Designing and evaluating the transfer of learning through a game-based simulation for Combat Medics

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ABSTRACT

The Tactical Combat Casualty Care Simulation is a government funded program that combines interactive training techniques with Advanced Distributed Learning (ADL) technologies and immersive, 3D game-based simulations to help train Army Combat Medics. The program uses a variety of instructional strategies to immerse students into scenario driven events in order to teach and evaluate a student's knowledge regarding the essential tactics, techniques and procedures required to successfully perform as an Army Combat Medic in a battlefield environment.

The application was developed for the Army Medical Department Center & School; Department of Combat Medic Training's (AMEDD, DCMT) "***68W10 Healthcare Specialist Course***" at Fort Sam Houston, TX. It is being implemented in three stages. First, it is being used in the classroom to familiarize students with initial concepts of providing care on the battlefield. Second, it is being hosted within the school's learning resource centers. Finally, in August 07, it will be hosted behind Army Knowledge Online and interfaced with a SCORM (Shareable Content Object Reference Model) conformant Learning Management System to provide both online and offline student tracking, assessment and remediation.

One critical component of this project is an ongoing training effectiveness evaluation being managed by the Army Research Institute to determine learning transfer into the field and the overall cost benefits of using the system. Earlier evaluations have resulted in changes to the interface, instructional strategies and playability of the application. This paper will discuss in detail how the student's need to master a variety of competencies impacts the design of the TC3 Simulation. It will look at the criteria used to balance game-play, instructional design, interface development and subject matter expertise while discussing the metrics and processes used to evaluate the application's overall benefits. Finally, it will compare the final results of the training effectiveness with developer notes to discuss best practices and lessons learned from the development and implementation of this project.

ABOUT THE AUTHORS

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Ms. Rosemary Peters, President, Integrated Learning Systems, is an innovative instructional systems designer dedicated to providing high quality interactive multimedia and game-based training solutions to a wide range of target audiences. She has provided the instructional foundation for the design, development and implementation of the National Guard Bureau's Civil Support Team Trainer and the Army Medical Department Center & School's Tactical Combat Casualty Care Simulation. She has also had extensive experience in writing creative, game/simulation based training scenarios and identifying assessment parameters/criteria within these scenarios to assess comprehension of course objectives and sub-objectives.

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INTRODUCTION

The use of military forces in urban operations has increased considerably over the past years. As illustrated by the current conflict in Iraq, the Army finds itself fighting its toughest battles in urban areas facing unconventional forces. The Army needs to be able to train in these urban scenarios, as well as conduct realistic mission planning and mission rehearsal. Modeling and simulation plays a big role in the development and refinement of Army tactics, techniques and procedures. One group that can greatly benefit from this kind of training is the military medical personnel.

The primary mission of all military medical personnel in the combat field is to treat the wounded and save lives. The Army combat medic, also known 68W, is responsible for providing the first line of medical care to casualties in the battlefield. Army medics must be able to quickly assess a situation, and decide on an appropriate course of action in order to save lives under combat conditions. Since training is the primary vehicle used to enhance and maintain a medic's readiness, trainers are focused on providing the necessary tools to enhance the Soldier's training experience and success in the battlefield

The 68W10-Tactical Combat Casualty Care Simulation (TC3 Simulation) is a game-engine based simulation which combines advanced interactive training techniques with Advanced Distributed Learning technologies and immersive 3D simulations. The TC3 Simulation uses a variety of instructional development strategies to support a student's need to master a variety of competencies and to apply them in unique situations. Drawing upon adult learning theory, performance-based training principles, and a suite of authoring tools and techniques, the TC3 Simulation provides the capabilities to generate diagnostic instruction and immediate feedback that will automatically address different levels of student proficiency within the range of complex training objectives.

The goal of the simulation is to immerse students into scenario-driven events in order to teach procedures relating to the combat medic's initial arrival on the scene, scene assessment, scene security, triage, initial treatment and evacuation of the casualty. Each scenario within the simulation is designed to be a short, goal-oriented training exercise that provides the means to train a group of closely related tasks within the context of a specific mission. It is this contextual experience of knowledge acquisition in an authentic environment that facilitates the learner to create the constructs that can be applied to new unfamiliar situations. An additional goal of this effort is to provide a foundation for integrating Advanced Distributed Learning courseware into the program while giving training developers the capability to mix and combine live, constructive, and virtual training simulations to meet institutional, operational and self development training requirements. [1]

When utilizing a tool for training, it is important to evaluate its effectiveness in transferring learning and to measure the overall cost benefits of using the system as part of a program of instruction. In an effort to evaluate the effectiveness of the TC3 Simulation, a training effectiveness evaluation managed by the Army Research Institute is currently being conducted to determine if the system improves performance and efficiency of the combat medic. Earlier usability evaluations have resulted in changes to the interface, instructional strategies, and playability of the application. This paper will highlight the criteria used to balance game-play, instructional design, interface development and subject matter expertise while discussing the metrics and processes used to evaluate the application's overall benefits. Finally, it is our intent to discuss best practices and lessons learned from the development and implementation of this project.

OVERVIEW

Tactical Combat Casualty Care

Tactical Combat Casualty Care [2], also known as TC3, is the pre-hospital care rendered to a casualty in a combat environment. The application of TC3 principles during a tactical combat environment has proven highly effective and is a major reason why combat deaths in latest conflicts (Operation Iraqi Freedom and Operation Enduring Freedom) are lower than in any other conflict in the history of the United States. Even though Killed in Action rate for Operation Iraqi Freedom is currently at a historically low rate, Soldiers continue to die from the three main causes: hemorrhage, airway compromise, and tension pneumothorax.

In a combat environment, casualties will generally fall into three categories:

- Casualties who will die regardless of receiving any medical intervention.
- Casualties who will live regardless of receiving any medical intervention.
- Casualties who will die if they do not receive timely and appropriate medical intervention.

TC3 addresses the casualties who will die if they do not receive timely and appropriate medical intervention. TC3 is structured so that correct intervention is performed at the correct time in order to meet the three important goals of field care: treat the casualty, prevent additional casualties and complete the mission. There are three distinct phases of care in combat casualty management. Each phase has its own characteristics and limitations and the care provided under each phase depends directly on those limitations. The following is a description of each phase:

- Care Under Fire – this phase is characterized by the care rendered at the point of injury when both the medic and the casualty are subjected to effective hostile fire. There is extremely high risk of additional injuries from hostile fire for both the medic and the casualty. Available medical equipment is limited to that carried by the medic and the casualty.
- Tactical Field Care – this phase is characterized by the care rendered by the medic once both the medic and the casualty are no longer under effective hostile fire. It also applies to those situations in which an injury has occurred on a mission, but there has been no hostile fire. Available medical equipment is still limited to that carried into the field by mission personnel. Time to evacuation may vary from minutes to hours.
- Combat Casualty Evacuation Care (CASEVAC) is the evacuation of combat casualties from the battlefield. This phase is characterized by the care rendered once the casualty has been evacuated and picked up by an aircraft, vehicle, or boat for transportation to a higher echelon of care. Additional equipment and medical personnel that has been pre-staged should be available.

AMEDD C&S Program of Instruction

As a nation at war, the initial skills medical training for Army combat medics has shifted focus from sterile, textbook procedures to realistic, battlefield-centric missions as outlined in the Operational Needs Statement for Medical Simulation Training Centers for Combat Lifesavers (CLS) and TC3 Training. The Department of Combat Medic Training (DCMT) at the U.S. Army Medical Department (AMEDD) Center and School serves as the proponent for the 68W Health Care Specialist and the Army Emergency Medical Service (EMS). DCMT provides the Army with highly motivated and disciplined 68W, Health Care Specialists (Combat Medics) who are National Registry Emergency Medical Technician-Basic (EMT-B) certified. These Soldier medics possess the additional necessary medical skills to sustain the force, survive the battlefield and accomplish the mission to *"Conserve the Fighting Strength."* [3]

Pre-hospital care continues to be the most important aspect of battlefield medicine. Newly assigned combat medics attend the 16-week, 68W10 Healthcare Specialist Course at AMEDD. The instructors use a variety of instructional development strategies to effectively prepare Soldier medics for administering care and saving lives on the battlefield. Soldier medics prepare for these missions by participating in field exercises with an emphasis on mass casualties and patient evacuation. Classroom instruction provides Soldiers with the basic knowledge and skills; however, current classroom and field instruction lack the ability to provide all Soldiers with an opportunity to test their skills in multiple, current operating environment-like training scenarios. Furthermore, operations in Afghanistan and Iraq have identified gaps in the training of combat medics. Improvements in Tactical Combat Casualty Care training can have a direct impact on

mission accomplishment by reducing the number of battlefield deaths. The goal is to improve medical care at the point of injury. If a casualty survives long enough to reach a care facility, his or her chance of survival increases.

68W10 TC3 Simulation

The tools and methods currently used for initial skills and sustainment training are insufficient for training the Army's combat medics. New technologies are needed to provide medics with greater opportunities to develop and test their decision making and technical medical skills.

To address these requirements, the U.S. Army Research Development and Engineering Command, Simulation and Training Technology Center (RDECOM-STTC) executed a three-year (FY04-06), joint Army Technology Objective (ATO) with the U.S. Army Medical Research and Materiel Command (MRMC), entitled Advanced Medic Training Technologies. The research produced enhanced tools, techniques, and procedures enabling the Army to field and maintain better trained medics and to improve the ability to save lives on the battlefield.

In fulfilling this ATO, the U.S. Army RDECOM-STTC forged a partnership with the AMEDD DCMT at Fort Sam Houston, TX, and the U. S. Army Research Institute (ARI) to develop and implement new technologies to support simulation-based training environments for Army combat medics. The 68W10 TC3 Simulation is a prototype application that was developed through this partnership. It is comprised of a desktop simulation and courseware for individual training of the Tactics, Techniques and Procedures (TTPs) associated with TC3.

The 68W10 TC3 Simulation provides a deliberate focus on training objectives by simulating realistic casualties within a tactical combat environment set up to provide cues and conditions to support the principles of TC3. It utilizes commercial gaming technologies to provide individual training in an immersive 3D environment. The TC3 interactive courseware compliments the simulation by providing the knowledge, skills, and practice necessary to help the trainee understand the differences between trauma management in a civilian environment in the United States and trauma management in a foreign country during wartime.

The courseware is based on the same systematic approach for Basic and Advanced Trauma Life Support (BTLS, ATLS) that is used for EMTs. However, it incorporates tactical situations that require departures from these established principles as dictated by the principles of Tactical Combat Casualty Care.

How does the TC3 simulation fit into the existing Program of Instruction

TC3 Simulation has been transitioned to the AMEDD DCMT for standardized use in their TC3 course. The TC3 simulation is intended to be integrated into the course after students have been previously exposed to the concepts of basic and advanced trauma life support. After completing the 68W10 Healthcare Specialist Course, medics are required to revalidate 23 critical hands-on skills every twelve months. The TC3 can be used in the following capacities for initial and sustainment training [1]:

- When used in a classroom environment, the TC3 simulation provides an opportunity for student medics to assume key positions and perform their duties under the guidance of an instructor. This approach also allows instructors to pause the simulation to discuss key points within the context of a lecture.
- The TC3 Simulation can be hosted at the AMEDD's Learning Resource Centers. This approach is geared towards fostering independent learning and relating their new knowledge and skills learned in the 68W10 Healthcare Specialist course to their own experiences in the TC3 Simulation. Students can earn three Continuous Education Units for refresher and sustainment training for military medics and Combat Lifesavers (CLS).
- The TC3 Simulation and courseware can be accessed via the web as a distributed-learning tool for sustainment training. This allows Soldiers access to the training anywhere, anytime. If web access is not available a CD can be distributed on request. In the near future TC3 will be hosted behind Army Knowledge Online and interfaced with a SCORM (Shareable Content Object Reference Model) conformant Learning Management System (LMS) to provide both online and offline student tracking, assessment and remediation.

INSTRUCTIONAL SYSTEMS DESIGN

Audience and Demographics

The TC3 audience typically consists of young, new recruits and older more experienced medics who have not received the TC3 training in their formal instruction programs. TC3 training is also valuable for reservists called to active duty. To be eligible for TC3, an individual must complete the initial six and a half week 68W training based on the civilian EMT model, and must have passed the National Registry EMT exam. Table 1 summarizes the TC3 target audience profile.

Educational background:	New recruits: high school Reserves & older medics: some college
Prior level of medical training:	New recruits: Passed the National Registry EMT exam Reserves & older medics: some prior EMT and combat medical training
Computer literacy level:	Recruits: intermediate level computer literacy Reservists: basic computer literacy
Male/female ratio:	5 to 1 male to female
Age range:	20 to 50
Reading level:	9th grade
Learning style:	Visual & kinesthetic
Background:	Various backgrounds from throughout the United States. Some foreign students
Motivation for completing the training:	Job requirement, advancement, job knowledge, personal pride

Table 1. TC3 Target Audience Profile

ISD Approach

The TC3 interactive courseware was designed and developed in compliance with the SCORM. This means that instruction was grouped into SCO's (sharable content objects), composed of assets such as text, audio, video and animation. The SCOs launch in a SCORM run-time environment based on predefined sequencing behaviors. The power of SCORM lies in its ability to provide:

- Content able to function in multiple applications, environments, and hardware and software configurations
- Content that does not require modification to operate as software systems and platforms are changed or upgraded, and
- Content that can be identified and located when it is needed and as it is needed, to meet training and education requirements.

This design embraces the idea of separating the content and the logic controlling the display and presentation of that content as the foundation for a robust learning environment.

Presentation Strategies

A variety of interactive presentation methods and screen layouts were incorporated in the TC3 courseware. Special 'explore-it' screens allow learners to click an image or roll over text to display additional information in the form of images, video or text.

A 'Your Thoughts' screen was integrated into the courseware. This feature provides learners with the ability to enter their thoughts on a particular issue and then compare what they entered to TC3 doctrine. Multiple choice exercises provide learners with a situation or question, requiring them to use current knowledge and experience to select the best response from a set of choices.

Evaluation Strategies

Pre-tests and post-tests are used to determine individual training needs. Test results identify learner deficiencies and provide input to customized curricula addressing these deficiencies. Pre- and post-test summaries inform learners of assessment outcomes. Scores are submitted to and stored in the LMS.

Lesson-level quizzes present two to five questions at the end of each lesson — at least one question for each enabling learning objective. The courseware provides immediate feedback and remediation, and directs learners to content requiring further study.

Tracking and Record Keeping

Learner progress can be tracked to the nearest completed lesson within the LMS. The LMS indicates to the learner, which lessons have been successfully completed. If learners exit a lesson without completing it, a bookmark function gives them the option of returning to the beginning of the lesson they left, but did not complete. A SCO/lesson is considered completed when the learner earns a score of 80% or higher on the quiz at the end of the lesson.

Content Structure Diagram

The TC3 instructional design follows a competency model, providing a customized learning experience based on the needs of an individual learner. Figure 1 illustrates the TC3 aggregations and SCOs. The program of instruction is designed to ensure the instructional integrity of SCORM content by making each SCO a stand-alone "lesson" or instructional unit. Since a SCO is intended to be inherently small, it represents a single instructional objective and all of the related materials and resources required to support that objective. Structured in this manner, the effective completion of the SCO will impart the knowledge or skill for which it was designed.

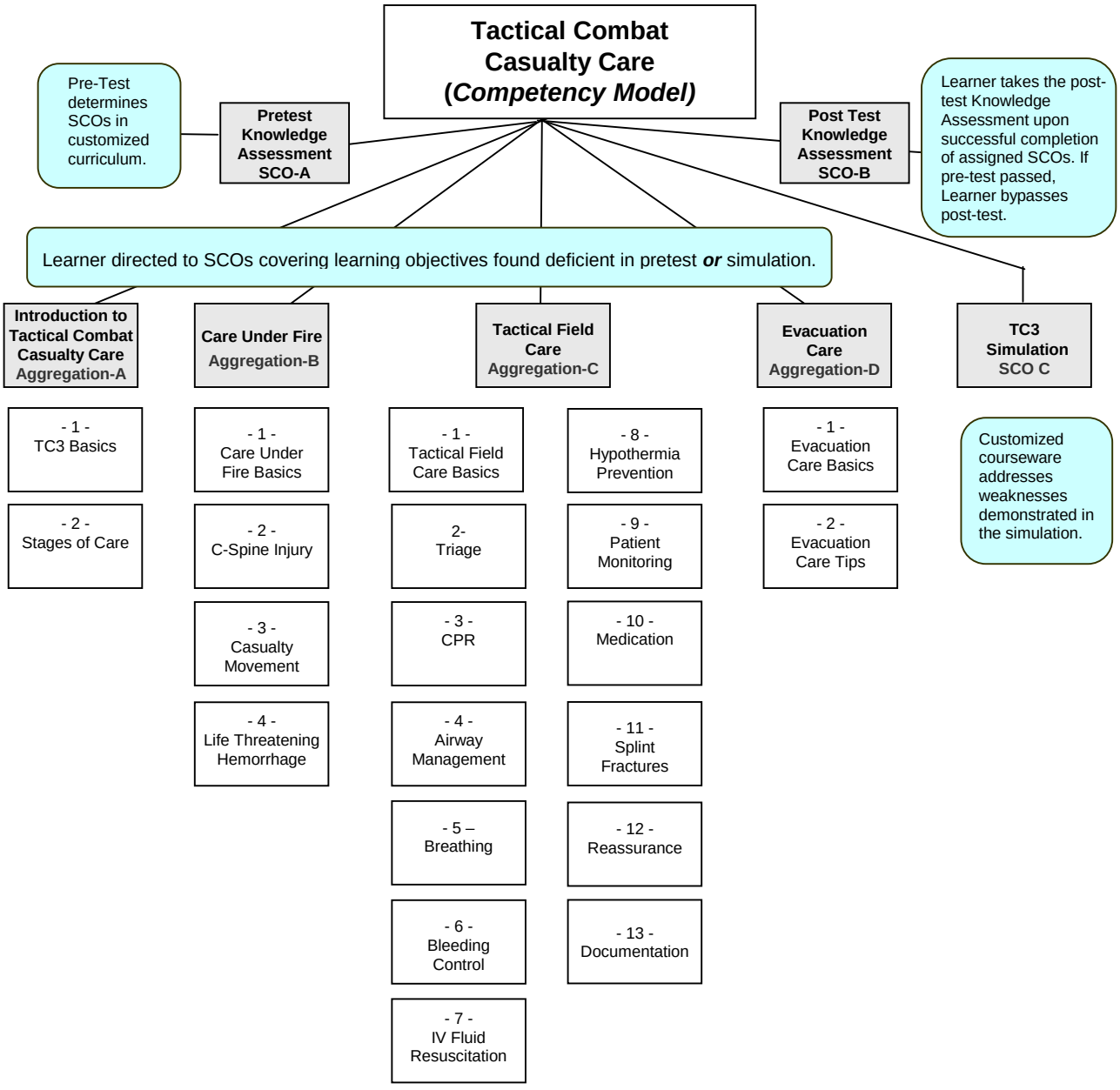

Figure 1. Tactical Combat Casualty Care – Content Structure Diagram Using a Competency Model

Content Type	Definition	Instruction Method	Example
Fact	Specific and unique data Instance	• Statements of fact • Pictures of specific forms or equipment	Illustration of a piece of equipment My password is John 1
Concept	A category that includes multiple examples	• Definitions • Examples • Non-examples • Analogies	The TC3 Courseware password
Process	A flow of events or activities	• Stage tables • Animated diagrams	The notification process
Procedure	Task performed with step-by-step actions	• Step-action tables • Demonstrations	The IV insertion procedure

Table 2. The four types of content in the TC3 courseware

Based on the analysis of the available TC3 information, the course content was categorized into four different types: facts, concepts, processes, and procedures. Table 2 above, further defines these content types.

Subject Matter Expert (SME) Support

Content used in the TC3 interactive courseware was based on the Tactical Combat Casualty Care instructor-led course developed by AMEDD DCMT. As part of the design process, the course was videotaped to capture the content along with student interactions.

TRAINING EFFECTIVENESS EVALUATIONS (TEE)

The ultimate goal of training is to effect cognitive, behavioral and attitudinal changes on the job. Determining if training is successful is not necessarily an easy task. One of the most well known goal-based models of training effectiveness evaluation was presented by Kirkpatrick in 1959 (see Table 3) [4]. Kirkpatrick suggests that training effectiveness can be assessed at multiple levels by evaluating: participant's *reactions*, skill acquisition or *learning* as a result of the training, changes in *behavior* on the job, which translate into organizational benefits or *results*.

The American Society for Training and Development's 2002 state of the industry report indicated 78% of TEEs conducted by organizations did so by obtaining user feedback (level 1); 32% conducted level 2 evaluations examining skill acquisition, while only 9% completed transfer studies and 7% examined the organization level impact of the training.

Table 3. Kirkpatrick (1959) four levels of Training Effectiveness Evaluation.

Level 1 – ***Reaction***	Participant reactions to the training. Typically captured through self reports (e.g., feedback questionnaires, focus groups,) and researcher observations of participant interactions with the software.
Level 2 – ***Learning***	The extent to which participants improve knowledge and skills and change attitudes as a result of the training. May be evaluated through pre-/post-testing, on-the-job assessments, and supervisor ratings of performance.
Level 3 – ***Behavior***	Extent to which changes in trainee knowledge, skills and attitudes transfer back to the workplace. Training transfer may be captured via self-assessments, on-the-job observation and ratings from customers, peers and superiors.
Level 4 – ***Results***	Organizational benefits resulting from the training. Indicators of organization level effects may be obtained from unit performance reports, quality inspections, and interviews with senior people.

This substantial drop off between level 2 and 3 evaluations may be explained in part by results of meta-analysis demonstrating that as studies move beyond level 2 the training effect size substantially diminishes [5] Small effect sizes make the effect of training difficult to detect and therefore requires rigorous attention to empirical research design.

The remainder of this section describes the level 1 evaluation of the TC3 Simulation, and outlines plans to conduct level 2 and 3 evaluations - acknowledging and attempting to address the difficulties associated with assessing training transfer.

TC3 Simulation Usability Studies (Level 1)

The usability of an interactive system can be defined, in part, in terms of how easily a user can access and use the intended functionality of the system to meet task objectives. Interactive systems should be designed such that they are intuitive, effective, and subjectively acceptable to users [6]. Performing a usability study early on can provide valuable information for system development. Early identification of user issues translates into reduced system redesign costs, enhanced user satisfaction and decreased user training time and the need for technical support.

Study I – Early prototype evaluation

A TC3 Simulation early prototype evaluation was conducted at the 68W training school at Fort Sam Houston in June 2006. The purpose of the evaluation was twofold; first, it was intended to obtain user (instructor and student) feedback regarding the current state of the game and scenario; second, it was intended to explore the feasibility of introducing this training tool in the current program of instruction. A total of 29 individuals (16 instructors and 13 students) first completed a short training scenario, and then provided feedback on their reactions through surveys and participation in structured focus group interviews. The participants were briefed on the game and the scenario. A short training session was conducted to familiarize the participants with the user interface. The participants were asked to play the game and complete the training scenario.

In the prototype scenario, the trainee was expected to assume the role of a combat medic assigned to a light infantry squad operating in an urban environment somewhere in the Middle East. The squad is attacked by an IED causing five injuries – one killed in action, three serious injuries (an amputation, a sucking chest wound, an airway compromise) and a relatively minor burn to an arm. Afterwards, the participants were asked to fill out two different questionnaires developed by the Army Research Institute and to participate in group discussions.

The first questionnaire collected demographic data. The second questionnaire consisted of 28 usability questions. Participants were asked to place an X on a scale from 0 (do not agree with the assertion) to 10 (very much agree with the assertion) based on their experience with the TC3 Simulation. The questions in the questionnaire assessed: Benefit to Training, System Usability, Presence and Realism, and Motivation to Use. Table 4 is a summary of the mean responses obtained from the instructors and students.

	Instructors	Students
Benefit To Training	6.2	6.9
System Usability	6.4	6.8
Presence and Realism	5.3	5.9
Motivation to Use	6	6.27

Table 4. Summary of results (mean response) obtained from the students and instructors on initial prototype.

In addition to the questionnaire, the users were asked to participate in focus group discussions to provide feedback about the current state of the prototype game and scenario. The following is a summary of the observations obtained from the questionnaire and the focus group discussions:

- The users felt that the TC3 Simulation could provide some benefit to the current program of instruction.
- Users rated system usability to be good. Overall, the users found the system relatively easy to learn.
- Users rated motivation to use the system high. Within this category, it is important to note that the desire to practice making TC3 decisions was rated significantly higher as a reason to use the game compared to the use of the game for fun and personal entertainment (7.0 vs. 5.3). Even though there is a difference, entertainment was still moderately important.
- When asked if required medics actions were missing from the options presented, both instructors and students strongly agreed. Among the questions, the one that got the most extreme negative rating (7.4 Mean response) was the one that inquired if while playing, there were options that they expected to be able to perform which were not available.

The inputs provided by the users during the focus group discussions regarding the current state of the prototype game and scenario were annotated and categorized in four different areas: Scenario/Environment, Medical Procedures, User Interface, and After Action Review (AAR). Discussions were held with AMEDD's TC3 subject matter expert to prioritize the suggested changes.

Study II – Mature prototype evaluation

After 9 months of further development including response to user feedback obtained in Study I, a second

usability evaluation involving a more mature prototype was performed in March 07. A total of 16 AMEDD students participated in the study. Procedures were similar to those described in Study I. Table 5 is a summary of the results (mean responses) obtained from the students during both studies.

	Survey June 06	Survey March 07
Benefit To Training	6.9	9.2
System Usability	6.8	7.95
Presence and Realism	5.9	8.34
Motivation to Use	6.27	7.77

Table 5. Summary of results (mean response) obtained from the students on later version of the TC3 Simulation.

The goal of the initial study was to collect feedback from potential users in an effort to make the system more efficient and intuitive. Also, feedback from the instructors and AMEDD SME was sought to ensure that the system would meet TC3 training goals. When comparing the mean response results from the evaluations, the users rated the system higher in all categories with presence and realism to be the one with highest improvement.

Increases in mean responses between the June 06 and March 07 studies highlight the importance of user involvement in the initial stages of system design. Having a user centric approach was instrumental in the design and development process of the TC3 Simulation. Another, perhaps more exciting finding of this research is the clear implication of the training benefit provided by the mature TC3 prototype (9.2 on a 10 point scale) indicated by users in the March 07 study.

TC3 Simulation Skill Acquisition and Training Transfer Study (Levels 2 and 3)

To date, the TC3 instructional strategy has been carefully planned and implemented, and user feedback sought - including content and aspects of usability - across two studies and incorporated into a final TC3 Simulation prototype. A skill acquisition and training transfer study is planned using the final TC3 Simulation training system.

It is anticipated that a pilot study will be conducted at AMEDD, Ft. Sam Houston, Texas. The goal of the pilot study is to collect preliminary data using experimental materials and measures and to identify potential challenges in methods and procedures prior to the experimental study. The results of the pilot study will be available and presented during I/ITSEC 2007.

The experimental study will be carried out at one or more of the Army's Medical Simulation Training Centers (MSTC) which are being stood up to conduct critical training in combat medicine training, including TC3 training. The specifics of the study have yet to be defined; however the general approach to assessing skills acquisition will be through a pre/post test design. Participants will include 68W Military Occupational Specialty (MOS) rotating to the MSTCs for sustainment training. Although 68 Ws entering the MSTCs for training will have already undergone initial MOS training, few opportunities exist for medics to maintain skills prior to returning to the MSTC for pre-deployment or sustainment training, hence, combat medic skills often decay. .

Although evaluation of skills transfer to performance in a field training exercise would be most desirable, difficulties in the ability to detect an effect of a single training intervention, the TC3 Simulation, among multiple training modules with the anticipated sample size will be, a significant challenge, one beyond the scope and resources of this effort. Therefore, several additional approaches are also being evaluated to assess training transfer. For example, training transfer may be assessed by determining if skills obtained through TC3 Simulation training transfer to performance on paper and pencil based scenarios, or even to performance on additional TC3 Simulation scenarios.

CONCLUSION

The non-linear battlefield limits the number of trained medical personnel attached to maneuver elements. There is a need to fill the gap with some type of medical capability at the individual Soldier level in order to improve the survivability of the Soldier in combat. Improving care at the point of wounding is the best medicine. Training provides the opportunity to start this process long before Soldiers ever see the battlefield [7].

The Army is currently pursuing the use of instructional games in an effort to improve effectiveness in training. Desktop simulations and digital game-based technologies have earned much attention for their potential as training tools [8]. Prior research indicates that higher levels of learning motivation are associated with digital game-based technologies [9]. There are some advantages to this concept when compared to live, virtual and constructive simulations. If developed to run on a PC, games provide a low cost alternative to

training. They can be distributed easily, therefore there is potential to minimize time and logistics. If the Soldier has access to a PC, he or she could play the game any time, anywhere.

TC3 Simulation was developed as a tool to improve the training of individual Soldiers as well as improve the readiness of combat medics. To date, the TC3 instructional strategy has been carefully planned and implemented, and user feedback sought across two studies and incorporated into a final TC3 Simulation prototype. Results from prototype evaluations conducted at Fort Sam Houston indicate that the system is relatively easy to learn and could provide some benefit to the current program of instruction. A skill acquisition and training transfer study is planned using the final TC3 Simulation training system. The intent of the overall training effectiveness evaluation is to evaluate the effectiveness of this instructional game in teaching the concepts of tactical combat casualty care. This will help determine the most effective way of introducing this training tool into the 68W10 Healthcare Specialist Course program of instruction. Prior to the TEE, a pilot study will be conducted at Ft. Sam Houston during fall 2007. The results of the pilot study will be available and presented during I/ITSEC 2007.

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