INSTRUCTOR-FACILITATED VS STAND-ALONE TACTICAL GAME TRAINING

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ABSTRACT

Sixty-nine Infantry leaders attending the Basic Non-Commissioned Officer Course (BNCOC) at Fort Benning, Georgia, participated in an experiment that investigated the impact of instructor-facilitated vs stand-alone game training on tactical decision making. Thirty-two leaders were assigned to complete two urban operations-based missions (patrol and defense) using the SimFX game. These leaders worked under the direction of an instructor and interacted with peers. Thirty-seven more leaders completed the two missions, but worked in the absence of an instructor and peer interaction. Pre-exercise measures included military and game experience and tactical situation judgment. A questionnaire administered to leaders following the exercise documented their perceptions of training value, opportunities to implement tactical decisions, and motivation. Leaders in both groups were assessed individually for their ability to recognize and implement sound tactical decisions while serving as leader of a light Infantry squad during patrol and defense missions in an urban environment. Results showed that tactical decision making performance was not impacted by training methods, but that leaders' perceptions of training value and decision making were more favorable when the exercise was facilitated by an instructor and when they interacted with peers. A discussion of the results and their applicability to the Army's trend towards distributed methods of instruction is included.

ABOUT THE AUTHOR

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INTRODUCTION

The Emergence of Computer-Based Games and Simulations for Training Infantry Soldiers

The perpetuation of computer-based games and simulations for military training has flourished since the Department of Defense (DoD) issued a directive for the development and use of live, virtual, and constructive simulations (DoD, 2004; OUSDPR, 2004). During the two years that followed this directive, developers witnessed the gradual opening of military training institutions as a potential market for efficient, effective games and simulations that could enhance existing training systems or provide Soldiers with new low-cost, realistic, immersive experiences (see Bourge & McGonigle, 2006). Currently, there are no signs that this trend is slowing.

In an effort to meet new training requirements emerging from Operation Iraqi Freedom and Operation Enduring Freedom (OIF/OEF), and to compensate for additional resource constraints, the US Army Infantry School at Fort Benning, Georgia, sought the use of desk-top computer games and simulations for training small unit leaders. While simulations for training military aviators and armored forces had been in use for years, there were few attempts to provide dismounted Infantry Soldiers with simulated execution experiences beyond some of the simple tasks associated with basic rifle marksmanship. Following the DoD's (2004) directive for an increased use of simulations, the first virtual games and simulations created specifically for training dismounted Infantry Soldiers and leaders began to emerge.

The developers of the first games and simulations for dismounted light Infantry recognized the complexity of simulating the intricate physical details and movements of an individual Soldier. Also difficult to imitate were the wide spectrum of missions and tasks associated with Infantry maneuvers, in addition to the various force structures and the diverse environments in which Soldiers trained. Ignoring these difficulties, some sponsors touted that the benefits of these early games and simulations included the capability to save lives on the battlefield. Others managed their expectations and suggested that games were tools that could enhance existing training, but that they offered mixed experiences within a limited number of tasks. Results from a series of subsequent training effectiveness evaluations seemed to confirm the latter (see Beal & Christ, 2004; 2005; Beal, 2005; 2007).

Using Games and Simulations as Stand-Alone Training Tools

Some promoters of military training games and simulations predicted a near-future where Soldiers could train on their own time, in the absence of qualified instructors and peers. Unencumbered by institutional constraints, individual Soldiers would use simulations to learn according to their immediate levels of knowledge and at their own pace. This so-called "stand-alone" process of simulation training had promise to provide even tactical training without the burden of instructor resources. The games and simulations themselves would collect data, track progress, and provide meaningful feedback. Based on captured results, Soldiers were expected to appraise their own levels of proficiency and determine if they had met training objectives successfully. Soldiers would provide results to their instructors who would use them to highlight areas of training that needed to be reinforced. Instructors would ensure that the quality of training was maintained even though Soldiers completed much of it on their own time.

The concept of using games and simulations as stand-alone trainers made sense, given the institutional training resource climate. However, there was no empirical support upon which to base decisions and guidelines about using games as stand-alone training tools. In general, Army leaders and trainers responsible for maintaining the quality of institutional training advocated the use of instructor-facilitated methods and peer interaction as much as possible, preferably in groups where the instructor-to-student ratio was relatively low.

Yet, findings emerging from investigations of alternative pedagogical approaches suggested that less resource-intensive modes of instruction could produce similar performance outcomes

Interaction and Equivalence Theory

Researchers have debated for several decades the strategies for optimizing learning through student-teacher interaction in the classroom (see Daniel & Marquis, 1979). Army leaders and trainers have confronted similar issues related to maintaining the quality of institutional training for Soldiers. Both educators and Army trainers have made difficult decisions about selecting teaching and training methods under conditions of constrained resources and in response to other consequential variables.

Anderson (2003) stated that the challenge still exists to find the right mixture of interaction that results in the greatest pedagogical value, although several sound theories have emerged from research in this area. After reviewing the literature, Anderson suggested that there was no single method for presenting information that was clearly better than any other. Instead, he proposed a theory of "Equivalency of Interaction" that presented three types of interaction that are particularly relevant to the use of games as stand-alone trainers and generally relevant to the Army's trend toward distance learning. These types of interaction are: (a) peer-trainer, (b) peer-peer, and (c) peer-content. Anderson described the essence of his theory by stating,

> "Deep and meaningful formal learning is supported as long as one of the three forms of interaction…is at a high level. The other two may be offered at minimal levels, or even eliminated, without degrading the educational experience. High levels of more than one of these three modes will likely provide a more satisfying educational experience, though these experiences may not be as cost or time effective as less interactive learning sequences. This theorem implies that an instructional designer can substitute one type of interaction for one of the others (at the same level) with little loss in educational effectiveness…" (p. 4)

The extent to which any one or any combination of these types of interactions produces the greatest training benefit for the Army depends upon what is being trained, who is being trained, who is providing the training, and the capacity for the training institution to promote and maintain the interactions.

Applying Equivalence of Interaction Theory to the Use of Training Games

Recent research on using desk-top computer games and simulations for training Infantry leaders suggested that under controlled conditions, instructor-facilitated training combined with peer interaction resulted in better tactical performance when Soldiers used a virtual simulation with real time communication, and when they executed simulated missions with which they were familiar (Beal, 2007). Under these conditions Soldiers' tactical decision making was more effective and their perceptions of overall training value were more positive than Soldiers who trained with a constructive, stand-alone simulation. However, when Soldiers executed a mission with which they were unfamiliar, there were no meaningful differences in tactical decision performance.

The primary focus of this recent research (Beal, 2007) was to investigate the outcomes of using two very different simulation systems (i.e., virtual vs constructive), each associated with different experimental methods (i.e., instructor-facilitated vs stand-alone). As such, the results were confounded with the administration of the simulations and the methods linked to them. One portion of the results seemed promising because they confirmed earlier findings presented in a comprehensive review of the use and effectiveness of instructional games in multiple settings (Hays, 2005). They also corroborated findings from earlier research by Pleban, Eakin, Salter, and Matthews (2001) that investigated the extent to which a "fully immersive" simulation could be an effective means for training small unit, dismounted Infantry leader cognitive tasks and skills. All three sources of research offered evidence suggesting that games and simulations had the potential to provide Infantry leaders with opportunities to train cognitive and tactical skills, so long as qualified instructors facilitated the training.

The progress towards the use of stand-alone games and simulations continues, while Army institutional training resources constrict and prevailing attitudes about maintaining the quality of training evolve. Questions remain about the extent to which games and simulations can be used in the absence of instructors and peer interactions, and without expending the resources associated with their involvement. There is a need to continue exploring instructor-facilitated vs stand-alone game and simulation training and to provide empirically-based results and a sound foundation upon which Army leaders and trainers can base decisions about training methods. The purpose of this paper is document results from an experimental comparison of instructor-facilitated vs stand-alone methods of game training for small unit Infantry leaders. The report concludes with an explanation of the findings in reference to Anderson's (2003) Equivalency of Interaction theory and a discussion of how research in this area can help guide the Army's trend towards the use of distributed learning.

SimFX[1]

The leaders who participated in this study executed missions using a desk-top computer simulation called Simulated Field Exercise or "SimFX." The SimFX simulation was developed by Micro Analysis and Design under the Army Phase II Small Business Innovative Research (SBIR) program (see Christ, R. E., 2006; Archer, R., Brockett, A. T., McDermott, P. L., & Warwick, W., 2006). The authors described SimFX as a simulation-based training tool designed to teach decision making skills to small unit leaders. The SimFX simulation provides an environment in which a series of discrete tactical decisions can be made in the context of realistic mission scenarios (Micro Analysis & Design, 2006).

METHOD

Participants

Sixty-nine Infantry leaders attending the Basic Non-Commissioned Officer Course (BNCOC) at Fort Benning, Georgia, served as participants in this experiment. All leaders had 11B as their military occupational specialty (MOS). Thirty-two leaders were assigned to complete two urban operations-based missions (patrol and defense) using SimFX. These leaders worked under the direction of an instructor during the entire exercise (i.e., Instructor-Facilitated group) and were allowed to interact with peers. Thirty-seven more leaders completed the two missions, but worked in the absence of an instructor and peers (i.e., Stand-Alone group).

Measurement Instruments

Biographical Information Questionnaire. This questionnaire was developed to permit each leader to describe experiences that might impact his tactical decision making performance and other measures and outcomes during the experiment. In addition to obtaining information such as name, age, rank, and time in service, the questionnaire provided the following:

- Whether leaders had combat experience
- Number of urban operations they completed as a squad leader in combat
- Perceived level of computer proficiency and hours per week of computer use
- Frequency of using Army simulations in the past year
- Number of training events completed at the McKenna MOUT site since basic training
- Number of hours per week playing video games and perceived level of video game proficiency

Tactical Decision Making Rating Scales. Two missions were developed to facilitate an assessment of each leader's ability to make appropriate, timely, and effective tactical decisions and to direct patrol and defensive operations successfully. The missions were executed within a simulated tactical environment, patterned after the McKenna MOUT site at Fort Benning, in which uncertain conditions emerged during mission execution**.** Each leader was required to initiate tactical decisions at specific points that were presented as critical events during the missions.

The Tactical Decision Making Rating Scales were developed by a group of military subject-matter experts to assess each leader's ability to make effective tactical decisions as uncertain battlefield conditions emerged during the simulated missions. The rating scales permitted evaluation of each leader's ability to respond to and make tactical decisions for as many as 33 and 40 critical events for the patrol and defense missions, respectively. The rating scales were used to indicate (a) whether the leader recognized the need to initiate a tactical decision in response to an emergent critical event, (b) whether he initiated a tactical decision, (c) if a tactical decision was initiated, whether the consequence was positive or negative, and (d) whether the mission was terminated before the event could be presented.

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A group of six military subject-matter experts at the Combined Arms and Tactics Directorate (CATD) at Fort Benning, Georgia, developed the ranking hierarchy of tactical responses shown in Table 1. One member of this group served as CATD's Tactics Chief, another served as Deputy Tactics Chief, and four more served as small group instructors in the Infantry

[1]There is no definitive consensus on a definition of military training games that clearly separates them from simulations. Hays (2005) stated, "In the literature on instructional games, we often find the terms simulations, games, simulation-games, and computer games used interchangeably (p. 9)." Therefore, the terms game and simulation are used interchangeably throughout the remainder of this report.

Captains Career Course. Three small group leaders from the Advanced Non-Commissioned Officer Course (ANCOC) corroborated the ranking hierarchy. All military experts involved in developing and corroborating the ranking hierarchy were combat experienced in patrol and defense urban operations.

Table 1
Ranking Hierarchy for Tactical Decision Making During Scenario Execution
(1 = Best, 6 = Worst)

Ranking	Tactical Responses
1	Recognized need to respond, implemented appropriate decision, positive consequence.
2	Recognized need to respond, implemented appropriate decision, negative consequence.
3	Recognized need to respond, implemented poor decision, positive consequence.
4	Recognized need to respond, implemented poor decision, negative consequence.
5	Failed to recognize need to respond, did nothing.
6	Recognized need to respond, did nothing.

SimFX Leader Perception Questionnaire. A questionnaire was developed to document the reactions of leaders to their experiences with SimFX. Each leader was asked to indicate his perceptions about SimFX for the following topics:

- Overall training value
- Tactical training value
- Adaptability and decision making opportunities
- Realism and tactical accuracy
- Motivation for training with simulations
- Fidelity and functional accuracy
- Overall opinion of the training experience

Most of the items on the questionnaire were selected and modified from those used in previous military training games evaluations (Beal & Christ, 2004; 2005; Beal, 2007) and from methods generated for use in large-scale, immersive virtual environments (Singer & Witmer, 1996; Witmer & Singer, 1994; 1998).

Procedures

Instructor-Facilitated Group

Procedures for Executing the Patrol Mission. Leaders in the Instructor-Facilitated group completed a four-hour training session under the direction of a qualified military instructor. Upon arrival at the ARI Warfighter Experimentation Laboratory, each leader completed the Biographical Information Questionnaire and the Squad Leader Situation Judgment Test. Upon completion, the instructor used a slide presentation of SimFX to present the following to the leaders:

- Purpose of the experiment
- Log-in and mission selection
- Description of SimFX screen options, text boxes, etc.
- Instructions on how to obtain information about the mission during execution
- Instructions on how to communicate with superiors and subordinates
- Description of screen icons and their uses
- Instructions and sequence for completing a mission

Following the slide presentation, the instructor answered any questions asked by leaders about the training exercise. He then instructed them to begin executing the patrol mission.

Once mission execution began, each leader was faced with multiple opportunities to make decisions and implement actions based on information in the operations order and in response to critical events and emerging simulated battlefield conditions. The instructor circulated around the room, observed leaders as they executed the patrol mission, offered solicited and unsolicited tactical guidance, and asked questions and made statements to prompt leaders to implement appropriate tactical decisions. When the leaders asked questions about any aspect of the training exercise, the instructor repeated the questions so that all the leaders could hear, and then answered the questions for the entire group. The instructor announced that leaders were to remain seated upon completion of the patrol mission until all other leaders had completed the mission.

Following execution of the patrol mission, the instructor conducted an after action review with the group of leaders. The after action review began with questions posed to the leaders about the operations order and the decisions upon which the leaders' plans were based. A few leaders were given the opportunity to review the tactical components of their plans, discuss the rationale behind the decisions they made during the construction of their plans, and discuss the reasons why their plans were successful or unsuccessful based on their tactical decisions during mission execution. A dialogue between the leaders and the instructor continued until most or all of the critical events and decision points were discussed. The instructor asked probing questions to solicit critical thinking, such as "Under what conditions would you make different decisions?" or "What decisions could you have made that would have led to a more positive outcome?" To conclude the after-action review the instructor offered suggestions and additional guidance for success with patrol missions in general, and then instructed the leaders to execute the defense mission.

Procedures for Executing the Defense Mission. The procedures prior to execution of the defense mission were identical to the ones used prior to the patrol mission. The instructor explained some of the key tactical differences between the two missions, as described in the operations orders.

The instructor provided feedback and guidance during the defense mission for all leaders, followed by an after action review similar to the one described previously for the patrol mission. Following the after-action review, leaders completed the SimFX Leader Perception Questionnaire, and then were invited to ask any questions about the training experience and the simulation. A researcher asked questions about the leader's overall impressions of the training experience. Upon completion of these questions, the leaders were free to leave.

Stand-Alone Group

The leaders in the Stand-Alone group completed the patrol and defense missions without the intervention of an instructor. Personnel during these training sessions consisted of up to10 leaders and one researcher. Upon entering the lab, the researcher instructed leaders to be seated at individual computer work stations. The researcher asked leaders to complete the Biographical Information Questionnaire and the Squad Leader Situation Judgment Test. Upon completion of these metrics, the researcher directed leaders to read carefully through a set of slides that included instructions for completing the patrol and defense missions. The leaders were asked to follow the directions contained in the slides and complete the patrol mission first, followed by the defense mission. The researcher told leaders that only questions about using the computer and the SimFX software functions would be answered. The leaders were encouraged to work alone, to solve problems on their own, and to do their best regardless of their level of understanding of the simulation or the training experience.

During mission execution, the leaders received no feedback or guidance about their tactical performance, nor did they receive an after-action review. The researcher instructed leaders to complete the SimFX Leader Perception Questionnaire upon completion of the missions. They were then directed to an area outside the lab where they could ask questions about the SimFX training experience. The researcher used this opportunity to ask leaders about their overall impressions of the SimFX tool. Following these questions, leaders were free to leave.

RESULTS

Biographical Information Questionnaire. All the leaders who participated in this experiment were non-commissioned officers, were the rank of Staff Sergeant, and had 11B (Infantryman) as their military occupational specialty (MOS). The average age of all leaders was 28 years, and the average time in service was 8.2 years. All the leaders had been deployed to either OIF or OEF at least once, and all had some form of combat experience. When asked if they had combat experience *as a squad leader during urban operations*, 74% reported they had. Those who had combat experience as a squad leader reported an average of 100 urban operations completed during deployment. On a scale of one to seven, one being the lowest rating and seven the highest, leaders reported their level of proficiency using computers. The mean rating of computer proficiency was 4.3 and the mean time per week using computers was 12 hours. Leaders reported that they had used an average of three Army simulations in the past year, and that they had trained an average of two times at the McKenna MOUT site at Fort Benning, Georgia. The mean amount of time for playing video games per week was 4.3 hours and the mean rating for video game proficiency using a seven-point scale was 4.2. As determined by Independent-samples *t*-tests, there were no significant differences between the Instructor-Facilitated and the Stand-Alone groups on any item on the Biographical Information Questionnaire.

Tactical Decision Making Rating Scales. A group of military subject-matter experts developed the patrol and defense missions to offer leaders opportunities to make effective and timely tactical decisions during the simulation exercise. The missions offered all leaders the same core of critical events and decision opportunities, regardless of group. The difference was that leaders in the Instructor-Facilitated group were given verbal prompts by the instructor to recognize critical events and implement decisions during mission execution, in addition to prompts given by the simulation. The leaders in the Stand-Alone group were prompted only by the simulation.

Analysis of Ratings of Tactical Decision Making. The leaders' responses to events presented during execution of the missions, and every other computer function they initiated, were recorded automatically by the SimFX program software. A group of military subject-matter experts analyzed records from each mission, and then rated leaders' tactical decisions at each critical event presented during execution and according to the ranking hierarchy shown in Table 1 above. These ratings were then analyzed to determine the impact that the presence of an instructor (vs no instructor) had on leaders' tactical decision making. A Mixed Factor Repeated-Measures ANOVA showed that there were no significant differences between groups on ratings for tactical decisions. However, the same analysis showed that within-group differences across missions were significant $F(1, 67) = 25.04$, $p = .001$, with a moderate effect size (eta squared = .272). The mean ratings values (and standard deviations) for tactical decisions initiated during the patrol mission were 3.91 (0.26) and 3.98 (0.45) for the Instructor-Facilitated and Stand-Alone groups, respectively. For the defense mission, mean ratings values were 3.74 (0.21) and 3.72 (0.35) for the Instructor-Facilitated and Stand-Alone groups, respectively. There was no significant interaction. These results are shown in Figure 1.

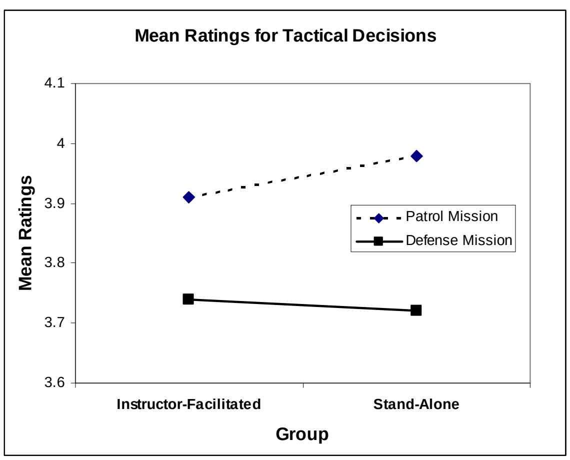

Figure 1. Mean ratings values for tactical decisions initiated during mission execution

Paired-Sample *t*-tests were conducted to gain an understanding of the simple within-group effects. For the Instructor-Facilitated group, leaders' ratings were significantly higher for the patrol mission than the defense $t(31) = 3.03$, p = 005. The same was true for the Stand-Alone group $t(36) = 4.10$, p = 001.

Analysis of Leader Perceptions of SimFX

The SimFX Leader Perception Questionnaire was developed to document the reactions of leaders to their experiences with the simulation. This questionnaire included a total of 41 items that were divided among six categories. Leaders rated the first 38 items by choosing one response from a seven-point scale, and completed items 39 through 41 by answering "Yes" or "No".

Analyses of Five Categories of Questionnaire Items. The first 38 items on this questionnaire represent the following five categories of interest: (a) overall training value, (b) tactical training value, (c) adaptability and decision making, (d) realism, and (e) motivation. Analyses were conducted to determine the internal consistency and reliability of the items in each category. Table 2 shows the results of these analyses.

Table 2
Internal Consistency and Reliability for Each Category of Items from the SimFXLeader Perception Questionnaire

Category of Items	Cronbach's Alpha	Items from SimFX Leader Perception Questionnaire
Overall training value	.87	1 – 7
Tactical training value	.87	8 – 15
Adaptability and Decision Making	.77	16 - 24
Realism	.94	25 – 35
Motivation	.75	36 - 38

Note: A Cronbach's alpha of at least .70 represents an acceptable level of reliability.

The ratings given by leaders for individual items were aggregated to form five new variables for analysis that represented the five categories of items shown in Table 2. In order to determine if there were group differences in ratings for the five categories of items, a One-Way ANOVA was conducted. Results of this analysis are shown in Table 3.

Table 3
Group Differences for Ratings on the Soldier Perception Questionnaire

Category of Items	*df*	F	*p*
Overall Training Value	1, 64	0.49	0.49
Tactical Training Value	1, 64	13.09	0.01
Adaptability and Decision Making	1,64	15.33	0.01
Realism	1, 64	0.35	0.55
Motivation	1, 64	0.28	0.60

Group differences emerged for Tactical Training Value and for Adaptability and Decision Making. Mean ratings given by leaders in the Instructor-Facilitated group for these categories were significantly higher than those given by leaders in the Stand-Alone group. There were no group differences in responses for items 39 – 41 on the questionnaire.

DISCUSSION

This report documents the results from a controlled experimental effort to compare the impact of instructor-facilitated vs stand-alone game training methods on Infantry small unit leaders' tactical decision making. This section of the report includes a discussion of these results.

Tactical Decision Making. The patrol and defense missions were developed to allow leaders to practice and gain additional experience with the critical events upon which squad leaders base tactical decisions during urban operations. While there were no differences in ratings for tactical decision making between groups, ratings were significantly higher for the patrol mission than for the defense within each group. These differences were probably due to the leaders' higher level of experience with patrol missions during training and deployment. Squad leaders who trained for or who were deployed in OEF and OIF tended to conduct many more patrol-oriented offensive missions than defensive missions, at least initially. The SimFX defense mission required leaders to make more tactical decisions about personnel related issues and fewer decisions about combat related procedures, with which leaders had more experience. These results were consistent with those from a previous evaluation in which leaders had lower ratings for their tactical decision making during the same defense mission (see Beal, 2007).

Leader Perceptions of SimFX. The SimFX Leader Perception Questionnaire was developed to allow leaders to rate the extent to which they believed SimFX was an effective training tool. The leaders rated questionnaire items from the following five categories:

- Overall Training Value
- Tactical Training Value
- Adaptability and Decision Making
- Realism
- Motivation

The findings suggest that, regardless of the training method, leaders in both groups believed that SimFX provided adequate training value and levels of realism, and that they were motivated by a desire to practice combat skills and make decisions. They were not motivated by a desire to have fun playing a game. Yet, leaders in the Instructor-Facilitated group offered higher ratings for Tactical Training Value and Adaptability and Decision Making than leaders in the Stand-Alone group. This suggests that leaders whose SimFX training was facilitated by an instructor and who engaged in peer interactions perceived more value for tactical training and adaptability and decision making than leaders who learned and trained with the game on their own.

With respect to Anderson's (2003) theory, the type of interaction in which participating leaders engaged had no measured impact on their tactical decision performance. The leaders who interacted with their instructor and peers received ratings that were no better than leaders who were required to interact with training content only. This finding supports Anderson's theory that implies that if one mode of interaction is at a high level (e.g., peer-content) then the other two (e.g., peer-trainer and peer-peer) can be eliminated without degrading the training experience. Thus, the theory appears to be accurate when applied to small unit Infantry leaders' tactical decision performance.

When leaders' perceptions of the SimFX training exercise are taken into account, the findings do not support Anderson's theory. The leaders who interacted with an instructor and with their peers perceived significantly greater value of the tactical training and the opportunities to adapt and to implement tactical decisions, both of which represent the most important training objectives of the SimFX exercise. It might be assumed that the lower ratings offered by leaders in the Stand-Alone group were a function of a lower level of motivation that is sometimes associated with peer-content methods of training. However, there were no data to suggest that a lack of either intrinsic or extrinsic motivation was responsible for the lower ratings.

During observations of previous instructor-facilitated and stand-alone game training with small unit Infantry leaders, the participants appeared to be actively engaged during the exercises, regardless of the training methods used. When asked, the leaders reported that it was their desire to learn combat skills and apply tactical decisions that sustained their motivation to train with games, even when the games themselves lacked sufficient tactical fidelity and psychological realism.

The leaders' perceived training value may be linked, at least in part, to the contingencies in the training environment and the performance expectations that are imposed by instructors, peers, and by the leaders themselves. While stand-alone systems and methods of training can provide pedagogic *opportunities* equivalent to those facilitated by instructors and peers, the environmental contingencies are reduced to those that are self-imposed and are void of any external reinforcement as a consequence for having taken the opportunities. The absence of external reinforcement may have the second-order effect of degrading leaders' perceptions of training value, even though tactical performance is not affected. On the other hand, when a functional relationship between meeting performance expectations and subsequent reinforcement from instructors and peers exists, the effect can be manifested in significantly higher ratings of perceived value and opportunities to perform, even though the actual opportunities are equivalent for both groups.

CONCLUSION

The findings reported here suggest that, under the controlled conditions imposed, leaders' tactical decision performance does not degrade when they conduct game training in the absence of instructors and peer interactions. However, leaders tend to perceive less training value when subjected to restrictions on their social environment. While these findings are specific to tactical game training with dismounted Infantry small-unit leaders, there are implications for the broader issue of the Army's trend towards distributed methods of instruction, particularly when those methods exclude the types of blended interaction that technology can provide.

Impact on Social Context and Leader Perceptions[2]. As the Army transitions some training from a residential to distributed instructional format, researchers are tending to focus on administrative and logistical concerns, course content and format, technology, and performance outcomes. How this transition may affect the social context of Army training, however, has received scant attention. This is an unfortunate gap in the research. Considering that real-time communications technologies are becoming widespread and will influence the future of Army training, it is essential to address issues concerning the benefits, costs, and characteristics of technologically-mediated social environments. A better understanding of how technologically-mediated communication will affect the perceptions of Soldiers and their social environment will allow decision makers to anticipate the costs and harness the benefits of blended training to Soldiers' professional development.

One perspective in the distributed learning literature downplays the role of the social environment in training. From this perspective, high quality interactions, whether between peer-instructor, peer-peer, or peer-content are understood as producing equivalent performance outcomes. Thus, these researchers argue for focusing on peer-content interactions, which also happen to be the least expensive and least time-consuming type of interaction. This argument makes some sense for the following reasons. First, the benefits of social interaction for learning and motivation are often ill-defined and not immediately apparent when compared to more concrete performance-based assessments, especially when these assessments demonstrate repeatedly no significant differences between face-to-face and online instructional modalities. Second, the promise of anytime, anywhere access to training (i.e., having personal freedom and control over one's own time) makes synchronous training less appealing at the outset. Third, synchronous communication produces a number of challenges to information networks, and has a tendency at times to produce a technologically-mediated social environment that is unappealing, even confusing, for those who have come to expect face-to-face communication. These reasons, among others, have led researchers to focus on administrative and content issues when investigating distributed learning, and to treat course content and performance evaluation as the most significant points of emphasis in developing and evaluating online training.

There are problems with an approach that neglects the social aspects of training. The content of a field manual or POI teaches Soldiers *about* the formal knowledge of the Army, not *how to be a Soldier* among other Soldiers. While expert knowledge of a content domain is important to being a Soldier, *being a Soldier* is also a

[2] This section of the report was adapted from a brief overview of Social Presence, contributed by Dr. Thomas Rhett Graves in April, 2008. Its purpose is to provide an appropriate conclusion with concepts that can be generalized to broader Army training issues, to promote discussion, and to alert researchers to an important, if neglected, area of investigation.

social and professional identity that exists and is maintained within a network of professional relationships and friendships, shared social norms, and an off-the-books mutual understanding of what that social role means. Being a professional Soldier is about being adept with, and comfortable in, practicing professionally among other Soldiers. It is a simple fact, too often overlooked, that professional practice is at its core a social phenomenon. Distributed training, without considering the essential social aspects of Army training, serves to disrupt the context of professional practice and professional identity, and may be demoralizing for an isolated Soldier trying to get through his or her requisite online coursework in order to be eligible for a new job or promotion. Professional training is as much a matter of connecting with one's professional cohort and mentors—sharing in a professional experience—as it is becoming expert in the facts associated with a knowledge domain and proficient in the tasks associated with performance.

Technology can make training better, and more engaging, when it facilitates connection among Soldiers and is not used to substitute for social connection. This area of research has as its goal to develop the meaning of social presence in Army training and identify what it may and may not contribute to a technologically-mediated training environment.

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