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CLOSE COMBAT TACTICAL TRAINER: CCTT

AUTHENTIC, TRANSFERABLE SIMULATION-BASED LEARNING FOR TANK AND MECHANIZED INFANTRY CREWS.

Abstract: Filling transferable learning requirement needs in a collaborative, authentic learning environment, the Close Combat Tactical Trainer (CCTT) trains tank and mechanized infantry units using both individual and collective methods.

Subject area and Population:

Mechanized warfare simulation; Tank and Bradley crews, platoons, companies and task forces.

Description of the Best Practice:

CCTT offers unit commanders the opportunity to develop and tailor structured exercises based on mission, enemy, troops, terrain, and time available (METT-T) to meet the unit's training plan and objectives. [CCTT](#) builds on the experience gained from prior training.

CCTT modules include:

- realistic crew stations
- machine guns
- commanders popped hatch capabilities
- thermal and night vision sights
- expanded engineer capabilities

collective missions as well as the ability to vary environmental conditions. Commanders can now select the environmental conditions and terrain in which the units train. Day or night

CCTT provides a realistic virtual environment in which units train on and perform tasks in order to successfully accomplish their

training is now possible as is training in fog, haze, or cloud cover.



Background:

Prior to CCTT, the army's primary means of training and testing its crews was through live fire and force on force training. Both of these methods were very expensive and included extensive support resources during planning and execution. Simulators existed for training and evaluating tank commanders and gunners (primarily the Unit Conduct of Fire Trainer – or UCFT), but the collaboration of the entire crew or a tank platoon did not exist at the simulation level. Since proficient tank crews rely on the timing

of the individual tasks in a collaborative tank environment, coupled with the expense of actual tank maneuver time, crews were not receiving sufficient amount of authentic training.

Due to the fast pace action (and “fog of war”) associated with force on force training, accurate assessment of performance was measured through qualitative observation and introspection, while live fire exercises, often limited assessment to target hit time, number of targets hit and evaluation of voice commands. While the military’s After Action Review (AAR) process is an excellent model, quite



often crew deficiencies could not be accurately identified or evaluated. The army needed a way to capture the individual events occurring within a tank crew in order to provide more finite assessment and feedback to its crews.



Conceptual Framework:



JEROME BRUNER

The basis of tank crew performance and training has heavy foundations within constructivist theories ([Bruner](#)). Individual and crew collective tasks are developed through prior knowledge and scaffolding. The military is fairly adept at teaching basics and using those basics as building blocks. In the case of tank crew skills, crewmen are required to complete 17 individual tasks. With those tasks mastered, the crewman can fit within his role as a crewmember, working toward accomplishing the collective tasks.

Authentic training experiences build and reinforce prior knowledge. Also, military tasks are framed within criterion referenced instruction ([Mager](#)), specifically designed with task analysis and performance objective



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The hands on approaches, coupled with the number of subject matter experts and personnel with similar experience, demonstrates traits of social learning behavior. Through interaction with other tank crewmembers and tank crews, the individual is able to code relevant tasks and attempt to reproduce the tasks when prompted. Learning can

come from peer to peer and peer to instructor interaction.

Finally, tank training is often both experiential and operant conditioning (Skinner). Many of the more complex collective tasks in a tank involve reaction to an external stimulus (like enemy fire). The real reward for good performance is survival (with death as an ultimate negative reinforcement). In training, annual evaluations are direct representations of a crew's performance in the scenarios presented at live fire and force on force exercises. The training is experiential, since it involves concepts of life and death (both literally and figuratively – in the career sense).

Personnel Roles in CCTT

Personnel	Role	Materials Needed
Unit Leader	Direct the unit rehearsal	OPORD Overlay
Unit	Rehearse for each exercise to ensure they understand the unit leader's plan for execution	OPORD Overlay Exercise Outline
O/C	Observe and coach the training unit in accordance with the exercise TSP	OPORDs Exercise TSP Unit's SOP
Support Personnel manning Op Center Workstations	Answer questions concerning their role in the exercise	Applicable portions of the OPORD



Technology and Management Plan:

CCTT provides a framework for authentic training, in which existing tank crews, platoons and companies can work through exercises designed to their level of proficiency. Crews can battle against varying levels of opposing forces, from "easy" computer generated enemy to complex force on force with other platoons. Repetition is achieved through multiple iterations and through "God" functions from a control center that can bring a crew back to life within the framework of a larger simulation. All events are recorded (internal (to the tank) and external communications, as well as the video performances within the crew's position) and selective sequences are played back at group after action reviews. This practice demonstrates social learning constructs – learning from others, as well as the operant conditioning involved with the end of a simulation due to crew error (getting shot by an enemy tank).

Unit commanders can make the exercises more complex, starting with individual tanks fighting in their own "world" and building to an entire Battalion fighting together, depending on crew proficiency. Typically, crews come to CCTT as the final preparation prior to live force on force engagements, but crews could operate safely within the CCTT environment with only the basic military occupation specialty experience required of the crew position.



Current military training outlines and evaluation (TO&E) which are traditionally used for live maneuver training can be applied against simulation training with only slight modifications. While CCTT has never been meant as a complete substitute for live training, it has significant prospects for augmenting expensive training.

Critical Assessment of the Project:

The major criticism of CCTT is availability and utilization. There are 10 locations that have fixed CCTT sites (which corresponds to the active duty armored brigade post locations) and each of those sites only has between 4 and 14 M1 tank simulators (with a corresponding number of M2 BFV simulators and proportionate numbers of Fire Support simulators). The sites are typically manned by civilians who work a strict 8 hour per day schedule. While some allowances are made for overtime, request for additional hours are often met with budgetary constraints. In Germany, for example, there are approximately 44 tank platoons (4 tanks per platoon) and the same number of M2 (Bradley) platoons. Grafenwöhr has only 8 M1A1 and 8 Bradley simulators that operate for only 35 hours per week. Therefore, a tank or Bradley company likely only spent one week per training

year in the simulator (and typically had 6 crews idle during that time). Expanding the amount of hours available and simulators would greatly affect the impact of the training. A side effect is that since tank and Bradley companies don't always train together, half of the simulators are typically empty during the training.

Typical Mission Timeline

Activity	Expected Duration
Exercise Preview	15 Minutes
Exercise Execution	1.5 Hours
Exercise AAR	30 Minutes

Another criticism is that learning is not as modular as it could be. Unit commanders often do not have the time to sit down with the engineers and develop new scenarios (not only is their time valuable, but the time inputting a new scenario is time that cannot be spent with crews in the simulation – since the same control center is used for both). Therefore, most platoons fall in on a canned scenario that has been deemed “good enough”. The platoons may run through the exact same scenario several times during their one week, reducing the amount of surprises. This predictability removes a major component from the scenario. The army ought to come up with more scenarios and make training materials and packages available to the forces that will fight in the simulators.



References:

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Definitions:

Constructivist Theory: A major theme in the theoretical framework of [Jerome Bruner](#) is that learning is an active process in which learners construct new ideas or concepts based upon their current/past knowledge. The learner selects and transforms information, constructs hypotheses, and makes decisions, relying on a cognitive structure to do so. Cognitive structure (i.e., [schema](#), mental models) provides meaning and organization to experiences and allows the individual to "go beyond the information given".

Criterion Referenced Instruction: The Criterion Referenced Instruction (CRI) framework developed by [Robert Mager](#) is a comprehensive set of methods for the design and delivery of training programs. Some of the critical aspects include: (1) goal/task analysis -- to identify what needs to be learned, (2) performance objectives -- exact specification of the outcomes to be accomplished and how they are to be evaluated (the criterion), (3) criterion referenced testing -- evaluation of learning in terms of the knowledge/skills specified in the objectives, (4) development of learning modules tied to specific objectives.

Experiential Learning: [Carl Rogers](#) distinguished two types of learning: cognitive (meaningless) and experiential (significant). The former corresponds to academic knowledge such as learning vocabulary or multiplication tables and the latter refers to applied knowledge such



CARL ROGERS

as learning about engines in order to repair a car. The key to the distinction is that experiential learning addresses the needs and wants of the learner. Rogers lists these qualities of experiential learning: personal involvement, self-initiated, evaluated by learner, and pervasive effects on learner.

Operant Conditioning:

The theory of [B.F. Skinner](#) is based upon the idea that learning is a function of change in overt behavior. Changes in behavior are the result of an individual's response to events (stimuli) that occur in the environment. A response produces a consequence such as defining a word, hitting a ball, or solving a math problem. When a particular Stimulus-Response (S-R) pattern is reinforced (rewarded), the individual is conditioned to respond. The distinctive characteristic of operant conditioning relative to previous forms of behaviorism (e.g., Thorndike, Hull) is that the organism can emit responses instead of only eliciting response due to an external stimulus.



B.F. SKINNER

Social Learning Theory: The social learning theory of [Albert Bandura](#) emphasizes the importance of observing and modeling the behaviors, attitudes, and emotional reactions of others. Bandura (1977) states: "Learning would be exceedingly laborious, not to mention hazardous, if people had to rely solely on the effects of their own actions to inform them what to do. Fortunately, most human behavior is learned observationally



ALBERT BANDURA

through modeling: from observing others one forms an idea of how new behaviors are performed, and on later occasions this coded information serves as a guide for action." (p22). Social learning theory explains human behavior in terms of continuous reciprocal interaction between cognitive, behavioral, and environmental influences. The component processes underlying observational learning are: (1) Attention, including modeled events (distinctiveness, affective valence,

complexity, prevalence, functional value) and observer characteristics (sensory capacities, arousal level, perceptual set, past reinforcement), (2) Retention, including symbolic coding, cognitive organization, symbolic rehearsal, motor rehearsal), (3) Motor Reproduction, including physical capabilities, self-observation of reproduction, accuracy of feedback, and (4) Motivation, including external, vicarious and self reinforcement.

Military Terms:

Certification Gate

A task or objective that a unit must complete before moving on to the next task or objective.

Individual Training

Training that officers, noncommissioned officers, and soldiers receive in units, at institutions, through self-study, and through supervised, on-the-job training. This training prepares the individual to perform specified duties or tasks related to the assigned or next-higher specialty code or skill level and duty position.

Local and major training areas

Land facilities that offer the potential to support effective and efficient training and over which the U.S. Forces have substantial control.

Military Education

The systematic instruction of individuals in subjects that will increase their knowledge of the science and art of war.

Military exercise

A military maneuver or simulated wartime operation involving planning, preparation, and execution. Military exercises are carried out to train and evaluate units and personnel.

Military training

The instruction of personnel to improve their ability to perform specific military functions and tasks, or the exercise of one or more military units conducted to enhance their combat readiness.

Mission-essential task list

A compilation of collective mission-essential tasks that will be successfully performed if an organization is to accomplish its wartime mission.

Model

A representation of some or all the properties of a device, system, or object.

Multiechelon

Simultaneous conduct of different events by a unit or the accomplishment of different tasks by elements of the unit.

Sustainment training

Individual and collective training conducted in unit or resident schools, units, and organizations to ensure continued expertise in the operation, maintenance, and employment of fielded systems or equipment.