuff you had to discover" (Davis, 2010). Therefore, cultural training, in part, must provide Soldiers and Marines with a set of questions that provide contextual understanding to help them to discover how culture can impact their operations. Simply providing cultural factoids does not adequately prepare members of the military to interact with individuals from other cultures and anticipate how their actions will be received.

General Operational Culture Training

In response to this need, the Marine Corps' Center for Advanced Operational Culture Learning (CAOCL) developed and implemented a training course that teaches Marines general operational culture knowledge and skills. Specifically, the Marine Corps has developed classroom-based training (i.e., Marine Corps' Operational Culture: General course) that is intended to improve Marines' awareness and understanding of, as well as capacity to think critically about, culture and how it impacts mission performance. While a classroom environment allows for instructor-led discussions, the sharing of in-depth examples and experiences, and group interaction, it also carries with it a specific set of limitations. Specifically, classroom training results in a limited throughput of students, rigid

training schedules, and course content that might vary based on the instructor's experiences and level of expertise (Bell & Kozlowski, 2007). As a result, classroom training can inhibit the efficient and timely delivery of training, especially in distributed, decentralized, and quickly evolving environments (Bell & Kozlowski, 2007).

To begin to address these constraints, the authors adopted the Operational Culture: General course as a use case for the current training approach. Specifically, the authors created a computer-based training architecture that would be suitable for training higher order cognitive competencies (e.g., problem solving, critical thinking) that are useful for developing general cultural skills, to supplement classroom-based training. Employing a computer-based training approach allows for self-paced learning, flexible administration to conform to the student's schedule, and an increased throughput of students due to the online distributed access of the training (Bell & Kozlowski, 2007; Salas, Tannenbaum, Kraiger, & Smith-Jentsch, 2012). Additionally, there is some evidence that computer-based training may reduce training time for learners, and while it may be more costly up front, it could reduce training costs over time (Bell & Kozlowski, 2007; Kraiger, 2003).

Instructional Design

While the benefits afforded by computer-based training (CBT) allow training to reach a wider audience and provide more flexibility, the effectiveness of CBT does not solely lie in the technology itself, but rather in what content is delivered via the technology, and how (Kraiger, 2003). Technology-based training has often been used to promote cognitive outcomes, such as declarative knowledge (e.g., facts, rules), but has been questioned as an effective mechanism for training soft skills, like interpersonal skills (Bell & Kozlowksi, 2007). However, it has been argued that CBT can be designed in a way to promote active learning (Brown & Ford, 2002), which is critical for the development and transfer of higher order cognitive skills (as opposed to rote cultural knowledge), like those required to develop cultural understanding (Bell & Kozlowski, 2008). Therefore, to ensure that the CBT training would be effective for all learners, we adopted a scientifically-based blended learning approach for incorporating the instructional content contained within the instructor-led operational culture course (MacMillan, Walker, Clarke, & Marc, 2012).

Specifically, the current training architecture combined traditional lecture-style (didactic) instruction with a constructivist approach (Schwartz, Lindgren, & Lewis, 2009). While efficient and effective at promoting factual and procedural knowledge, traditional lecture approaches to training consistently have been found to be less effective at developing the depth of understanding necessary to facilitate adaptive transfer (i.e., the application or generalization of knowledge and skills to novel environments; [Bell & Kozlowski, 2008; Schwartz, Lindgren, & Lewis, 2009]). On the other hand, constructivist (active learning) approaches, which encourage active exploration and knowledge construction, have been shown to be more effective at training cognitive knowledge and skills (e.g., metacognition; problem solving) and promoting adaptive transfer (Bell & Kozlowski, 2008; Duffy & Kirkley, 2004; Freeman et al., 2011). However, constructivist approaches have been criticized in the literature for being inefficient (time intensive) and less effective for low ability, low experience individuals due to the increased cognitive load and decreased guidance provided to learners (e.g., Kirschner, Sweller, & Clark, 2006). Therefore, by using a blended approach, we hoped to reap the benefits of both instructional styles while mitigating their respective weaknesses.

Current Research

A Training Effectiveness Evaluation (TEE) was designed and conducted to determine the extent to which CBT could improve trainees' knowledge of operational culture, as well as their ability to effectively apply that knowledge in different scenarios. Two hypotheses were tested during the TEE. First, we hypothesized that the CBT would result in performance improvements (pre- to post-training) that were as good, or better, than the improvements resulting from the instructor-led course. This hypothesis was driven by findings in the extant research, that reveal small, often non-significant differences in learning outcomes when comparing technology-based training to more traditional, classroom-based training (Bell & Kozlowski, 2007). Additionally, while the instructor-led training group had some elements of active learning embedded in it (e.g., case studies; discussion), the CBT was carefully designed to promote active learning and depth of understanding. To the extent that the instructional design of the CBT allows learners to be more engaged in active knowledge construction than the instructor-led course, it could be expected that the CBT would result in greater improvements on the SJT than the instructor-led course. However, no difference would be expected between the two groups on the declarative knowledge test. The rationale for this prediction is that constructivist/ active learning approaches to training are intended to facilitate adaptive transfer (i.e., applying skills to novel environments; Bell & Kozlowski, 2008), which is consistent with the goal of the SJTs.

However, basic declarative knowledge is not as affected by the instructional style (passive vs. active learning). If the CBT is as (or more) effective at promoting change as the instructor-led course, it justifies using this CBT as a flexible, possibly supplemental, alternative to training Operational Culture.

Second, we hypothesized that participants in the CBT condition would report as positive, if not more positive, reactions to training than those in the instructor-led condition. As with learning outcomes, trainee satisfaction and reactions tend to be fairly similar regardless of training platform (i.e., computer-based or instructor-led; Bell & Kozlowski, 2007; Williams & Zahed, 1996). To gain a better understanding of what aspects of the CBT and the instructor-led course that the trainees enjoyed (or did not enjoy), a set of open-ended reaction questions were included. It was anticipated that the unique features built into the CBT system (e.g., flexibility, instructional design, self-pacing) would emerge as characteristics that trainees liked best about the CBT, while other features would be highlighted in the instructor-led group.

METHOD

Participants

Thirty-four Marines participated in the training effectiveness evaluation (TEE) of the CBT developed for the Marine Corps, which was conducted at The Basic School (TBS) at Quantico. The majority of the participants were 2nd Lieutenants (n = 33), with a mean age of 25 (range: 22 to 33 years). The participants had an average of 3 years previous military service (range: 0.5 to 10.5 years). Nearly one-third (n = 10) of participants reported being previously enlisted, while only 15% (n = 5) indicated that they had been deployed previously. Additionally, 12 participants (35%) reported completing a previous course on culture. Seven (21%) participants had lived in a foreign country, while 8 (24%) participants had never left the US. Of those who had left the US, the most frequently travelled to locations were Central/South America and Europe. Nearly one quarter (n = 8) of participants reported that they spoke at least one foreign language, of which, 6 reported speaking Spanish. Over half (n = 21) of the participants were raised in a suburban neighborhood, while eight were raised in a rural neighborhood and five were raised in an urban neighborhood. Overall, the participants in the two training groups were evenly distributed across the demographics of interest. The only noteworthy dissimilarity was that twice as many CBT participants (as compared to instructor-led participants) had taken a previous operational culture course. However, this difference should only make the test of the CBT training more conservative, as the CBT group's pre-training scores may be higher allowing for a smaller effect of training.

Design

A 2 X 2 mixed factorial design was used, in which Training Group (CBT or instructor-led) was the between-subjects factor, while Timing (pre- or post-training assessment) was the within-subjects factor. All individuals first completed pre-training assessments of operational culture knowledge and application, and then participated in a training intervention (either CBT or instructor-led), randomly assigned, before taking post-training assessments. As an extra precaution, two versions of both the pre- and post-training assessments were used, and counterbalanced to mitigate the effects of learning and test version.

Instructor-led Training

An instructor-led training intervention was administered to half of the participants and served as the control condition. Training was delivered by a CAOCL instructor (retired Marine) in a group classroom setting. The classroom training followed the existing lesson plan for the operational culture general course developed by CAOCL. Specifically, the instructor followed a lecture-style, PowerPoint approach through which he communicated the learning objectives of the course, gave an overview of the cultural impact of Marine operations, covered the five dimensions of operational culture: environmental, economic, social structure, political, and belief systems, and discussed the role of operational culture in mission planning. The instruction style consisted of the presentation of both basic factual knowledge (e.g., definitions) for each area and the application of that knowledge to examples and case studies. The instructor-led training took one hour and forty minutes. However, the Master Lesson File (MLF) for the course indicates that it can run as long as three hours and twelve minutes.

CBT Training

The experimental training condition consisted of a computer-based training tool that was installed on individual laptops brought to the TEE by the experimenters. Participants sat at their own work station and completed the training individually (although they were in the same room as the rest of the CBT group). The CBT training content was developed to mirror the content delivered in the instructor-led training discussed above. However, while the training content was similar across the two interventions, the CBT was developed to be flexible and engaging, allowing trainees to complete the training at their own pace. The training concept for the CBT was based on best practices in learning and training design (MacMillan, Walker, Clarke, & Marc, 2012; Schwartz, Lindgren, & Lewis, 2009). Specifically, the CBT began with a period of exploration which allowed learners to begin discovering the cultural principles that emerged across different types of case studies. The exploration period was followed by didactic instruction, which served to fill in the gaps in the learners' understanding. Previous research has proposed that the initial exploration period maximizes the effectiveness of the lecture, as it primes learners to better receive and organize the information they are being taught (Schwartz et al., 2009). Finally, the learners were given an opportunity to practice applying the knowledge and skills they acquired during the exploration and didactic phases of instruction. This three-phase process was used for each of the five operational culture dimensions. On average, the CBT training took individuals an hour and a half to complete (range: 1hr 4m to 2hr 53m[1]).

Measures

Demographics Questionnaire

Individuals completed a demographics questionnaire at the start of the TEE. The questionnaire consisted of fourteen items capturing demographic (e.g., age, gender, neighborhood), education (e.g., highest level of civilian education), previous foreign or cultural experience (e.g., previous course on culture; lived in foreign country; speak non-English languages; regions traveled to), and military background (e.g., rank, MOS, years in service, previous billets, previously enlisted, previously deployed).

Knowledge Tests

The knowledge test was a paper-pencil multiple choice test developed to assess participants' basic declarative knowledge about operational culture before (pre) and after (post) training. The content for the knowledge test questions and response options was driven by the training material. Specifically, the knowledge test was designed to target the five dimensions of operational culture (environment, economy, social structure, political, and belief systems) along with basic knowledge of general (operational) cultural and second- and third-order effects.

Situational Judgment Tests

Situational judgment tests (SJTs) assess the ability of individuals to determine the best (and worst) responses to a hypothetical situation (Ployhart & Bliese, 2006). Typically, a short scenario is presented to the test taker followed by four to six possible responses. There are several different versions of SJT instruction, but the most common approach is to ask individuals to indicate what they would most likely do (best answer) or what they would least likely do (worst answer; [Ployhart & Bliese, 2006]). Individuals' answers are then compared to the answers provided by subject matter experts (SMEs). The scoring scheme used to score each of the SJT questions was as follows: a) if the participant's best response matches the SME's best response (+1); b) if the participant's worst response matches the SME's worst response (+1); c) if the participant's best response is the SME's worst response (-1); d) if the participant's worst response is the SME's best response (-1); and e) all other combinations (0). Therefore, it was possible to receive a score ranging from -2 to +2 for each question (Motowidlo et al., 1990).

Our SJTs were intended to assess Marines' ability to transfer deeper level concepts learned during the operational culture training to novel situations. Therefore, the research team worked with two former Marines as SMEs to develop realistic hypothetical operational culture scenarios related to Marine Corps mission-type orders. Two general scenarios were created – a humanitarian aid mission scenario and a security and stability ops scenario. For each general scenario, two specific scenarios were created, each consisting of four SJT questions. Unlike the knowledge test, the SJT questions were intended to require an understanding of multiple dimensions of operational

[1] The individual who took 2hr 53m was a statistical outlier (i.e. this time was more than three standard deviations away from the mean). Experimenters spoke with the individual following the training and learned that this individual had a different approach to this TEE than the rest of the individuals. Specifically, he was focused on not only going through the training, but also critiquing the training. He took approximately an hour longer to go through the training than the participant taking the next longest time.

culture. Once the SJTs were complete they were piloted to assess testing length, identify any areas that needed revised, evaluate the flow, and ensure that difficulty was similar across both general and specific scenario questions. The results from the pilot feedback suggested that the four specific scenarios (and accompanying questions) were similar in difficulty.

Once the development of the SJT materials was completed, two versions of the SJT were created, each containing one specific scenario from the humanitarian mission and one specific scenario from the security and stability ops mission. Version 1 consisted of a rubble clearing scenario and MEDCAP scenario; while version 2 consisted of an aid station scenario and a polling station scenario. By including one specific scenario from each general scenario, it allowed the two test versions to control for any differences between the general scenarios. The administration of the two versions was counterbalanced as discussed above.

Reaction Survey

The reaction survey was developed to assess participants' subjective impressions of the training courses. Specifically, participants were asked to evaluate the training they had just received by rating their level of agreement with 13 items on a scale from strongly disagree (1) to strongly agree (5). For example, participants were asked to rate to what extent the training: was well-designed; met their expectations; helped them meet the learning objectives; was relevant to their mission; improved their skills; was challenging; was interesting; held their attention; and was engaging. In addition, the reaction survey contained three open-ended questions: "What did you like best about the training?"; "What did you like least about the training?"; and "How can we make the training better?" Participants were encouraged to provide specific comments to each of the questions. One additional question was included on the reaction survey for the CBT training group, which asked individuals if the computer-based Operational Culture training was easy to use.

Procedure

The TEE lasted approximately five concurrent hours (including a break for chow). Participants arrived at the TBS classroom at 1000. Upon the participants' arrival, the experimenters handed them an index card with the training group and pre-test version to which they had been randomly assigned. When all participants had arrived, an experimenter verbally briefed all participants on the purpose of the study and gave instructions for completing the consent form. After filling out the consent form, participants completed the demographics questionnaire. The participants then took a 5-10 minute break while the experimenters reviewed the demographics to verify the groups were equally distributed as a result of the randomization.

Participants were split into two classrooms according to their training condition (CBT vs. instructor-led training). The lead experimenter in each classroom gave a verbal overview of and instructions for the pre-training knowledge test. Participants were given 15 minutes to complete the knowledge test. Next, the first scenario of the pre-training SJT was handed out and verbal instructions regarding how to complete the pre-training SJT questions were given. The lead experimenter then read the scenario background information to the group. Participants were given 10 minutes, including the time it took for the experimenter to read the background information, to complete the four questions. Once everyone finished, the experimenter handed out the second scenario of the pre-training SJT and followed the same procedure. Following completion of the pre-test, the Marines were directed not to discuss the experiment and dismissed for chow (from 1100-1200).

Following chow, participants then completed the CBT or instructor-led training. For those individuals in the instructor-led group, the instructor followed the established operational culture course lesson plan. For those receiving the CBT training, the lead experimenter provided verbal instructions regarding how to use the CBT software (e.g., using the arrows to navigate) before allowing participants to navigate the CBT independently. There was no time limit for the CBT training, so individuals were instructed to set their own pace.

After all individuals had completed the training (in their respective groups), the experimenter handed out a reaction survey that asked individuals for their subjective impressions and evaluation of the training. Following the reaction survey, individuals were asked to complete a post-training knowledge test and SJT, following the same procedure as was described for the pre-training tests. After completing the post-training tests, participants were given a verbal debrief about the purpose of the training evaluation and were dismissed at 1500.

RESULTS

There were three primary outcome measures of interest – knowledge test scores, SJT scores and responses to the reaction survey. All data was examined for normality and outliers and corrected accordingly. Time to complete training was also examined, on average, participants spent 85.4 minutes on the CBT. The instructor-led course took 80 minutes, although the MLF indicates the course may last as long as 192 minutes.

Situational Judgment Test (SJT)

The SJT data were analyzed with a one way (Timing – pre/post) repeated measures ANOVA with Training Group (CBT vs. Instructor-led) as a between subjects variable. There was a significant main effect for Timing ($F(1, 32) = 5.96$, $p < 0.05$, $\eta^2 = 0.16$; see Figure 1). Examination of the means showed that participants scored higher on the post-training SJT administration than on the pre-training SJT administration (pre-training, M = 6.31, SE = 0.57; post-training M = 8.04, SE = 0.35; see Figure 1). There were no significant differences in performance between training groups.

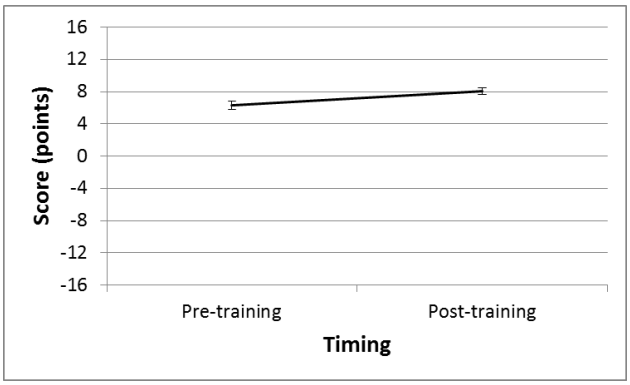

Figure 1. SJT scores before and after training

Knowledge Test

The knowledge test analyses required score standardization prior to data analysis to account for variation in the number of questions on the two versions of the knowledge test. This was achieved by converting the raw knowledge test scores into the percentage of correct answers.

A one way (Timing – pre/post) repeated measures ANOVA with Training Group (CBT vs. Instructor-led) as a between subjects variable, was conducted using the standardized knowledge test data. There was a significant main effect of Timing ($F(1,26) = 68.00$, $p < 0.01$, $\eta^2 = 0.72$; see Figure 3), such that participants performed better post training when compared to pre-training (pre-training M = 71.16, SE = 2.46; post-training M = 86.61, SE = 1.53, see Figure 2). There were no significant differences in performance between training groups.

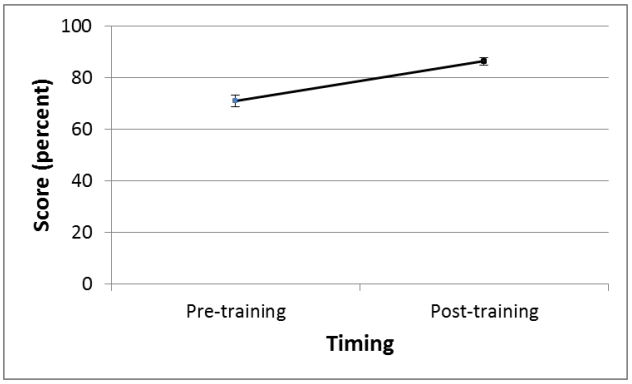

Figure 2. Knowledge test score before and after training

Reaction Survey

In general, reaction survey data indicated a positive response to training, regardless of Training Group. Average ratings for Likert scale items were above the midpoint for all questions except one, "the operational culture training exercises were challenging" (see Figure 3).

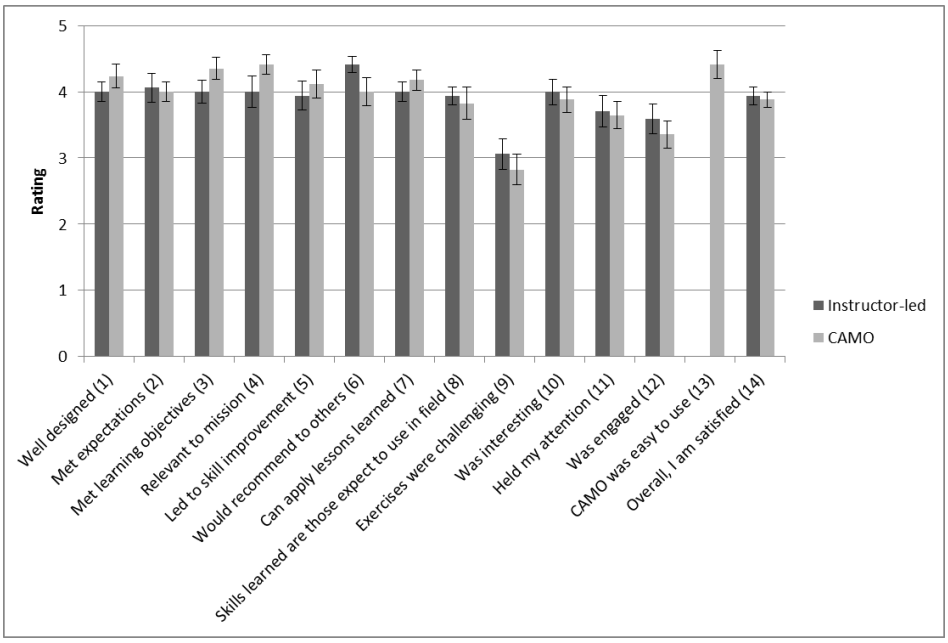

Figure 3. Likert scale Reaction survey data

When the open-ended reaction survey questions were examined, it was found that responses were generally similar across Training Groups, but there were also a few thematic differences. Both groups identified the use of real world case studies and examples as something they liked the most about the training, while the CBT group also liked the instructional design and the instructor-led group liked the instructor. Regarding what they liked least about the training, both groups felt that the training was not challenging enough. The CBT group also did not like the amount of redundancy in the training, while the instructor-led group had complaints about the instructional design of the lecture. Responses from both groups on the last open-ended question ("How can we make the training better?") indicated a need to improve the trainees' experience. Additionally, the instructor-led group indicated a desire for increased interactivity in the training.

DISCUSSION

The goal of the current study was to understand if higher-order cognitive skills (problem solving, critical thinking), associated with general cultural competencies, could be taught through a computer-based training system. Two training schemes were compared, both containing roughly the same course content, but using different delivery and instructional strategies. The results of this comparison show that CBT designed to promote active learning was able to produce increases in performance similar to those seen as a result of traditional classroom-based training. Additionally, the two training schemes both elicited similar positive reactions from the trainees as a result of participation. In general, these results provide evidence that a CBT designed with a consideration towards learning theory, can be used to train higher order cognitive skills. Specifically, CBT can be used to teach general cultural knowledge and skills used by the Marine Corps.

When examining the specific hypotheses of this study, we found support for the hypothesis that the CBT would be associated with performance that was as good as that associated with the instructor-led course. Both approaches led to similar improvements on the SJT, an assessment of the ability to transfer knowledge, and on the knowledge test, an assessment of the ability to recall knowledge. This suggests that the CBT and the instructor-led course are equally effective at training operational culture.

Additionally, the results from the reaction survey indicated that participants found both training approaches equally acceptable and engaging. The lowest rated item was, "the operational culture training exercises were challenging." This may reflect the large amount of background knowledge possessed by our participants. Since the skill level of the trainee is likely to vary, it may be beneficial to adjust the difficulty level of the training to match the trainees' experience or ability level. While an expert instructor can often gauge the skill level of a class and adjust instruction to match, that typically occurs at the gross classroom level. Alternatively, the CBT could be modified to accommodate this adaptive learning style of training at the individual student level. Another advantage of the distributed nature of a CBT is that it may be taken at a pace that is comfortable for the student's learning style, and it can be delivered to a very large number of students. The results of the analyses on the reaction survey items suggest that both the CBT and instructor-led style of training are well accepted by Marines and that addressing concerns raised by the reaction survey could increase the effectiveness of the CBT.

The reaction survey also included open-ended questions. When the responses to those questions were examined it was found that both groups provided similar general input, with some noticeable differences. Both groups identified the use of real world examples as their favorite part of the training and the lack of challenge as their least favorite. They both also thought that improvements could be made on trainee/user experience. Interestingly, the CBT group identified the instructional design as what they liked the most about training while the instructor-led group identified this as something that they liked the least. However, while the instructor-led course identified the instructional design as something they liked least, in general, the trainees in this group gave positive feedback on the actual instructor. The instructor-led group also indicated a desire for increased interactivity. Together this suggests that the lower level of individual interaction during the instructor-led training might account for the dislike of the instructional design, not the instructor. The main issue raised by the CBT group was a need for increased difficulty. The desire for increased difficulty in a CBT could be easily addressed by modifying the CBT to adapt to the skill level of the trainee, as was previously discussed.

Future Directions

The TEE revealed important future directions for the current CBT. The largest complaint made by Marines was that the examples in the CBT and the instructor-led course were not challenging enough. We suspect that the perceived lack of difficulty is likely a function of the amount of background knowledge of operational culture possessed by our participants. Given that Marines of varying skill level are required to take operational culture training, we propose to, in the future, create a version of the CBT that is capable of adapting to user skill level. This may result in greater acquisition of knowledge as keeping users challenged will aid in maintaining user engagement (Brehm et al. 1983; 1989). Additionally, the evidence in support of our hypotheses suggests that this style of CBT might make an ideal supplement to the instructor-led course or could be used as a refresher course following classroom training.

Conclusion

The increased importance of Marines' interactions with foreign populations has rendered proper training of Operational culture critical. CAOCL has already taken steps to ensure that Marines are well educated on general

operational culture, specifically through the development of a classroom based Operational Culture: General course (in addition to region specific courses). While these courses provide a solid basis for operational culture training, opportunities remain to augment and/or supplement that training. In an effort to address this opportunity, a computer-based operational culture training system was developed based on scientifically valid learning theory, using CAOCL course content. This CBT can be flexibly allocated, allowing for a higher student throughput and a self-paced experience, resulting in efficient use of training time. Additionally, the CBT's standardized content ensures that Marines receive a consistent quality of training. The current research found that when grounded in learning theory, a CBT can afford all of these benefits while being just as effective and satisfactory as a classroom-based course led by a CAOCL instructor.

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REFERENCES

Abbe, A. & Halpin, S. (2010). The cultural imperative for Professional Military Education and leader development. *Parameters, 39*(4), 21–22.

Bell, B. S., & Kozlowski, S. W. J. (2007). Advances in technology-based training [Electronic version]. In S. Werner (Ed.), *Managing human resources in North America* (pp. 27-43). Abingdon, UK: Routledge.

Bell, B. S., & Kozlowski, S. W. J. (2008). Active learning: Effects of core training design elements on self-regulatory processes, learning, and adaptability. *Journal of Applied Psychology, 93*, 296-316.

Brehm, J., & Self, E. (1989). The intensity of motivation. *Annual review of psychology, 40*, 109-131.

Brehm, J., Wright, R., Solomon, S., Silka, L., & Greenberg, J. (1983). Perceived difficulty, energization, and the magnitude of goal valence. *Journal of Experimental Social Psychology, 19*(1), 21-48.

Brown, K. G., & Ford, J. K. (2002). Using computer technology in training: Building an infrastructure for active learning. In K. Kraiger (Ed.), *Creating, implementing, and maintaining effective training and development: State-of-the-art lessons for practice* (pp. 192-233). San Francisco, CA: Jossey-Bass.

Department of the Army. (2006, December). *Counterinsurgency* (FM 3-24). Washington, DC: Author.

Davis, R. (2010). Culture as a weapon. *Middle East Report MER255 Weapons of the Strong, 40*, Summer 2010.

Duffy, T. M., & Kirkley, J. R. (2004). *Learner centered theory and practice in distance education: Cases from higher education*. Routledge.

Freeman, J., Walker, A., Puglisi, M., Geyer, A., Marceau, R., & Marc, Y. (2011). Cognitive and perceptual skills involved in Combat Hunter expertise: Exploratory evidence for a new training framework. *Interservice/Industry Training, Simulation, and Education Conference (I/ITSEC)*. Orlando, FL.

Johnson, W. L. (2009). A simulation-based approach to training operational cultural competence. *Proc. Of ModSIM World*.

Kraiger, K. (2003). Perspectives on training and development. In W. C. Borman, D. R. Ilgen, & R. J. Klimoski (Eds.), *Handbook of psychology, Vol. 12, industrial and organizational psychology* (pp. 171-192). Hoboken, NJ: Wiley.

MacMillan, J., Walker, A., Clarke, E., & Marc, Y. (2012). Cultural awareness training for Marine Corps operations: The CAMO project. Proceedings of the 4th International Conference on Applied Human Factors and Ergonomics, San Franscico, CA. 2309-2318.

Motowidlo, S. J., Dunnette, M. D., & Carter, G. W. (1990). An alternative selection procedure: The low-fidelity simulation. *Journal of Applied Psychology, 75*, 640-647.

Ployhart, R. E., Schneider, B., & Schmitt, N. (2006). *Staffing organizations: Contemporary practice and theory*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Salas, E., Tannenbaum, S. I., Kraiger, K., & Smith-Jentsch, K. A. (2012). The science of training and development in organizations: What matters in practice. *Psychological Science in the Public Interest, 13*, 74-101.

Schwartz, D. L., Lindgren, R., & Lewis, S. (2009). Constructivism in an age of non-constructivist assessments. In S. Tobias & T. M. Duffy (Eds.), *Constructivist theory applied to instruction: Success or failure*? New York: Taylor & Francis.

Williams, T. C., & Zahed, H. (1996). Computer-based training versus traditional lecture: Effect on learning and retention. *Journal of Business and Psychology, 11*, 297-310.