U.S. Army Research Institute
for the Behavioral and Social Sciences

Research Report 1835

Soldier Perceptions of the Rapid Decision Trainer

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U.S. Army Research Institute

May 2005

U.S. Army Research Institute
for the Behavioral and Social Sciences

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REPORT DOCUMENTATION PAGE

1. REPORT DATE (dd-mm-yy)	2. REPORT TYPE	3. DATES COVERED (from. . . to)
May 2005	Final	September 2003 – October 2004

4. TITLE AND SUBTITLE

Soldier Perceptions of the Rapid Decision Trainer

5a. CONTRACT OR GRANT NUMBER

5b. PROGRAM ELEMENT NUMBER
622785

6. AUTHOR(S)

Scott A. Beal and Richard E. Christ, (U.S. Army Research Institute)

5c. PROJECT NUMBER
A790

5d. TASK NUMBER
215

5e. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

U.S. Army Research Institute for the Behavioral and Social Sciences
Infantry Forces Research Unit
P.O. Box 52086
Fort Benning, GA 31995-2086

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

U. S. Army Research Institute for the Behavioral & Social Sciences
2511 Jefferson Davis Highway
Arlington, Virginia 22202-3926

10. MONITOR ACRONYM
ARI

11. MONITOR REPORT NUMBER
Research Report 1835

12. DISTRIBUTION/AVAILABILITY STATEMENT

Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES

Authors are listed in alphabetical order, as they contributed equally to this research.
Subject Matter POCs: Scott A. Beal and Richard E. Christ

14. ABSTRACT *(Maximum 250 words)*: This report describes the approach and results of a preliminary evaluation of the Rapid Decision Trainer (RDT), a personal computer-based simulation developed for use by the Infantry Officer Basic Course (IOBC) at Fort Benning, Georgia. The objective of the RDT was to provide each lieutenant with the opportunity to serve as platoon leader while executing a simulated attack mission in preparation for a platoon live-fire exercise. Nineteen lieutenants enrolled in the IOBC were assigned to train with the RDT in one large group. Twenty other lieutenants trained in two-man buddy-teams. After executing the RDT mission, lieutenants in both training conditions participated in an after-action review with a senior instructor. A questionnaire administered to the lieutenants documented their perceptions and opinions of RDT training value, their motivations for training with the RDT, their sense of personal involvement in the simulated mission, and the adequacy of the realism portrayed in the simulation. Following the RDT training, the lieutenants participated in a live-fire exercise. A second questionnaire was administered subsequent to the live-fire exercise after-action review. Regardless of which RDT training condition the lieutenants were in, they endorsed the use of the RDT for the IOBC. They indicated the RDT had training value, they were motivated and involved during the simulated mission, and the realism of simulated battlefield events and actions was adequate for training. The results highlighted a number of issues that were described and will be investigated in future training research for desktop simulations and game-based technologies.

15. SUBJECT TERMS

Training Simulation, Training Games, Combat Simulation, Decision Making, Video Games, Infantry Platoon Leader, Mission Planning, Mission Execution, Mission Rehearsal

SECURITY CLASSIFICATION OF			19. LIMITATION OF ABSTRACT	20. NUMBER OF PAGES	21. RESPONSIBLE PERSON
16. REPORT	17. ABSTRACT	18. THIS PAGE			
Unclassified	Unclassified	Unclassified	Unlimited	69	Ellen Kinzer Technical Publication Specialist 703-602-8047

Standard Form 298

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May 2005

Army Project Number
622785A790

Personnel Performance and
Training Technology

FOREWORD

The Infantry Forces Research Unit of the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) conducts research under its *Future Force Warrior Training* research program that seeks to develop methods and guidelines for efficient, effective cognitive skills training of small unit leaders. In support of this objective, our behavioral scientists work closely with those who develop and the Soldiers that may use various innovative training methods. Most recently, new training methods include various types of desktop simulations of combat environments that employ game-based technologies. Our objectives in this research are to examine the training effectiveness of the new technologies and to assist in the development of training programs that will optimize their usefulness in preparing small unit leaders to make rapid and adaptive tactical decisions.

This report documents an initial training assessment of a personal computer-based combat simulation, the Rapid Decision Trainer (RDT), for augmenting the training of Infantry rifle platoon leaders. The RDT was developed jointly by subject matter experts attached to the U.S. Army Infantry Officer Basic Course and others working in the Simulation and Training Technology Center of the U.S. Army Research, Development and Engineering Command. Working in conjunction with personnel from these agencies, our behavioral scientists planned and conducted research to measure the reactions of newly commissioned officers to the RDT and the training it provided to prepare them for a major culminating event in the Infantry Officers Basic Course, a platoon live-fire exercise.

Results of this research showed that, in general, lieutenants who participated in the evaluation endorsed the use of the RDT during their training. The reactions of these lieutenants also highlighted a number of other issues that call for additional training research of desktop simulations and game-based technologies. These results were presented to and discussed with senior personnel in the U.S. Army Infantry School and the Simulation and Training Technology Center of the U.S Army Research, Development and Engineering Command. Plans are underway for continuing cooperative training research on the RDT and other innovative training methods and tools.

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ACKNOWLEDGEMENTS

The authors acknowledge leaders of the Infantry Officer Basic Course at Fort Benning, Georgia. They and their students worked diligently and patiently with us during the planning and execution of this research effort. Special thanks go to Captain Marcus W. Wright, a senior instructor for the course, for sharing with us his subject matter expertise and his willingness to create the conditions necessary for our evaluation of the Rapid Decision Trainer. Special thanks go also to William Y. Pike and Timothy Wansbury of the Simulation and Training Technology Center of the U.S. Army Research, Development and Engineering Command for their support during the evaluation.

SOLDIER PERCEPTIONS OF THE RAPID DECISION TRAINER

EXECUTIVE SUMMARY

Research Requirement:

The U.S. Army Infantry School at Fort Benning, Georgia, seeks to exploit the training potential of desktop simulations and game-based technologies. While the capabilities and power of these types of innovative training methods hold much promise for improving the performance of Infantry small unit leaders and teams, there is a need for behavioral research to examine the training effectiveness of the new technologies and to assist in the development of training programs that will optimize their usefulness. This report documents research to evaluate and identify training issues associated with a desktop simulation named the Rapid Decision Trainer (RDT).

Procedure:

Nineteen newly commissioned lieutenants enrolled in the Infantry Officer Basic Course (IOBC) were assigned to train with the RDT in one large group. Twenty other lieutenants trained in two-man buddy-teams. The single scenario used to drive the RDT training closely resembled the terrain and battle conditions that occur during the IOBC live-fire exercise. After executing the RDT mission, lieutenants in both training conditions participated in an after-action review with a senior instructor. A questionnaire subsequently administered to the lieutenants documented their perceptions and opinions of the RDT training value, their motivations for training with the RDT, their sense of personal involvement in the simulated mission, and the adequacy of the realism portrayed in the simulation. Following the RDT training, the lieutenants participated in the IOBC live-fire exercise. A second questionnaire was administered after the live-fire exercise.

Findings:

Regardless of which RDT training condition the lieutenants were in, they endorsed the use of the RDT for the IOBC. They indicated the RDT had training value and that the realism of simulated battlefield events and actions was adequate for training. They also indicated they were motivated to train with the RDT and were personally involved during its simulated mission. These results support use of the RDT in the IOBC to provide all lieutenants with the opportunity to serve as a platoon leader in preparation for the live-fire exercise. Most lieutenants also believed their experience with the RDT helped them prepare to lead a platoon in their subsequent assignment to a war fighting unit. The detailed analyses of the results suggested there are several unresolved issues for using desktop simulations such as the RDT. These issues include the requirement for (a) a qualified instructor to be present while the RDT is used, (b) high levels of fidelity between events and activities in the RDT simulated mission and those in a live exercise, (c) entertainment or fun as a factor to motivate

students to train using the RDT, and (d) individual trainees to interface directly with the simulated RDT mission to achieve optimal training outcome.

Utilization of Findings:

The results of this research have influenced how the RDT will be used in the IOBC. After briefing and discussing these results with senior personnel in the U.S. Army Infantry School and the Simulation and Training Technology Center of the U.S. Army Research, Development and Engineering Command, plans are underway for continuing cooperative training research on the RDT and other innovative training methods and tools.

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INTRODUCTION

The U.S. Army Infantry School (USAIS) at Fort Benning, Georgia, is at the forefront of efforts to exploit the training potential of desktop simulations and game-based technologies. In particular, there is much interest in using low-cost simulations of realistic combat environments to allow future small-unit leaders to experience the consequences of executing an operations order and the challenges inherent in making hasty changes to those orders in response to emerging battlefield conditions. This report documents an assessment of the perceptions and opinions of newly commissioned officers about a personal computer (PC)-based combat simulation, the Rapid Decision Trainer (RDT), designed to augment the training of rifle platoon leaders in the Infantry Officer Basic Course (IOBC).

Instructional Features of the IOBC

The IOBC trains newly commissioned second lieutenants to serve as Infantry platoon leaders. The 16-week course is designed to produce combat ready, physically and mentally tough Infantry officers prepared to lead a rifle platoon in combat. The training objectives of the course are in accordance with those provided in the Department of the Army (DA) Field Manual 7-8, *Infantry Rifle Platoon and Squad* (DA, 1992). These training objectives include: (a) tactical and technical competence with squad and platoon dismounted battle drills, (b) the ability to apply troop leading procedures at the squad and platoon levels, (c) the ability to operate and control all current dismounted Infantry platoon weapons and equipment, and (d) the ability to direct and control all combined arms fires on targets using current platoon-level communication systems. Lieutenants in the course demonstrate their knowledge of these subjects through a series of written exams and practical exercises. The course culminates in a platoon-level live-fire exercise (LFX) conducted at the Griswold Range at Fort Benning, Georgia. Platoon trainers and instructors conduct an after-action review (AAR) at the conclusion of the LFX.

The platoon LFX provides the lieutenants with an experience that simulates to some degree the types of physical and cognitive challenges that characterize the decision-making environment of an Infantry platoon leader in combat. In this environment, the lieutenants are able to develop and demonstrate the tactical knowledge and rapid decision-making skills required of an Infantry platoon leader. However, resource constraints limit the number of IOBC lieutenants that can fully benefit from the experiences made possible during the platoon LFX. While several lieutenants in each IOBC class of about 40 students are given the opportunity during the LFX to serve in the leadership positions of platoon sergeant, squad leader, or team leader, only one can serve as the platoon leader. The majority of lieutenants in each

class participate in this training exercise as members of rifle or special weapons squads, or as members of the platoon headquarters.

To improve the training opportunities provided by the IOBC, the USAIS sought alternative means for providing all IOBC lieutenants with the opportunity to develop and demonstrate the rapid decision-making skills required of a platoon leader in combat. In 2003, the USAIS requested assistance from the U.S. Army Research, Development and Engineering Command, Simulation and Training Technology Center (RDECOM-STTC) to develop a training simulation that leverages PC gaming technologies. The result of this effort is the platoon-level RDT that was delivered in the fall of 2004. The Infantry Forces Research Unit of the U.S. Army Research Institute at Fort Benning, Georgia, was asked by the leadership of the IOBC and RDECOM-STTC to assist in a preliminary evaluation of the RDT by assessing the perceptions and opinions of IOBC lieutenants about the RDT.

The RDT [1]

The objective of the RDT was to prepare each lieutenant to serve as an Infantry rifle platoon leader during the IOBC platoon LFX. To meet this objective, the RDT was designed to give a lieutenant the opportunity to serve as platoon leader for a simulated platoon offensive mission during a "virtual" LFX. The RDT required the lieutenant to conduct mission analysis and planning and to make hasty decisions in response to conditions that emerge during the execution of the simulated mission.

The single scenario used to drive the RDT mission closely resembles the terrain and battle conditions that occur during the IOBC LFX at Griswold Range. It presents the lieutenant with a wooded and hilly terrain over which he leads an Infantry rifle platoon.[2] Blue force elements portrayed in the RDT are those available to an Infantry rifle platoon leader. The enemy force represented in the RDT is the kind of asymmetric force that might be encountered during a typical rifle platoon offensive mission.

The simulated LFX begins when the RDT presents a company operations order to the lieutenant. The lieutenant is then required to develop a platoon operations order. The lieutenant uses drop-down menus to input the following key aspects of that order into the RDT: the task organization, assignment of assets to squads, and maneuver control measures. After the lieutenant has entered the results of his mission analysis and planning into the RDT, he can initiate action and begin observing and responding to emerging conditions portrayed during the simulated battle. The RDT mission is over when the objective of the simulated mission has been accomplished or when the platoon is no longer capable of completing the mission.

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[1] A more complete description of the RDT is provided in Appendix C.

[2] Because all Infantry officers and enlisted personnel are male, they are referred to using only masculine pronouns.

Objective of This Report

This report describes the results of a preliminary evaluation of the RDT. We asked IOBC lieutenants to report their perceptions and opinions of the capabilities of the RDT and its potential effectiveness as a training tool to help them prepare for the IOBC platoon LFX. We were able to evaluate these data under two methods used to train with the RDT, as well as with data collected before and after the LFX. Our goal was to analyze these data and report our findings to the USAIS and RDECOM-STTC. Even though we have conducted evaluations of two other desktop simulations and game-based technologies developed for use at the USAIS (see Beal & Christ, 2004a, 2004b), we had no basis for making a priori hypotheses concerning the results of this evaluation of the RDT.

METHOD

Participants

Thirty-nine lieutenants enrolled in one IOBC class served as participants in this evaluation research. These lieutenants were one of the four platoons of students in this IOBC class. A Biographical Survey was administered to the lieutenants following their RDT training to obtain information about their experience with LFXs and with PC-based video games. A copy of the Biographical Survey is presented on page A-2 of Appendix A. Responses to this survey showed that all lieutenants but one were between the ages of 21 and 26. The exception, who was subsequently determined to have had prior enlisted service, was 31 years old. Other data obtained from the questionnaire are summarized in Table 1.

Table 1
Summary Data from the Biographical Survey

LFX Experience	PC Video Game Experience	Level of Expertise With PC Games	Hours per Week Playing PC Game
100%	79%	Beginner = 51% Intermediate = 30% Expert = 19%	Less than 2.0

As shown in Table 1, all the lieutenants had previously participated in LFXs. The most frequent LFX experience was determined to have been with squad-level exercises conducted during the IOBC. Table 1 also shows that while most lieutenants had experience playing PC video games, they generally considered themselves novices at PC game playing. Of the 30 lieutenants who indicated they had experience playing PC video games, 25 indicated they played two hours or less per week and only two indicated they played more than five hours per week.

RDT Evaluation Instruments

Pre-LFX Questionnaire. The Pre-LFX Questionnaire asked lieutenants to report their reactions to the RDT following their RDT training and prior to the LFX. A copy of the Pre-LFX Questionnaire is given in Appendix A, beginning on page A-3. This questionnaire asked each lieutenant to indicate the following.

- His perceptions of the overall training value of the RDT
- His motivations for training with the RDT
- The extent to which he was personally involved in the RDT training
- His perceptions of the adequacy of realism portrayed in the RDT
- His opinions concerning user-interface factors with the RDT
- His overall opinion of the RDT and what he liked best and least about it

Many items in the Pre-LFX Questionnaire were modified from those used earlier to assess the training effectiveness of other Army training games (Beal & Christ, 2004a, 2004b).

Post-LFX Questionnaire. The Post-LFX Questionnaire was developed to allow lieutenants to report their perceptions of the overall training value of the RDT following the IOBC platoon LFX at Griswold Range. A copy of the Post-LFX Questionnaire is given in Appendix A, beginning on page A-12. Six of the items used in the Pre-LFX Questionnaire also were used in the Post-LFX Questionnaire. The other seven items in the Post-LFX Questionnaire asked lieutenants to rate the extent to which the RDT accurately simulated the LFX and the training value of the RDT with respect to their experiences during the LFX.

Evaluation Design and Procedures

Figure 1 summarizes the timeline of major events associated with RDT training and the procedures used during this evaluation. Each major event or procedure is described in this section.

RDT mission and mission planning. To accommodate the time constraints on RDT training, all lieutenants were given a paper copy of the company operations order (OPORD) that would drive the platoon mission a few days prior to the RDT training. This allowed lieutenants to develop their platoon OPORD before the scheduled day of RDT training. This procedure for issuing the company OPORD and developing a platoon OPORD also gave them more time to execute their missions during the time established for RDT training.

RDT demonstration and assignment of lieutenants to training conditions. The RDT demonstration and training were administered on one day during two different three-hour sessions. Each session began with a 30-minute group demonstration of the functions and capabilities of the RDT for the planning and execution phases of the mission. The lieutenants in both sessions were able to observe the RDT demonstration on a large screen. A representative from RDECOM-STTC conducted both demonstration sessions.

Following the morning demonstration, 20 lieutenants were assigned to two-person buddy teams. Each buddy team was assigned to a different PC to receive RDT training. Following the afternoon demonstration, 19 lieutenants received RDT training in one large group.

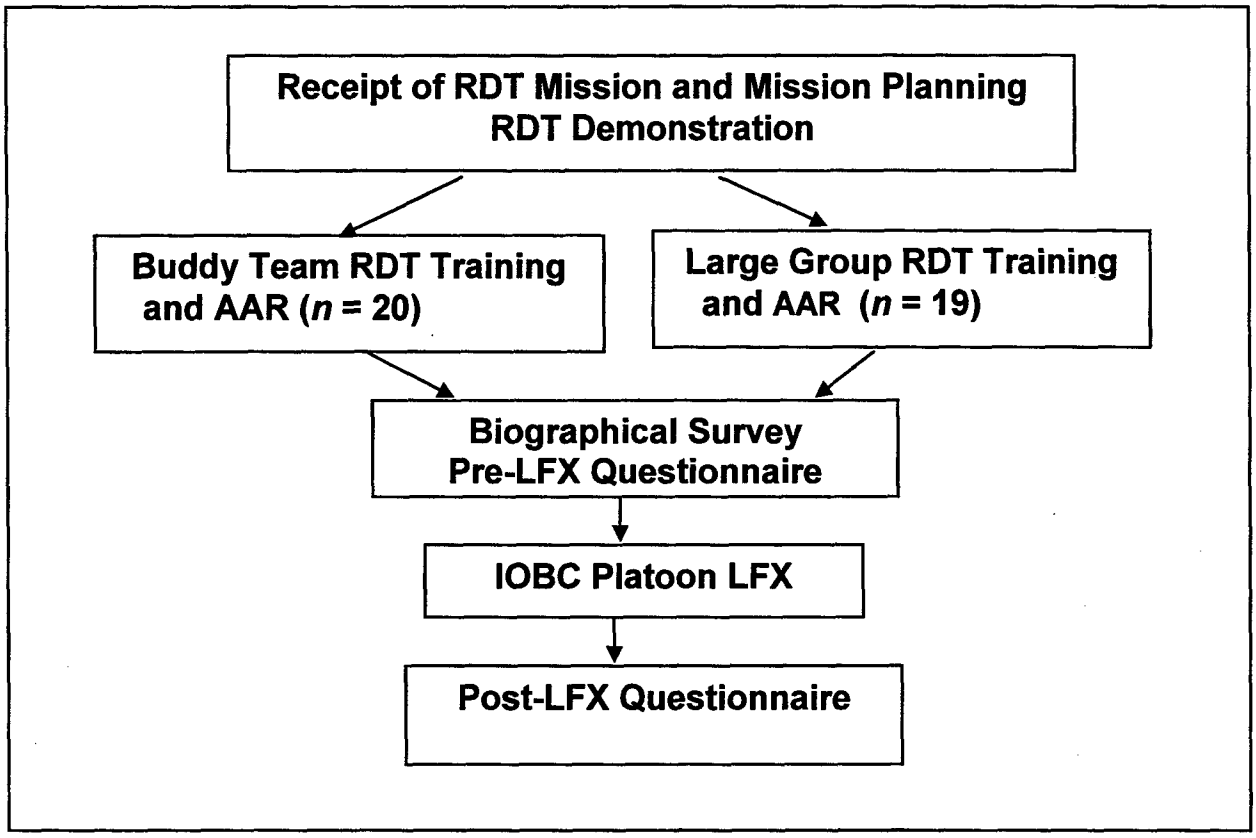

Figure 1. A summary of training events and data collection procedures used to evaluate RDT training.

Buddy team RDT training. One member of each buddy team was initially assigned the role of platoon leader. The other member of the buddy team was assigned the role of observer. The assigned platoon leader controlled RDT functions using the computer mouse and keyboard. The observer watched the platoon leader's actions and was encouraged to make suggestions to the platoon leader during all phases of the simulated mission.

An IOBC senior instructor and two representatives from RDECOM-STTC independently circulated among the ten PC stations to answer any questions by the lieutenants and to offer suggestions that might improve the execution of the RDT mission. When the assigned platoon leader completed the RDT mission, he and the observer were asked to switch roles and to reinitiate the RDT mission. Each buddy team trained with the RDT for two hours, during which time all of the lieutenants acted as platoon leaders for at least one repetition of the RDT mission.

Large group RDT training. In turn, each of seven lieutenants from the large group training session was assigned by the IOBC senior instructor to serve as the RDT platoon leader. The other lieutenants observed the actions of the assigned platoon leader and the consequences of his actions on a large screen. Using the computer mouse and keyboard, the first assigned platoon leader planned the platoon mission and subsequent assigned platoon leaders executed successive portions of the mission. The group of 18 observers was encouraged to make suggestions to the assigned platoon leader during all phases of the simulated mission.

The time allotted to each assigned platoon leader varied from 10 to 15 minutes, depending on the portion of the mission he controlled. Total RDT training time for the large group session was approximately two hours. The same was true for lieutenants in the buddy team session. However, there was only one mission cycle for the large group session, whereas each buddy team initiated two mission cycles.

After-action review. After the RDT training, lieutenants in each training condition participated in a collective AAR session. During each AAR session, one of the RDECOM-STTC representatives served as a platoon leader as he executed the RDT mission while the lieutenants observed his actions and the consequences of these actions on the large screen. As these events were occurring, the senior IOBC instructor led an AAR discussion with the lieutenants during which he asked questions that required them to think critically about the decisions and actions being initiated during mission execution. The senior instructor also addressed tactics, techniques and procedures, and doctrinal principles relevant to the RDT scenario.

Pre-LFX data collection. Following their respective AARs, lieutenants in both training conditions completed the Biographical Survey and the Pre-LFX Questionnaire. One of the authors distributed both data collection instruments, remained with the group to address any questions the lieutenants had, and collected the completed instruments.

IOBC LFX and Post-LFX data collection. Four days after the RDT training all 39 lieutenants participated in a blank-fire safety exercise at Griswold Range. This exercise served as a prelude to the LFX that occurred on the following day. The senior IOBC instructor administered two questionnaires to each lieutenant after the LFX AAR. In one questionnaire, each lieutenant indicated his position in the platoon during the IOBC LFX. A copy of this questionnaire is given on page A-11 of Appendix A. The second questionnaire was the Post-LFX Questionnaire. The senior IOBC instructor delivered the completed questionnaires to the authors the day following the LFX.

RESULTS

Major portions of the Pre-LFX Questionnaire and all items in the Post-LFX Questionnaire asked lieutenants to use a seven-point or a five-point rating scale to indicate their perceptions or opinions about various features of the RDT. Other portions of the Pre-LFX Questionnaire required lieutenants to provide a short written response to questions concerning specific aspects of the RDT. A full description of all relevant statistics associated with these results is given in Appendix B. In this section, we describe the results in terms of the items that received high and very high ratings. We defined a rating for any questionnaire item as "high" when at least 50 percent of the lieutenants used any of the highest three ratings categories of a seven-point rating scale or either of the highest two rating categories of a five-point rating scale to indicate their perceptions or opinions. We defined a rating as "very high" when at least 70 percent of the lieutenants marked any of the highest ratings categories. We defined "low" and "very low" ratings in a similar manner for the lowest ratings categories.

Pre-LFX Questionnaire

Overall training value of the RDT. Lieutenants gave high ratings to 13 of the 18 questionnaire items that focused on the overall training value of the RDT (see Appendix Table B-1). Ratings for the five remaining items in this part of the questionnaire did not meet the criteria for a high or a low rating. Of the 13 items that received high ratings, seven received very high ratings. The overall training value items that received high ratings indicated that lieutenants believed the following, in descending order of the percentage of high ratings (shown in parentheses).

- The RDT permitted training and rehearsal of the types of decisions a platoon leader must make during a LFX (85%)
- The RDT provided meaningful practice for exercising command and control of platoon operations (82%)
- A qualified instructor should be present to provide guidance during a RDT AAR (82%)
- The RDT accurately simulated tasks and conditions specified in current platoon-level battle drills (80%)
- The RDT had a valuable impact on preparing them for leading a platoon in a unit (77%)
- The RDT provided meaningful practice for planning a platoon mission (72%)
- A qualified instructor should be present to provide tactical guidance during RDT training (72%)
- The RDT taught them how to make the tactical decisions required when leading a platoon (64%)
- The RDT provided an effective "virtual live-fire" training experience (64%)

- Experience with the RDT provided meaningful practice for controlling a platoon-level movement to contact (64%)
- Experience with the RDT provided meaningful practice for planning appropriate platoon-level fire control measures (59%)
- Experience with the RDT helped them better understand the key doctrinal principles for conducting platoon battle drills (59%)
- Experience with the RDT added to their IOBC classroom instruction in learning to lead an Infantry platoon (56%)

RDT motivation and involvement. Lieutenants gave high ratings to seven of the 17 questionnaire items that focused on their motivation for wanting to receive training with the RDT and their personal involvement or immersion while using the RDT (see Appendix Table B-2). Of those seven items, four items received very high ratings. The high ratings in this part of the questionnaire indicated that the lieutenants believed the following, in descending order of the percentage of high ratings (shown in parentheses).

- The desire to prepare for a LFX was an important reason to train with the RDT (90%)
- The desire to learn combat skills was an important reason to train with the RDT (84%)
- They were satisfied with the training opportunities provided by the RDT (71%)
- The desire to practice making rapid decisions was an important reason to train with the RDT (68%)
- They could focus on the platoon leader experience created by the RDT rather than on the PC keyboard and mouse functions (63%)
- There were moments during their experience with the RDT when they felt completely focused on the task of leading a platoon (62%)
- They were able to search the RDT environment completely (50%)

Three questions were given low ratings by the lieutenants, one of which was a very low rating. These low ratings indicated that they believed the following, in descending order of the percentage of low ratings (shown in parentheses).

- The RDT did not realistically portray actions made by the enemy (73%)
- The desire for fun and personal entertainment was not an important reason to train with the RDT (55%)
- The RDT did not realistically portray actions made by members of the platoon (50%)

The remaining seven questions in this part of the Pre-LFX Questionnaire received ratings that were neither low nor high. One of these questions asked

lieutenants to describe the adequacy of the amount of time they trained with the RDT, three questions asked about personal involvement while using the RDT, and three asked about the realism of the RDT training environment in terms of its portrayal of physical objects and the experiences of the lieutenant during field exercises.

Adequacy of RDT realism for training. Details of the ratings given for the adequacy of RDT realism for training are in Appendix Table B-3. Most of the lieutenants indicated that the realism of RDT graphics was at least adequate for their training to be a platoon leader. Nearly all lieutenants used the rating categories of *Adequate*, *Very Good*, or *Excellent* to describe the physical (95%) and psychological (84%) realism of RDT graphics. A majority of the lieutenants used these three rating categories to describe the adequacy of the realism of the RDT portrayal of the tactical blue force (76%) and the tactical enemy force (57%).

User-interface factors with the RDT. Lieutenants used a five-point scale to rate the ease with which they could use the RDT to acquire decision skills associated with (a) understanding and planning a mission and (b) executing the mission tasks and steps. Details of the ratings of user-interface factors are given in Appendix Table B-4. All but two of the 12 questionnaire items were rated high, and the two exceptions were almost high. Ratings for six of the items were very high. The ratings for all 12 items indicated that the lieutenants endorsed the following statements, in descending order of the percentage of high ratings (shown in parentheses).

- The means provided to develop signal plans were adequate (95%)
- The reporting process was adequate to keep the company commander informed (82%)
- The computer functions for mission planning were easy to use (74%)
- The planning map provided an appropriate amount of detail (74%)
- An appropriate amount of information was provided to plan the mission (74%)
- It was easy to issue commands while executing the mission (69%)
- It was easy to execute the plans for platoon operations (62%)
- It was easy to request and obtain information for executing the mission (61%)
- The company operations order allowed me to understand my mission clearly (56%)
- Methods provided to control and synchronize fires were adequate (56%)
- It was easy to implement fragmentary orders based on emerging battlefield conditions (49%)
- It was easy to control and coordinate the movements of maneuver elements (49%)

Overall opinion of the RDT. In the last section of the Pre-LFX Questionnaire, the lieutenants were asked to indicate if their experience using the RDT taught them something new about how a platoon leader should perform two key Infantry tasks: (a)

plan an Infantry offense mission, and (b) respond appropriately to emerging battlefield conditions. A majority of participants responded "Yes" to both items, 77 percent to the first and 60 percent to the second item.

If a lieutenant indicated that using the RDT taught him something new about the two designated tasks, he was asked to provide written examples of what was learned during the RDT training. The results of a preliminary content analysis of the written responses are given in Appendix Table B-5. The single most frequent written example of what was newly learned for planning an Infantry offensive mission was an understanding the importance of planning fires. The two most frequent examples of what was newly learned for the task of responding appropriately to emerging battlefield conditions were (a) an understanding of how to integrate terrain with the map to set up positions and (b) coordinating movement of squads.

When lieutenants were asked to provide a short written statement to describe what they liked best about the RDT, only two responses were provided by more than two lieutenants (see Appendix B-5). These two responses indicated the lieutenants liked best (a) the planning stage of using the RDT and (b) that they were able to use the RDT to learn how to use terrain during movement.

When asked to record what they liked least about the RDT, only one response was provided by more than two lieutenants. This response indicated the lieutenants liked least the amount of enemy intelligence they were provided and the low levels of enemy activity in response to combat events.

Differences between methods of using the RDT for training. A series of independent sample *t*-tests were used to compare ratings provided by lieutenants assigned to the buddy team and large group RDT training methods. Details of the results of these tests are given in Appendix Table B-6. Descriptions of the results of these tests will be in terms of the percentages of high and low ratings rather than the difference in the mean rating values. This method for reporting the results is used to be consistent with other results being presented.

The independent sample *t*-tests showed no statistically significant differences (at the $p < .05$ level) between the two methods of training for any of the items in the Motivation and Involvement part of the Pre-LFX Questionnaire and only one difference in the Overall Training Value part of the questionnaire. The latter item asked, *How challenging was the overall experience provided by the RDT training?* The percentage of lieutenants with high ratings for that item was 15 percent for the large group method of training and 55 percent for the buddy team method.

The tests showed a statistically significant difference between training methods for one item that addressed the adequacy of the realism portrayed in the RDT graphics. That item asked, *Does the enemy force react as you would expect an enemy to react?* Lieutenants who trained in the large group rated this aspect of RDT realism higher than did those who trained in buddy teams (73% and 50%, respectively).

The tests also showed significant differences between training methods for six of the items addressing user-interface factors with the RDT. All six of these items were associated with mission execution. These items and the percentage of lieutenants in each training method that agreed with them are shown in Table 2. The lieutenants in the large group training method rated the ease of using the RDT for these six tasks or steps in executing a mission higher than did the lieutenants in the buddy team method.

Table 2.
Percentage of Lieutenants in Each Training Method That Agreed or Strongly Agreed With Items on User-Interface With the RDT

Pre-LFX Questionnaire Item	Training Method	
	Buddy Team	Large Group
It was easy to execute the plans for platoon operations	50	70
It was easy to request and obtain information while executing the mission	45	79
The reporting process was adequate to keep my CO informed	30	69
It was easy to control and coordinate the movement of maneuver elements.	70	95
Methods provided to control and synchronize fires were adequate	40	74
It was easy to implement FRAGOs based on emerging battlefield conditions	30	69

Note: All items were rated on a five-point scale ranging from "Strongly disagree" through "Neither agree nor disagree" to "Strongly agree." Independent sample *t*-tests (see Appendix Table B-8) showed the difference between training methods was significant ($p < .05$) for each of the six items shown in this table.

The final item that showed a significant difference between the two training methods was the overall opinion of the RDT item in Part 5 of the questionnaire that asked, *Did training with the RDT teach you something new about responding appropriately to emerging battlefield conditions?* A higher percentage of lieutenants in the large group training method responded "Yes" to this question than did those in the buddy-team training method (79% and 42%, respectively).

Post-LFX Questionnaire

Details of the results obtained for the Post-LFX Questionnaire are given in Appendix Table B-7. The same definitions of "high" and "very high" ratings for items in this questionnaire are used here as was reported for the Pre-LFX Questionnaire.

The Post-LFX Questionnaire consisted of 13 questions. Two questions asked lieutenants about the extent to which the RDT accurately simulated conditions during the IOBC at Griswold Range and one asked if the RDT was consistent with doctrine.

Only the latter item produced a high rating. About 54 percent of the lieutenants indicated that the RDT accurately simulated the tasks and conditions specified in FM 7-8 for platoon-level battle drills.

The remaining ten items asked questions about the training value of the RDT. Seven of these training value items received high ratings. Of these, five received very high ratings. The other three items were rated neither high nor low. The high ratings for RDT training value items in the Post-LFX Questionnaire indicated that the lieutenants believed the following, in descending order of the percentage of high ratings (shown in parentheses).

- The RDT permitted them to train and rehearse the types of decisions a platoon leader must make during the LFX (80%)
- The experience of training with the RDT helped them better understand the key doctrinal principles for conducting platoon battle drills (80%)
- It is desirable to use a simulated training exercise such as the RDT to gain experience as a platoon leader during the LFX (80%)
- Experience with the RDT helped them better understand the decisions of the acting platoon leader during the LFX (72%)
- Using the RDT had a valuable impact on preparing them to lead a platoon in a unit (72%)
- The RDT prepared them to make decisions they would have made had they been the platoon leader during the LFX (56%)
- The RDT provided them opportunities to practice reacting to enemy contact as if they had been the platoon leader during the LFX (56%)

Comparison of Items Common to the Pre- and Post-LFX Questionnaires

Paired-sample *t*-tests were used to compare ratings given to six overall training value items that were contained in both the Pre-LFX and Post-LFX Questionnaires. These six items and the results of the *t*-tests that compared the mean difference in their ratings in the two questionnaires are given in Appendix Table B-8. Descriptions of the results of these tests will be presented in terms of the percentage of high ratings rather than the mean difference in rating values. This method for reporting the results is used to be consistent with other results being presented.

Paired-sample *t*-tests for each of the six items showed the results varied with the item being analyzed. Table 3 shows the percentage of high ratings given by the lieutenants on these six items both before and after the LFX. The mean difference in ratings was significantly higher ($p < .05$) in the Pre-LFX Questionnaire than in the Post-LFX Questionnaire for the first three items shown in Table 3. There were no significant mean difference scores for the next two items shown in the table. For the last item in the table, the mean difference in ratings was significantly lower ($p < .05$) in the Pre-LFX

than in the Post-LFX Questionnaire. A separate analysis of the difference scores showed the mean difference scores were not affected by the training condition to which the lieutenants were assigned. While the mean difference in ratings from the two questionnaires were statistically significant for some of the common items, Table 3 shows that with two exceptions, all the ratings for these items were classified as high or very high.

Table 3.
Percentage of High Ratings for Overall Training Value Items in the Pre- and Post-LFX Questionnaires

Item common to the Pre- and Post- LFX Questionnaires	**Pre-LFX**	**Post-LFX**
The RDT accurately simulated the tasks and conditions specified in current platoon-level battle drills.	86	54
The RDT provided an effective "virtual live-fire" training experience.	64	46
The RDT had a valuable impact on preparing lieutenants to lead a platoon in a unit.	77	72
The RDT allowed lieutenants to train and rehearse the types of decisions a platoon leader must make during a LFX.	85	80
Experience with the RDT added to classroom training for leading an Infantry platoon.	56	44
Experience with the RDT helped lieutenants to better understand key doctrinal principles for conducting platoon battle drills.	59	80

Note: The items are listed in the order of the mean difference between Pre-LFX and Post-LFX ratings. Paired-sample *t*-tests (Appendix Table B-10) showed the mean difference between Pre-and Post-LFX ratings was significant ($p < .05$) for the first three items (Pre > Post) and the last item (Pre < Post) shown in this table.

DISCUSSION

The purpose for wanting to use a relatively low-cost desktop simulation such as the RDT in the IOBC was to provide all lieutenants the opportunity to serve as a platoon leader in preparation for a platoon LFX. Because the battlefield environment and the single scenario used to generate the RDT experience closely resembled that which occurred in the IOBC platoon LFX, the RTD experience should optimize the training value each lieutenant would derive from their participation in the IOBC LFX. This outcome should occur even though each lieutenant would not be able to serve in a leadership position, much less as the platoon leader, during the field exercise. By

optimizing the experience each lieutenant derived from the IOBC LFX, the use of the RDT should contribute to the key objectives of the IOBC, namely, to prepare each lieutenant to use properly the tactical knowledge he had acquired to make the rapid and adaptive decisions required of an Infantry platoon leader in combat.

The reported perceptions and opinions of IOBC lieutenants about the RDT and the experiences they derived from using the RDT suggested that the objectives for wanting to use the RDT were achieved. Though they had limited training time with the RDT and only one simulated combat environment and one training scenario, the lieutenants who participated in this evaluation endorsed the continuing development and use of the RDT to augment the training they received during the IOBC. However, this endorsement was equivocal. The results obtained during this evaluation highlighted several issues for using desktop simulations such as the RDT that have yet to be resolved. This section discusses the results and their implications for using the RDT in the IOBC and for directing future evaluations of PC-based combat training simulations.

Perceived Training Value of the RDT

The IOBC lieutenants indicated generally that they thought the RDT had training value for them. The positive perceptions of the RDT training value were obtained from the responses provided in both Part 1 of the Pre-LFX Questionnaire and the Post-LFX Questionnaire, and equally so from lieutenants assigned to both the buddy team and large group methods of training. In short, the IOBC lieutenants indicated they believed their use of the RDT provided them with the opportunity to experience and practice the types of decision-making behaviors required of a platoon leader in the IOBC platoon LFX. Further, based on one item in both questionnaires, they indicated this experience would have a valuable impact on preparing them to lead a platoon in a unit to which they would subsequently be assigned.

There was one caveat to these generally positive endorsements for the training value of the RDT. In the Pre-LFX Questionnaire most lieutenants indicated they believed a qualified instructor needed to be present when the RDT is used for training. A very high percentage of the lieutenants indicated a qualified instructor was needed to conduct an RDT AAR. An almost equally high percentage of lieutenants indicated the qualified instructor was needed to provide guidance and feedback while they trained with the RDT. The perceived importance of having an instructor available to provide guidance has implications for how the RDT might be used most effectively in the IOBC. We will return to this matter at the end of this section while discussing issues related to the user interface with the RDT.

Two items unique to the Post-LFX Questionnaire may be of particular interest to those responsible for IOBC instruction. Even though their role in the IOBC LFX generally was not that of a leader, a high percentage of the lieutenants indicated the RDT helped them to experience the role a platoon leader would have in the IOBC LFX. An almost equally high percentage of lieutenants indicated their experience with the RDT helped them to better understand the decisions that were made by the acting

platoon leader in the IOBC LFX. These two specific findings further highlighted the suggestion that using the RDT optimized the training value each lieutenant would derive from their participation in the IOBC LFX.

Comparisons of ratings obtained from the six items common to the Pre-LFX and Post-LFX Questionnaires have implications for how participation in the LFX affects perceptions of the RDT and its training value. These difference scores also underscore the importance of evaluating a training device at more than one point in the training process. These results showed that following the LFX, most lieutenants had a less favorable opinion of the extent to which the RDT accurately simulated platoon battle drills and provided an effective virtual live-fire training experience than they did before the LFX. On the other hand, the high levels of endorsement of the training value of the RDT were essentially unaffected by their LFX experience for items that addressed the impact the RDT had on their training for platoon leader decision making and its ability to augment classroom instruction. These two sets of comparative results suggested that the fidelity of the simulation may not be a key factor for determining the training effectiveness of the simulation – a point to which we will return in the next section.

The one item that had significantly higher ratings after than before the LFX was concerned with the extent to which the RDT experience helped the lieutenants gain a better understanding of the importance of key doctrinal principles for conducting platoon battle drills. This specific finding suggested that understanding materials taught in the classroom or by using a desktop simulator is facilitated by live field experiences.

Motivation to Use, Involvement With, and Realism of the RDT

The ratings provided by the lieutenants in part 2 of the Pre-LFX Questionnaire showed that the lieutenants were motivated to use the RDT to prepare for the LFX, to learn combat skills, and to practice making rapid decisions. They further indicated that they were satisfied with the training opportunities provided by the RDT. The majority of the lieutenants rejected the notion that they were motivated to use the RDT to have fun or to be entertained.

The results obtained from part 2 of the Pre-LFX Questionnaire also showed that the high perceived training value of the RDT was not consistently associated with a strong sense of personal involvement or immersion with the simulated battlefield environment. Most lieutenants gave high ratings to questions that asked if they could focus on the platoon leader experiences created by the RDT and if they felt completely focused on the task of leading a platoon as they used the RDT. On the other hand, they gave neutral ratings to items that asked if they were captivated or drawn in to actions and events portrayed by the RDT and if training with RDT was a challenging experience. These results tend to support the finding that lieutenants were motivated to use the RDT to facilitate their training and not because it captivated them in the manner of a game used to entertain them. These results may also suggest that the lieutenants did not have to become involved with the RDT by personally interfacing with the simulation. This interpretation of the results suggests that each lieutenant may not need

to interface directly with the RDT to benefit from its training potential. We will return to this matter while discussing issues related to the user interface with the RDT.

The results from parts 2 and 3 of the Pre-LFX Questionnaire suggested that the RDT simulation did not have to incorporate a high degree of fidelity with the conditions, events, and activities it portrayed. When asked in part 2 of the questionnaire to rate the extent to which the RDT realistically portrayed the actions of friendly and enemy elements, a majority of the lieutenants rated the absolute level of RDT realism as low, and most gave only neutral ratings to how realistically the RDT portrayed physical objects in the mission environment. On the other hand, when asked in part 3 of the questionnaire to rate the adequacy of RDT realism for training platoon leader skills, a very high percentage of the lieutenants indicated the RDT portrayed at least adequate levels of realism in physical, psychological, and tactical blue force events and activities, and a majority indicated the RDT portrayed adequate realism for tactical enemy force actions. In short, the lieutenants seemed to be saying that the fidelity of or realism portrayed by the RDT was not high, but was quite adequate to serve as a useful method for training. While these results are specific to the experiences this sample of lieutenants had with the RDT, they may have implications for the use of simulations and game technology for training as opposed to entertainment, and the use of high-fidelity graphics.

The User Interface With the RDT

In part 4 of the Pre-LFX Questionnaire, the majority of lieutenants agreed with items that stated that the RDT was easy to use or that it adequately permitted them to perform required tasks for planning and executing the mission simulated by the RDT. However, the lieutenants' responses to many of these items, as well as several other related items, were significantly influenced by whether they were trained with the RDT in a large group setting or in two-person buddy teams. If the issue addressed was using the RDT to ***plan*** the mission that was to be simulated, there was no effect of the method of training on the ratings for user interface with the RDT. However, for items that addressed using the RDT to ***execute*** the mission, a higher percentage of the lieutenants assigned to the large group agreed with statements that claimed the RDT was easy to use than did the lieutenants assigned to the buddy teams. Further, the lieutenants in the large group gave lower ratings than those in the buddy teams to the item for the level of challenge provided by the RDT training and higher ratings to the item that indicated the RDT training taught them something new about executing a combat mission. Clearly, most of the lieutenants assigned to the large group did not have to interface directly with the RDT. Instead, they were able to concentrate on the lessons being learned during the execution of the mission. The lieutenants assigned to the large group also had more continuous exposure than those assigned to the buddy teams to qualified instructors who could guide the decisions being made during mission execution. Taken together, the results suggested that the lieutenants' perception of RDT training benefits was higher if they were assigned to the large group than to the buddy team method of training.

CONCLUSION

Because this was a preliminary evaluation of the RDT, any firm conclusion would be premature. There were many constraints in this evaluation, to include: a small sample of only 39 lieutenants participated; no performance measures were available, the lieutenants spent relatively little time training on a simulation that was still under development, the simulation was limited to one scenario conducted in a single simulated battlefield environment, and the methods used for exposing the lieutenants to the desk top simulation were confounded with the level of participation of qualified instructors. Given these constraints, it is worth emphasizing that most lieutenants indicated the RDT had training value. This opinion was expressed even though the lieutenants did not sense they were fully and consistently personally involved or immersed in the simulation or that the realism portrayed in the simulation, while adequate for training, was not high in an absolute sense. These results invite additional study of the training value of tabletop simulations and game technologies. They also are provocative and challenge the claims of some who suggest that more immersive and more realistic levels of simulation fidelity are required for virtual simulations to be perceived as effective for training. Finally, and more specific to the objectives of the RDT and this evaluation, because more resources are required for a buddy team or an individualized method than for a large group method for training platoon leader skills with the RDT, the results suggest that equally good training outcomes may be achieved using the less resource intensive large group method.

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APPENDIX A

Measurement Instruments used in the Evaluation of the Rapid Decision Trainer

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Biographical Survey for IOBC RDT

Print Your Full Name _____

Please fill in the blanks or circle the appropriate responses for each item below.

1. Age in years _____

2. Have you had experience with a live-fire exercise? Yes No

3. Do you have any experience playing video games on a personal computer (PC)?

   Yes No

   If Yes, on the average, how many hours per week do you play PC games?

   _____Hours

   What is your level of expertise for playing video PC video games? (Circle one of the following)

   Beginner Intermediate Expert

[Continue with the Pre-LFX Questionnaire on the following page]

Pre-LFX RDT Questionnaire

Your responses to items in this questionnaire should be based on your experience training with the RDT in preparation for the IOBC live-fire exercise (LFX). Respond to the questions in Parts 1 and 2 of this questionnaire by marking an "X" in the appropriate box of the 7-point scale. Respond to subsequent parts of the questionnaire as each directs.

Part 1. Overall Training Value of the RDT

1. To what extent did your experience with the RDT add to your IOBC classroom instruction in learning to lead an Infantry platoon?

|_____|_____|_____|_____|_____|_____|_____|
NOT AT ALL SOMEWHAT VERY MUCH

2. To what extent did your experience with the RDT teach you how to make the tactical decisions required when leading an Infantry platoon?

|_____|_____|_____|_____|_____|_____|_____|
NOT AT ALL SOMEWHAT VERY MUCH

3. To what extent did your experience with the RDT teach you to better understand the influence of METT-TC factors when leading an Infantry platoon?

|_____|_____|_____|_____|_____|_____|_____|
NOT AT ALL SOMEWHAT VERY MUCH

4. To what extent did the RDT provide you with an effective "virtual live-fire" training experience?

|_____|_____|_____|_____|_____|_____|_____|
NOT AT ALL SOMEWHAT VERY MUCH

5. To what extent did the RDT accurately simulate the tasks and conditions specified in current platoon-level battle drills?

|_____|_____|_____|_____|_____|_____|_____|
NOT AT ALL SOMEWHAT VERY MUCH

6. To what extent did the RDT permit you to train and rehearse the types of decisions a platoon leader must make during **a live fire exercise**?

|_____|_____|_____|_____|_____|_____|_____|
NOT AT ALL SOMEWHAT VERY MUCH

[Continue on back of page]

7. To what extent did your experience with the RDT provide meaningful practice for planning a platoon mission?

|_____|_____|_____|_____|_____|_____|_____|
NOT AT ALL SOMEWHAT VERY MUCH

8. To what extent did your experience with the RDT provide meaningful practice for exercising command and control of platoon operations?

|_____|_____|_____|_____|_____|_____|_____|
NOT AT ALL SOMEWHAT VERY MUCH

9. To what extent did your experience with the RDT provide meaningful practice for planning appropriate platoon-level fire control measures?

|_____|_____|_____|_____|_____|_____|_____|
NOT AT ALL SOMEWHAT VERY MUCH

10. To what extent did your experience with the RDT provide meaningful practice for designating movement routes according to the terrain?

|_____|_____|_____|_____|_____|_____|_____|
NOT AT ALL SOMEWHAT VERY MUCH

11. To what extent did your experience with the RDT provide meaningful practice for controlling a platoon-level movement to contact?

|_____|_____|_____|_____|_____|_____|_____|
NOT AT ALL SOMEWHAT VERY MUCH

12. To what extent did your experience with the RDT provide meaningful practice for responding to enemy fires?

|_____|_____|_____|_____|_____|_____|_____|
NOT AT ALL SOMEWHAT VERY MUCH

13. To what extent did your experience with the RDT help you to better understand the key doctrinal principles for conducting platoon battle drills?

|_____|_____|_____|_____|_____|_____|_____|
NOT AT ALL SOMEWHAT VERY MUCH

14. To what extent did the RDT permit you to make hasty adjustments (FRAGOs) to your plans based on emerging battlefield conditions?

|_____|_____|_____|_____|_____|_____|_____|
NOT AT ALL SOMEWHAT VERY MUCH

[Continue on next page]

15. How challenging was the overall experience provided by the RDT training?

NOT CHALLENGING		MODERATELY CHALLENGING		VERY CHALLENGING

16. To what extent should a qualified instructor be present to provide you with tactical guidance while you train with the RDT?

NOT AT ALL REQUIRED		SOMEWHAT REQUIRED		VERY MUCH REQUIRED

17. To what extent should a qualified instructor be present to guide you through an RDT after-action review?

NOT AT ALL REQUIRED		SOMEWHAT REQUIRED		VERY MUCH REQUIRED

18. In your opinion, will using the RDT have a valuable impact on preparing you to lead a platoon in a unit?

NO VALUE		SOME VALUE		GREAT VALUE

[Continue on back of page]

Part 2. Motivation and Involvement with RDT Training

1. How would you describe the amount of time you trained with and/or interacted with others during the RDT experience?

TOO MUCH TIME			RIGHT AMOUNT OF TIME			NEED MORE TIME

2. How captivated or drawn in were you by events and actions presented in the RDT?

NOT AT ALL			SOMEWHAT			COMPLETELY

3. How important is the desire to learn combat skills a reason for you to want to train with the RDT?

NOT AT ALL			SOMEWHAT			VERY MUCH

4. How important is fun and personal entertainment a reason for you to want to train with the RDT?

NOT AT ALL			SOMEWHAT			VERY MUCH

5. How important is a desire to practice making rapid decisions a reason for you to want to train with the RDT?

NOT AT ALL			SOMEWHAT			VERY MUCH

6. How important is a desire to prepare for a live-fire exercise a reason for you to want to train with the RDT?

NOT AT ALL			SOMEWHAT			VERY MUCH

7. To what extent was training with the RDT a challenging experience?

NOT AT ALL			SOMEWHAT			VERY MUCH

8. How fast did the RDT respond to the actions you initiated?

NOT FAST			MODERATELY FAST			VERY FAST

[Continue on next page]

9. How realistically did the RDT portray physical objects in the mission environment?

|_____|_____|_____|_____|_____|_____|_____|
NOT AT ALL SOMEWHAT COMPLETELY

10. How realistically did the RDT portray actions made by members of the platoon?

|_____|_____|_____|_____|_____|_____|_____|
NOT AT ALL SOMEWHAT COMPLETELY

11. How realistically did the RDT portray actions made by the enemy?

|_____|_____|_____|_____|_____|_____|_____|
NOT AT ALL SOMEWHAT COMPLETELY

12. How satisfied were you with the training opportunities provided by the RDT?

|_____|_____|_____|_____|_____|_____|_____|
NOT SATISFIED SOMEWHAT SATISFIED COMPLETELY SATISFIED

13. How completely were you able to search the RDT environment?

|_____|_____|_____|_____|_____|_____|_____|
NOT AT ALL SOMEWHAT COMPLETELY

14. How much were experiences in the RDT environment consistent with your experiences during IOBC field exercises?

|_____|_____|_____|_____|_____|_____|_____|
NOT CONSISTENT MODERATELY CONSISTENT VERY CONSISTENT

15. How real was the experience of being a platoon leader *inside* the RDT environment?

|_____|_____|_____|_____|_____|_____|_____|
NOT AT ALL REAL MODERATELY REAL VERY REAL

16. Overall, how much could you focus on the platoon leader *experiences* created by the RDT rather than on the computer keyboard functions?

|_____|_____|_____|_____|_____|_____|_____|
NOT AT ALL SOMEWHAT VERY MUCH

17. Were there moments during your experience with the RDT when you felt completely focused on the task of leading a platoon?

|_____|_____|_____|_____|_____|_____|_____|
NONE OCCASIONALLY FREQUENTLY

[Continue on back of page]

Part 3. Adequacy of RDT Realism for Training

In the table below, provide your assessment of the RDT in terms of these types of realism by circling one of the alternatives in the *right* column.

Type of Realism	How good was this type of realism in the RDT?
Physical: *(Do Soldiers look like real Soldiers? Does the terrain look realistic? Do trees and vehicles look real?)*	Excellent Good Adequate Poor Inadequate
Tactical Blue Force: (*Does the Blue force react according to doctrine? Does it react in a timely manner?)*	Excellent Good Adequate Poor Inadequate
Tactical Enemy Force: (*Does the Enemy force react as you would expect an enemy to react?)*	Excellent Good Adequate Poor Inadequate
Psychological: (*Were you involved in your role as a Platoon Leader during mission execution?)*	Excellent Good Adequate Poor Inadequate

[Continue on next page]

Part 4. Factors Associated with Using the RDT to Train

In Part 4 of the questionnaire draw a circle around the letter that best indicates the extent to which you agree or disagree with each statement. Write the letters NA to the left of the statement number to indicate that you have no basis for having an opinion about the statement because you did not did not perform or observe the action it describes.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Section I: Understanding and Planning the Mission					
1. The company OPORD allowed me to clearly understand my mission.	A	B	C	D	E
2. The computer functions required for mission planning were easy to use.	A	B	C	D	E
3. The means provided to develop signal plans were adequate.	A	B	C	D	E
4. The planning map provided an appropriate amount of detail.	A	B	C	D	E
5. An appropriate amount of information was provided to plan the mission.	A	B	C	D	E
Section II. Execution the Mission Tasks and Steps					
6. It was easy to execute the plans for platoon operations.	A	B	C	D	E
7. It was easy to request and obtain information while executing the mission.	A	B	C	D	E
8. It was easy to issue commands while executing the mission.	A	B	C	D	E
9. The reporting process was adequate to keep my CO informed.	A	B	C	D	E
10. It was easy to control and coordinate the movement of maneuver elements.	A	B	C	D	E
11. Methods provided to control and synchronize fires were adequate.	A	B	C	D	E
12. It was easy to implement FRAGOs based on emerging battlefield conditions.	A	B	C	D	E

[Continue on back of page]

Part 5. Overall Opinion of the RDT

Did training with the RDT teach you something new about how a platoon leader should perform the following Infantry tasks?

1. **Plan an Infantry offense mission.** Circle one: Yes No
   If Yes, give at least one example of what you learned by training with the RDT.

_____

_____

_____

2. **Respond appropriately to emerging battlefield conditions.** Circle one: Yes No
   If Yes, give at least one example of what you learned by training with the RDT.

_____

_____

_____

3. **What did you like *best* about the RDT?**

_____

_____

_____

4. **What did you like *least* about the RDT?**

_____

_____

_____

Please make any other comments you wish to make about the RDT and its training value on the following sheet.

Thank you for completing this questionnaire

IOBC LFX Position at Griswold Range

Print Your Full Name_____

Please check the type of position in the chain of command that you held during the LFX.

Platoon Leader _____

Platoon Sergeant _____

Rifle or Weapons Squad Leader _____

Other platoon HQ position (e.g., platoon leader RTO, platoon sergeant RTO, FO RTO, FO, medic) _____

Other line position (e.g., rifle squad TL, AR, GRN, R, weapons crew member) _____

[Continue with the Post-LFX Questionnaire on the following page]

Post-LFX RDT Questionnaire

Your responses to items in this questionnaire should be based on your experience training with the RDT and participating in the IOBC live-fire exercise (LFX). Respond to the following questions by marking an "X" in the appropriate box of the 7-point scale.

---

1. To what extent did your experience with the RDT add to your classroom instruction in learning to lead an Infantry platoon?

|_____|_____|_____|_____|_____|_____|_____|
NOT AT ALL SOMEWHAT VERY MUCH

2. To what extent did the RDT provide you with an effective "virtual live-fire" training experience?

|_____|_____|_____|_____|_____|_____|_____|
NOT AT ALL SOMEWHAT VERY MUCH

3. To what extent did the RDT accurately simulate the tasks and conditions specified in current platoon-level battle drills?

|_____|_____|_____|_____|_____|_____|_____|
NOT AT ALL SOMEWHAT VERY MUCH

4. To what extent did the RDT accurately simulate the IOBC LFX at Griswold Range?

|_____|_____|_____|_____|_____|_____|_____|
NOT AT ALL SOMEWHAT VERY MUCH

5. To what extent did the RDT permit you to train and rehearse the types of decisions a platoon leader must make during **a live-fire exercise**?

|_____|_____|_____|_____|_____|_____|_____|
NOT AT ALL SOMEWHAT VERY MUCH

6. To what extent did your experience with the RDT help you to better understand the key doctrinal principles for conducting platoon battle drills?

|_____|_____|_____|_____|_____|_____|_____|
NOT AT ALL SOMEWHAT VERY MUCH

7. To what extent did your experience with the RDT help you to better understand the decisions of the acting platoon leader during the IOBC LFX at Griswold Range?

|_____|_____|_____|_____|_____|_____|_____|
NOT AT ALL SOMEWHAT VERY MUCH

[Continue on back of page]

8. To what extent did your experience with RDT help you predict how you would have performed if you had been the platoon leader during the IOBC LFX at Griswold Range?

|_____|_____|_____|_____|_____|_____|_____|
NOT AT ALL SOMEWHAT VERY MUCH

9. To what extent did the scenario and terrain used in the RDT accurately simulate what you experienced during the LFX at Griswold Range?

|_____|_____|_____|_____|_____|_____|_____|
NOT AT ALL SOMEWHAT VERY MUCH

10. To what extent did training with the RDT prepare you to make the decisions you would have made if you had been the platoon leader during the IOBC LFX at Griswold Range?

|_____|_____|_____|_____|_____|_____|_____|
NO PREPARATION SOME PREPARATION GREAT PREPARATION

11. To what extent did training with the RDT provide you with opportunities to practice how you would react to enemy contact if you had been the platoon leader during the IOBC LFX?

|_____|_____|_____|_____|_____|_____|_____|
NO OPPORTUNITIES SOME OPPORTUNITIES MANY OPPORTUNITIES

12. In your opinion, how desirable is it to use a simulated training exercise such as the RDT to gain experience as the platoon leader **during the IOBC LFX**?

|_____|_____|_____|_____|_____|_____|_____|
NOT AT ALL DESIRABLE SOMEWHAT DESIRABLE VERY DESIRABLE

13. In your opinion, will using the RDT have a valuable impact on preparing you to lead a platoon in a unit?

|_____|_____|_____|_____|_____|_____|_____|
NO VALUE SOME VALUE GREAT VALUE

Please make any other comments you wish to make about the RDT and its training value on the following sheet.

Thank you for completing this questionnaire

APPENDIX B

Detailed Results from the Data Analyses

Page

Table B-1.
Results for Ratings of Overall Training Value From the Pre-LFX Questionnaire

Item # in the Questionnaire and Question	M	SD	Frequency of Rating							%	%
			1	2	3	4	5	6	7	1-3	5-7
6. To what extent did the RDT permit you to train and rehearse the types of decisions a platoon leader must make during a live-fire exercise?	5.6	1.2	0	2	0	4	8	17	8	5.1	84.6
8. To what extent did your experience with the RDT provide meaningful practice for exercising command and control of platoon operations?	5.3	1.1	0	1	1	5	15	11	6	5.1	82.1
17. To what extent should a qualified instructor be present to guide you through an RDT after-action review?	5.8	1.6	1	1	2	3	6	7	19	10.3	82.1
5. To what extent did the RDT accurately simulate the tasks and conditions specified in current platoon-level battle drills?	5.3	1.2	0	1	3	4	13	12	6	10.3	79.5
18. In your opinion, will using the RDT have a valuable impact on preparing you to lead a platoon in a unit?	5.5	1.1	0	0	0	9	9	13	8	0.0	76.9
7. To what extent did your experience with the RDT provide meaningful practice for planning a platoon mission?	5.1	1.3	1	0	4	6	10	14	4	12.8	71.8
16. To what extent should a qualified instructor be present to provide you with tactical guidance while you train with the RDT?	5.2	1.5	1	1	3	6	12	6	10	12.8	71.8
2. To what extent did your experience with the RDT teach you how to make the tactical decisions required when leading an Infantry platoon?	4.8	1.1	0	1	4	9	13	11	1	12.8	64.1
4. To what extent did the RDT provide you with an effective "virtual live-fire" training exercise? training experience?	4.9	1.4	0	3	3	8	9	12	4	15.4	64.1
11. To what extent did your experience with the RDT provide meaningful practice for controlling a platoon-level movement to contact?	5.0	1.1	0	1	1	12	12	9	4	5.1	64.1
13. To what extent did your experience with the RDT help you to better understand the key doctrinal principles for conducting platoon battle drills?	4.7	1.4	0	3	6	7	10	11	2	23.1	59.0
9. To what extent did your experience with the RDT provide meaningful practice for planning appropriate platoon-level fire control measures?	4.7	1.6	0	5	5	6	9	10	4	25.6	59.0
1. To what extent did your experience with the RDT add to your IOBC classroom instruction in learning to lead an Infantry platoon?	4.7	1.2	0	1	5	11	10	10	2	15.4	56.4
10. To what extent did your experience with the RDT provide meaningful practice for designating movement routes according to the terrain?	4.4	1.7	1	7	3	9	5	12	2	28.2	48.7
14. To what extent did the RDT permit you to make hasty adjustments (FRAGOs) to your plans based on emerging battlefield conditions?	4.3	1.6	2	3	7	8	11	5	3	30.8	48.7
12. To what extent did your experience with the RDT provide meaningful practice for responding to enemy fires?	3.9	1.4	2	5	8	10	9	5	0	38.5	35.9
15. How challenging was the overall experience provided by the RDT training?	4.2	1.4	1	3	8	13	8	3	3	30.8	35.9
3. To what extent did your experience with the RDT teach you to better understand the influence of METT-TC factors when leading an Infantry platoon?	4.0	1.2	1	2	9	17	4	5	1	30.8	25.6

Note: $N = 39$. Items are listed in descending order of the percentage of ratings between 5 and 7.

Table B-2
Results for Ratings of Motivation and Involvement From the Pre-LFX Questionnaire

Item # and Question in the Questionnaire	M	SD	Frequency of Rating							%	%
			1	2	3	4	5	6	7	1-3	5-7
6. How important is a desire to prepare for a live-fire exercise a reason for you to want to train with the RDT?	5.9	1.1	0	1	0	3	6	15	13	2.6	89.5
3. How important is the desire to learn combat skills a reason for you to want to train with the RDT?	6.0	1.3	0	1	2	3	3	11	18	7.9	84.2
12. How satisfied were you with the training opportunities provided by the RDT?	5.0	1.1	0	0	4	7	14	10	3	10.5	71.1
5. How important is a desire to practice making rapid decisions a reason for you to want to train with the RDT?	5.2	1.7	1	2	3	6	9	5	12	15.8	68.4
16. Overall, how much could you focus on the platoon leader experiences created by the RDT rather than on the computer keyboard functions?	5.1	1.3	0	1	3	10	9	9	6	10.5	63.2
17. Were there moments during your experience with the RDT when you felt completely focused on the task of leading a platoon? ($N = 39$)	4.8	1.4	1	1	4	9	13	7	4	15.4	61.5
13. How completely were you able to search the RDT environment?	4.6	1.5	0	2	9	8	8	6	5	28.9	50.0
2. How captivated or drawn in were you by events and actions presented in the RDT?	4.4	1.3	0	4	4	12	9	7	2	21.1	47.4
1. How would you describe the amount of time you trained with and/or interacted with others during the RDT experience?	4.7	1.4	0	2	2	17	7	4	6	10.5	44.7
8. How fast did the RDT respond to the actions you initiated?	4.4	1.3	1	0	9	11	10	5	2	26.3	44.7
14. How much were experiences in the RDT environment consistent with your experiences during IOBC field exercises?	4.3	1.2	1	2	6	12	11	6	0	23.7	44.7
7. To what extent was training with the RDT a challenging experience?	4.0	1.6	2	5	7	8	10	4	2	36.8	42.1
15. How real was the experience of being a platoon leader inside the RDT environment?	4.2	1.1	0	2	7	14	12	2	1	23.7	39.5
9. How realistically did the RDT portray physical objects in the mission environment?	4.0	1.3	0	6	5	14	9	3	1	28.9	34.2
10. How realistically did the RDT portray actions made by members of the platoon?	3.7	1.5	2	6	11	8	7	2	2	50.0	28.9
4. How important is fun and personal entertainment a reason for you to want to train with the RDT?	3.1	1.7	9	7	5	9	3	5	0	55.3	21.1
11. How realistically did the RDT portray actions made by the enemy? ($N = 37$)	2.8	1.3	5	13	9	6	3	1	0	73.0	10.8

Note: N=38, except as noted for Items 11 and 17. Items are listed in descending order of the percentage of ratings between 5 and 7.

Table B-3.
Results for Ratings of Adequacy of RDT Realism for Training From the Pre-LFX Questionnaire

Question in the Questionnaire	M	SD	Frequency of Rating					% 3-5
			Inadequate	Poor	Adequate	Good	Excellent	
			1	2	3	4	5	
How good was physical realism?	3.5	0.8	0	2	19	12	4	94.6
How good was psychological realism?	3.7	1.0	0	6	7	17	7	83.8
How good was tactical Blue Force realism?	3.2	0.9	0	9	13	13	2	75.7
How good was tactical Enemy Force realism?	2.8	1.1	4	12	12	6	3	56.8

Note: $N = 37$. Questions are listed in descending order of the percentage of ratings between 3 and 5.

Table B-4
Results for Ratings of User-Interface Factors With the RDT From the Pre-LFX Questionnaire

Item # and Question in the Questionnaire	M	SD	Frequency of Rating					% 1-2	% 4-5
			1 Strongly Disagree	2 Disagree	3 Neither D or A	4 Agree	5 Strongly Agree		
3. The means provided to develop signal plans were adequate.	4.4	0.7	0	1	1	20	17	2.6	94.9
9. The reporting process was adequate to keep my CO informed.	4.0	0.9	0	4	3	20	12	10.3	82.1
2. The computer functions required for mission planning were easy to use.	4.0	0.7	0	0	10	19	10	0.0	74.4
4. The planning map provided an appropriate amount of detail.	3.8	1.1	1	6	3	20	9	17.9	74.4
5. An appropriate amount of information was provided to plan the mission.	3.8	1.1	1	5	4	18	11	15.4	74.4
8. It was easy to issue commands while executing the mission.	3.7	0.9	1	2	9	21	6	7.7	69.2
6. It was easy to execute the plans for platoon operations.	3.7	0.8	0	3	11	18	7	7.7	64.1
7. It was easy to request and obtain information while executing the mission.	3.5	1.0	1	7	7	19	5	20.5	61.5
1. The company OPORD allowed me to clearly understand my mission.	3.4	1.2	2	10	5	15	7	30.8	56.4
11. Methods provided to control and synchronize fires were adequate.	3.4	1.1	2	8	7	17	5	25.6	56.4
12. It was easy to implement FRAGOs based on emerging battlefield conditions.	3.4	1.0	1	5	14	14	5	15.4	48.7
10. It was easy to control and coordinate the movement of maneuver elements.	3.2	1.2	2	12	6	14	5	35.9	48.7

Note: $N = 39$. Items are listed in descending order of the percentage of ratings between 4 and 5.

Table B-5

Results of a Preliminary Content Analysis of Written Comments Concerning the RDT

1. What did you learn new about planning an Infantry offense mission.	Frequency
Helped me understand the importance of planning fires	5
The importance of pre-combat inspections	2
The importance of using terrain	2
Able to run through and reinforce tasks	1
Allows you to focus on decision making rather than physical movement	1
Clarified the reporting to higher echelons process	1
Fire control	1
Helped in planning future steps ahead of time	1
How to assess the situation	1
How to make left and right limits	1
How to maneuver the squads in relation to one another and the enemy	1
Helped to solidify the sequence of events that must occur	1
How to think through the mission like we would in the real world before movement to contact	1
How to use whistles for only one signal because it's hard to distinguish between multiple blasts	1
Learned signal planning	1
Learned that you must inform your Soldiers of the plan before execution	1
.Learned the importance of radio checks	1
Learning how to be a platoon leader	1
Made us focus on the uncertain events in route to our objective	1
Provide an outlet for actions on the objective	1
Taught how to set up over watch and assault	1
The checklist of things to do before and during a pre-combat training exercise	1
The importance of getting and sending reports	1
The philosophy behind each style of movement	1
.The placement of the machine gun	1
Using PLOT-CR effectively	1
Was an opportunity to be a PL without actually doing the mission	1

2. What did you learn new about responding appropriately to emerging battlefield conditions.	Frequency
Gave a better understanding of coordinated movement between squads	3
Helped me understand how to integrate terrain with the map to set up positions	3
Learned to remain flexible when things don't go right	2
Allows more time to makes decisions	1
Allows you to focus on the decision making rather than physical movement	1
Emphasized using reports	1
Encountering an out post and switching to over watch	1
How to deal with a smoke malfunction when giving "shift fire" signal	1
Learned how to set up squad movements, signals and fires and how to execute the mission	1
Learned how to react to contact	1
Learned that in stressful conditions my Soldiers will not always execute perfectly	1
Learned that there is a correct sequence for completing tasks	1
Learned to establish an over watch position in addition to the initial base of fire	1
Learned where the PL should be to best coordinate movement	1
Let the situation develop and allow Soldiers adequate time To move into position	1
Reinforced past training concerning courses of action (COAs)	1
Using mass and fire power appropriately	1
When a second enemy pops up you have to react	1
Where to send machine guns	1

Note: Comments with equal frequency are listed in alphabetical order.

Table B-5. (continued)

3. What did you like BEST about the RDT?	Frequency	4. What did you like LEAST about the RDT?	Frequency
The planning stage	4	Lack of enemy intelligence and response	5
Learning to use terrain for movement (i.e. use creek bed to mask flank)	3	Couldn't communicate to my SLs other then halt and move out	2
		Difficult to coordinate the assault because I couldn't find the enemy	2
It was realistic	2		
Taught the little things that I need to think about during the LFX	2	Difficult to determine where the enemy actually was	2
That it focused on PL responsibilities (leadership and decision making) rather than 1st person shooting	2	Lack of instruction/guidance given to understand the software	2
		The bugs of the system	2
Challenge of maneuvering a large force and multiple pieces	1	Can't make contact first if BLUFOR spots enemy first	1
Could practice doctrine with ease	1	Couldn't see where enemy fire was coming from	1
Familiarization of the types of things I need to be thinking about during a mission	1	Didn't feel the battlefield awareness that I would have on the ground	1
Game was easy to play	1	Hard to assault because the Soldier has no initiative to line himself up when he can't tell where the enemy is	1
Reacting to the mission	1		
The ability to see the whole picture of platoon live fire	1	Needs more detail in the responsibilities of a PL	1
The OPORD		Squad leaders did not automatically orient to the enemy, just followed blindly my commands	1
You can make decisions and understand the process in a more relaxed environment	1		
		Squad movement and orientation was cumbersome	1
You can practice the mission so it becomes second nature	1	The time it takes to make decisions	1
		Too much like a game	1
		Translating the concept of over watch and assault to a map	1
		Using terrain to move troops didn't play a large enough role	1

Note: Comments with equal frequency are listed in alphabetical order.

Table B-6.
Results from a Comparison of Ratings for the Two Training Methods (Buddy Team and Large Group)

Item # and Question in the Questionnaire	Training Method	*N*	M	SD	Means Test *t*	Means Test df	Means Test Sig.	% Low	% High
Pre-LFX Training Value Item 15	Buddy Team	20	4.7	1.3	2.40	37	0.02	20	55
How challenging was the overall experience provided by the RDT training?	Large Group	19	3.6	1.3				41	15
Fidelity Item 3	Buddy Team	18	2.3	1.1	-2.59	35	0.01	50	50
How good was tactical Enemy Force realism?	Large Group	19	3.2	1.0				37	73
Usability Factor: Item 6	Buddy Team	20	3.5	0.8	-2.34	37	0.02	0	50
It was easy to execute the plans for platoon operations.	Large Group	19	4.1	0.8				5	70
Usability Factor: Item 7	Buddy Team	20	3.2	1.0	-2.41	37	0.02	30	45
It was easy to request and obtain information while executing the mission.	Large Group	19	3.9	0.9				10	79
Usability Factor: Item 9	Buddy Team	20	3.8	1.0	-2.04	37	0.05	55	30
The reporting process was adequate to keep my CO informed.	Large Group	19	4.3	0.7				15	69
Usability Factor: Item 10	Buddy Team	20	2.8	1.2	-2.34	37	0.02	15	70
It was easy to control and coordinate the movement of maneuver elements.	Large Group	19	3.6	1.1				5	95
Usability Factor: Item 11	Buddy Team	20	2.9	1.2	-3.08	37	0.00	45	40
Methods provided to control and synchronize fires were adequate.	Large Group	19	3.9	0.8				5	74
Usability Factor: Item 12	Buddy Team	20	3.1	1.1	-2.77	37	0.01	30	30
It was easy to implement FRAGOs based on emerging battlefield conditions.	Large Group	19	3.8	0.7				0	69
Overall Opinion of RDT (b)	Buddy Team	19	0.4	0.5	-2.44	36	0.02	58	42
Trained something new about PL responding to emerging battlefield conditions.	Large Group	19	0.8	0.4				21	79

Note: The percentage of low and high values represent the percentage of ratings at the high- and low- ends of three different rating scales. The Training Value item in this table was rated on a 7-point scale; the Usability items were rated on a 5-point scale. In these two cases, the middle rating values were not considered in the determination of low and high values. The Fidelity item was rated on a 5-point scale, but high and low values for this item were based on a contrast between ratings of 1 or 2 and ratings of 3 – 5, respectively. Low and high Values for the Overall Opinion item represent the percentage of lieutenants responding no and yes to the item, respectively.

Table B-7.
Results for Ratings of Overall Training Value From the Post-LFX Questionnaire

Item # and Question in the Questionnaire	M	SD	Frequency of Rating							%	%
			1	2	3	4	5	6	7	1-3	5-7
5. To what extent did the RDT permit you to train and rehearse the types of decisions a platoon leader must make during a live-fire exercise?	5.3	1.0	0	0	2	6	14	14	3	5.1	79.5
6. To what extent did your experience with the RDT help you to better understand the key doctrinal principles for conducting platoon battle drills?	5.2	1.1	0	1	1	6	17	9	5	5.1	79.5
12. In your opinion, how desirable is it to use a simulated training exercise such as the RDT to gain experience as the platoon leader during the IOBC LFX?	5.4	1.1	0	0	2	6	12	11	8	5.1	79.5
7. To what extent did your experience with the RDT help you to better understand the decisions of the acting platoon leader during the IOBC LFX at Griswold Range?	5.0	1.1	0	1	1	9	17	8	3	5.1	71.8
13. In your opinion, will using the RDT have a valuable impact on preparing you to lead a platoon in a unit?	5.0	1.1	0	0	3	8	18	6	4	7.7	71.8
10. To what extent did training with the RDT prepare you to make the decisions you would have made if you had been the platoon leader during the IOBC LFX at Griswold Range?	4.7	0.9	0	0	2	15	14	8	0	5.1	56.4
11. To what extent did training with the RDT provide you with opportunities to practice how you would react to enemy contact if you had been the platoon leader during the IOBC LFX?	4.7	1.0	0	1	2	14	12	9	1	7.7	56.4
3. To what extent did the RDT accurately simulate the tasks and conditions specified In current platoon-level battle drills?	4.6	1.3	0	2	5	11	13	5	3	17.9	53.8
2. To what extent did the RDT provide you with an effective "virtual live-fire" training experience?	4.3	1.3	1	3	5	12	12	5	1	23.1	46.2
4. To what extent did the RDT accurately simulate the IOBC LFX at Griswold Range?	4.5	1.4	0	2	8	11	6	9	3	25.6	46.2
9. To what extent did the scenario and terrain used in the RDT accurately simulate what you experienced during the LFX at Griswold Range.	4.3	1.5	2	2	8	10	8	7	2	30.8	43.6
1. To what extent did your experience with the RDT add to your classroom instruction In learning to lead an Infantry platoon?	4.5	0.8	0	0	3	19	12	5	0	7.7	43.6
8. To what extent did your experience with RDT help you predict how you would have performed if you had been the platoon leader during the IOBC LFX at Griswold Range?	4.2	1.2	1	1	7	14	12	3	1	23.1	41.0

Note: *N* = 39. Items are listed in descending order of the percentage of ratings between 5 and 7.

Table B-8.
Results of Tests of Paired Differences in Ratings for Items Common to the Pre- LFX and Post-LFX Questionnaires

Questionnaire and Item #		Question	Pre - Post		*t*	sig.	% 1-3	% 5-7
			M	SD				
Pre-LFX	**5**	To what extent did the RDT accurately simulate the tasks and conditions specified in current platoon-level battle drills?	0.69	1.45	2.97	0.01	10	86
Post-LFX	**3**						18	54
Pre-LFX	**4**	To what extent did the RDT provide you with an effective "virtual live-fire" training experience?	0.64	1.88	2.12	0.04	15	64
Post-LFX	**2**						23	46
Pre-LFX	**18**	In your opinion, will using the RDT have a valuable impact on preparing you to lead a platoon in a unit?	0.51	0.91	3.50	0.00	0	77
Post-LFX	**13**						8	72
Pre-LFX	**6**	To what extent did the RDT permit you to train and rehearse the types of decisions a platoon leader must make during a live-fire exercise?	0.33	1.34	1.55	0.13	5	85
Post-LFX	**5**						5	80
Pre-LFX	**1**	To what extent did your experience with the RDT add to your classroom instruction in learning to lead an Infantry platoon?	0.26	1.23	1.30	0.20	15	56
Post-LFX	**1**						8	44
Pre-LFX	**13**	To what extent did your experience with the RDT help you to better understand the key doctrinal principles for conducting platoon battle drills?	-0.54	1.29	-2.60	0.01	23	59
Post-LFX	**6**						5	80

Note. Degrees of freedom for *t*-tests are 38. Common items are listed in descending order of the value of the mean difference statistic.

APPENDIX C

A Description of the Rapid Decision Trainer

The following description of the Rapid Decision Trainer is reproduced with permission of the authors from a paper they presented at and that was published in the proceedings of the December 2004 Interservice/Industry Training, Simulation and Education Conference (I/ITSEC) in Orlando, Florida. To order full-text copies of this paper or any other paper published in any published proceedings of I/ITSEC contact the publishers of the proceedings as given below.

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INFANTRY OFFICER BASIC COURSE (IOBC) RAPID DECISION TRAINER (RDT)

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ABSTRACT

The Department of Defense recently published the roadmap for transforming future military training in the document *Strategic Plan for Transforming DOD Training*. Distributed learning technologies play a key role in the DOD training transformation strategy and support *life-long learning*, a key component of the Army's training transformation strategy. The U.S. Army Training & Doctrine Command (TRADOC) is leveraging distributed learning capabilities as a means to improve training effectiveness, reduce training costs, and improve overall Soldier readiness. Research continues in the Army to improve distributed learning technologies as well as the ability of the Army to incorporate these technologies in both resident and non-resident training programs.

Newly commissioned infantry second lieutenants are trained at the US Army Infantry Officer Basic Course (IOBC) at Ft. Benning, GA. To successfully complete the course, IOBC students must demonstrate an understanding of individual and small unit infantry skills by participating in live-fire battle drill exercises. Resource constraints limit the number of students who can perform in leadership roles during the live-fire exercises, thus preventing many of the students from fully demonstrating their knowledge and skills. Distributed learning technologies can help address this training shortfall. A research effort led by the U.S. Army Research, Development and Engineering Command's Simulation Technology Center produced a PC-based, web-enabled rapid decision trainer, enabling all IOBC students to participate as a leader in a "virtual live-fire exercise." The trainer has successfully demonstrated the use of distributed learning technology to enhance live training.

The trainer incorporates web-enabled 3D graphics and audio content built upon open source technologies. Training scenarios are delivered through Extensible Markup Language (XML). A Learning Management System (LMS) provides instructors with feedback and a summary of student performance. Existing government standards such as the High Level Architecture (HLA) and Sharable Content Object Reference Model (SCORM) are also used.

ABOUT THE AUTHORS

Bill Pike is the Lead Principal Investigator for Advanced Learning Environments at the US Army Research, Development and Engineering Command, Simulation Technology Center in Orlando, FL. He has led research projects in advanced distributed learning technologies such as intelligent tutoring systems, game engine-based simulation, and handheld training platforms. Bill earned his Master's Degree in Computer Engineering from the University of Central Florida. He holds a Bachelor's Degree in Systems Science from the University of West Florida and is currently working toward a Ph.D. in Modeling and Simulations at the University of Central Florida. He is also a Naval Reserve officer, currently assigned to US Special Operations Command at MacDill Air Force Base, FL.

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INTRODUCTION

Armed conflicts at the end of the 20th century and recent events in Iraq and Afghanistan have demonstrated conclusively that the armed forces of the United States are the premier warfighting force in the world today. However, the US military's dominance in the 21st century will continue to be challenged by new threats created in the dynamic international environment. In response to these new and emerging threats, the Department of Defense (DoD) has developed an ambitious strategy to transform the armed forces and insure they have the capabilities to meet these new security challenges.

Central to this transformation strategy are DoD's efforts to identify new and innovative ways to educate, train, and improve unit and individual performance. Superior training and knowledge will be critical to continued success on the modern battlefield.

The DoD strategy for transforming US military training was published in March 2002 in the ***Strategic Plan for Transforming DoD Training***. The goal of this strategy is to develop a robust, networked, live, virtual, and constructive training and mission rehearsal environment that will enable US military forces to build unparalleled joint military capabilities. DoD training transformation efforts will capitalize on the capabilities and power of modern computing and telecommunication systems and will deliver training opportunities that were impossible just a few years ago.

Advanced Distributed Learning (ADL) technologies are a key and essential component of the DoD Training Transformation Strategy. ADL programs will provide DoD personnel with access to high quality education and training opportunities that can be tailored to meet individual needs and can be delivered cost effectively, whenever and wherever training is required.

In general, the benefits of ADL learning are recognized as:

- reduced learning time
- increased content retention
- increased student motivation through active involvement in learning activities
- increased safety
- increased access to training opportunities and resources
- increased learner satisfaction
- improved instructional consistency

Each military service has begun to implement its training transformation strategy in support of the overall DoD effort. ADL is a key component of the strategy for each service. Within the Army, organizations such as the US Army Training & Doctrine Command (TRADOC), the US Army Research, Development, and Engineering Command (RDECOM), and the Army Research Institute (ARI), are working to develop the technologies, tools, and procedures that will provide efficient and effective distance learning training capabilities to support the future force.

NEED FOR THE IOBC RAPID DECISION TRAINER (RDT)

The U.S. Army's Infantry School (USAIS) is the US Army TRADOC organization responsible for training infantry officers, non-commissioned officers, and infantry Soldiers through resident and non-resident training programs at Ft. Benning, Georgia. Newly-

commissioned infantry second lieutenants are trained by the USAIS through the Infantry Officer Basic Course (IOBC).
The IOBC is an intense, 16-week, resident training program that prepares new infantry second lieutenants for their first assignment as infantry platoon leaders. Each IOBC course includes approximately 200 students.

To successfully complete the course, IOBC students must learn and develop a variety of skills to include every aspect of an infantry platoon. This includes an understanding of individual, squad, and platoon-level infantry operations as described in the US Army Army Training and Evaluation Program (ARTEP) Manual 7-8, ***Infantry Rifle Platoon and Squad.*** Students are required to demonstrate their understanding of basic infantry principles through written examinations and through practical exercises, such as participating in both squad and platoon-level live-fire exercises at Ft. Benning. The squad level live-fire exercise is conducted at the Ware Live-Fire Range and the platoon exercise is conducted at the Griswold Live-Fire Range.

The squad and platoon level live-fire training exercises are divided into three events using a "crawl, walk, run" approach. The first event is a walk-through, "dry-fire" exercise, where instructors accompany students over the exercise terrain describing the scenario and actions that should be performed by the unit. The second event is conducted in "real-time," with students conducting the exercise using blank ammunition. The third event is a repeat of the second; however, live ammunition is added to the exercise increasing realism in the training. Feedback is provided to the students by platoon trainers and instructors at the conclusion of each training event. The introduction of live ammunition in the third event increases the intensity, risk, and stress in the training exercise and produces a highly effective training experience.

Ideally, each IOBC student should be given an opportunity to demonstrate his knowledge and skills during the live-fire exercise by performing in a key leadership position. These four key leadership positions in an infantry platoon include platoon leader, platoon sergeant, squad leader, and fire team leader. Students assigned to one of these positions are faced with the most challenging decisions thereby providing the students with an excellent opportunity to develop the tactical knowledge and rapid decision-making skills required of an infantry platoon leader. Live-fire exercises also help instructors to evaluate each student's understanding of key doctrinal principles prior to graduation from the course.
Unfortunately, resource constraints significantly limit the number of students (approximately ten percent) who can perform in a leadership position during the live-fire exercises. Time is the major constraint facing course planners; however other factors such as limited ammunition and range availability are also constraints affecting this training opportunity.

To address this training challenge and thereby improve the training for all students, the USAIS and the Commander, 11th Infantry Regiment, began to investigate the use of simulations or PC-based games as an alternative way to provide an effective training environment for all IOBC students. In February 2003, the USAIS requested assistance from the US Army Research, Development, and Engineering Command, Simulation Technology Center (RDECOM STC) in Orlando, FL, to develop a low-cost, PC-based, rapid decision trainer (RDT) to supplement the IOBC live-fire training program.

Two primary objectives were established for the RDT initiative. The first was to develop a training simulation or PC-game that would satisfy the training requirement identified by the USAIS. The RDT would provide a challenging, doctrinally correct learning environment to help IOBC students master the skills required to successfully complete a squad or platoon-level, live fire exercise.

The second objective was to advance the research being conducted by the RDECOM STC in advanced learning environments by developing a trainer that integrates doctrinally accurate courseware, a virtual simulation, an effective After-Action-Review capability, and a Learning Management System (LMS), and produce this trainer in a distributed learning environment. The initial prototype was to be developed as a stand-alone PC trainer, with future work expanding the trainer to a web-based system. The web-based training environment will be compliant with technical standards established by the Department of Defense Shared Content Object Reference Model (SCORM).

It was envisioned during initial discussions with the USAIS, that students would be issued a copy of the trainer during the IOBC course of instruction and they would participate as a squad or platoon leader during a "virtual live-fire exercise." The simulation will eventually support both single-player and multi-player participation. The scenarios presented in the simulation were expected to closely resemble those conducted during the IOBC live-fire training, thus

enabling students to develop and demonstrate the rapid decision making skills required during an actual live-fire exercise.

The RDT was developed under the direction of the RDECOM STC over a seven-month period with subject matter expert (SME) support provided by the USAIS. Funding was provided through the FY01-03 Science and Technology Objective (STO), ***Training Tools for Collaborative Web-based Environments.*** The prime contractor for the project was Veridian Corporation with additional support provided by I.D.E.A.L. Corporation of Orlando, FL. The squad-level trainer was delivered to the USAIS in July 2003 and the platoon-level trainer was delivered in September 2003.

The RDT has been an effective addition to the IOBC program allowing each student to participate as a squad or platoon leader during a "virtual live-fire exercise." The trainer successfully replicates the terrain and scenarios used in the IOBC squad and platoon live-fire exercises. The trainer can facilitate synchronous and asynchronous training and can allow both single-player and multi-player participation. Students can rerun each training scenario multiple times and receive effective feedback through an embedded After-Action-Report (AAR) process. The RDT tracks student performance by recording execution data in a LMS, thereby making it a useful tool for students and instructors alike. The RDT is distributed to each IOBC student as part of the course curriculum and students are allowed to take a copy of the trainer with them upon graduation.

Although the purpose of the RDT was not to replace the IOBC live-fire exercises, it has been successful in providing an effective, low-cost tool for supplementing the live-fire exercises. Additional research and development work is planned in FY04 as the desire for a variety of system enhancements has been identified. Additional research will also be conducted to determine the effectiveness of the trainer on overall student performance.

TECHNICAL APPROACH

The approach taken to develop the trainer included four basic phases. The first included the initial work to define the system requirements and course content included in the trainer. The second phase included development of the PC-based, squad-level training simulation. The third phase included extending the PC-based simulation to a web-based, SCORM-compliant application. The fourth phase included the development of a PC-based, platoon-level exercise. Software engineers from Veridian Corporation assumed the lead in developing the training simulation while engineers from I.D.E.A.L Corporation collaborated and developed the web-based, SCORM-compliant architecture.

Defining the Requirement

Clearly defining the system requirements and understanding the customer's expectations at the beginning of the project were critical steps in ensuring the successful development of the trainer. Members of RDECOM STC, Veridian, and I.D.E.A.L participated in a number of meetings and discussions with USAIS Platoon Trainers and SMEs, to review the training objectives and to fully understand the training scenario. The team observed and videotaped several iterations of both the squad and platoon live-fire exercises. A detailed script was prepared for each scenario and they were subsequently reviewed for accuracy by the Infantry School SMEs. Frequent contact between the software developers and the SMEs throughout the development process ensured the trainer met the customer's needs and expectations.

Simulation Development

The IOBC simulation application was developed using ***Alloy***, a platform-independent, three-dimensional game engine developed by Veridian Corporation. The game engine is built upon a foundation of several freely-available, freely-

distributable, well-respected software products. The game engine includes an open-source audio library and an open-source graphics project called ***OpenSceneGraph***, a mature, robust, 3D graphics library. The ***Alloy*** game engine supports the following functionalities:

- View, display, and interact with 3D graphics created from the most common graphics tools used in the modeling and simulation community. These tools include ***Multigen OpenFlight*** and ***Discreet 3D Studio Max***. Other formats such as ***Maya***, can be translated and can be used with the ***Alloy*** game engine using a graphics conversion utility.

- Integrated 3D spatialized sound, supporting the most common sound formats including Wav and Midi.

- Support for the integration of video clips in the 3D environment.

- Support for 3D character animation and movement using deformable mesh technology, including full support for motion-capture animation technology.

- Support for simulated weather and environmental effects including rain, hail, snow, fire, smoke, ash, ordnance detonation, and rubble, as well as primitive support for the development of additional undefined effects.

- Support for multiple types of hardware input devices including joysticks, mice, and keyboards.

The ***Alloy*** game engine includes a GUI application that allows an engineer or instructional designer to combine graphical, sound, or other simulation components with a simulation sensor-behavior model. It enables instructional designers to form persistent, scalable, and multi-rolled learning scenarios. This capability facilitates the development of the various team, squad, and platoon leadership learning scenarios created in the trainer. The learning scenarios for IOBC can be developed and easily modified as Army doctrine and the IOBC learning objectives evolve.

SCORM Integration

A major objective of this research effort was to expand the squad-level trainer from a PC-based, single player trainer, to a web-enabled, SCORM-compliant environment. The SCORM-conformant content package developed for this part of the effort included a set of instructional modules and files that are loaded into a SCORM-conformant LMS. Once loaded, this package can be accessed by students via the Internet and run on a computer at the Infantry School or on a student's personal computer. The content package contains Shareable Content Objects (SCOs), shareable content assets (SCAs) and metadata that provides information for the LMS to run the package. I.D.E.A.L. created the following types of SCOs for the RDT:

- Teaching SCO – a set of web pages and associated files that presents instructional material to a student.

- Testing SCO – a set of web pages and associated files that implements an evaluation of a student's knowledge. In the case of the RDT, the Testing SCO invokes the simulation.

- Assessment SCO - a set of web pages and associated files that performs the assessment of a student's performance against the defined learning objectives.

API Adapter

SCORM provides a single defined, JavaScript interface between an LMS and a SCO. Each LMS

implements the JavaScript interface to provide the standard interface for SCOs. This interface is normally called the "API Adapter." By definition, all SCOs require JavaScript and all communication with the LMS is via JavaScript. A major challenge for interfacing a simulation with a SCORM compliant LMS is the JavaScript interface.

SCO/Simulation Architecture

The limitations of the JavaScript language and the browser/web page model make it difficult to interface with applications that execute outside of the browser. Each of the possible solutions require trade-offs and the best solution depends on the application programming language, application file size, the platform support required, the browser support required, and the performance requirements. Some of the possible methods of interfacing the simulation to JavaScript that were considered included "Plug-ins," "Java Applets," and "ActiveX Components."

Assessment of Alternatives

Plug-ins are platform- and browser-specific. Developing a different version of a plug-in would be potentially needed for each platform or browser combination used by the students. The Plug-ins are typically activated by the MIME type of an accessed resource on the server. This requires configuration of the LMS server to generate the proper MIME type.

ActiveX Controls are software modules that are implemented using Microsoft's ActiveX Framework. They are supported only on Microsoft Windows platforms using Internet Explorer and Netscape Navigator (using a Microsoft ActiveX plug-in). Although Microsoft states that ActiveX controls will run on UNIX, it is only possible using a third-party Windows OS emulator. Default security limits the controls ability to perform some operations on the client computer. Allowing secure operations involves configuring the client browser/computer and digitally signing the control.

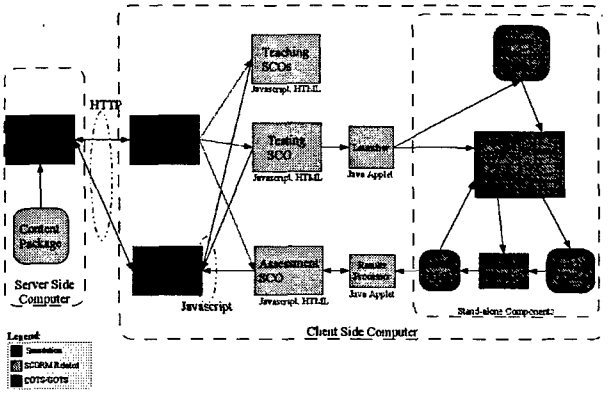
Java Applets are Java software modules that are launched by the browser. They are platform independent and have been supported by all of the common browsers for the last few years. Security issues are similar to ActiveX, however applets installed on the client computer (as opposed to downloaded by the web page), do not have the security limitations. Allowing secure operations for downloaded applets requires modifying the Java security policy file.

Design Decision

In order to provide the best platform and browser independence, we chose to use Java Applets. Applets installed on the client computer operate with the same privileges as the browser.

The following diagram shows the RDT SCORM Simulation Interface Architecture.

RDT SCORM/Simulation Architecture



Delivery Methods

A goal of creating the web-enabled version of the RDT was to ensure it was platform independent and was easy to install. Initially, it was assumed that the SCORM-conformant LMS would be used to download the files necessary to execute a SCO directly to the student's computer. Under this method, a student would access both the Testing SCO and the RDT simulation application after they were downloaded and launched on the student's computer. However, the size of the RDT software precluded this approach

CD-ROM was the primary method of delivery chosen due to the difficulty in setting up a network-accessible download site for IOBC students and the large size of the application. The USAIS has been able to install the RDT on school computers and has issued the RDT on CD-ROM to each IOBC student to install on their individual computers. Using a CD-ROM as a delivery method takes advantage of a client installation and avoids the problem of configuring applet security privileges.

SCO/Simulation Interface

Defining an XML interface between the simulation and the SCORM components has allowed for language and execution independence. The simulation can use any programming language as long as it generates the XML data. Execution independence means that the simulation and the SCORM components do not need to run at the same time or even on the same computer. The only requirement is that the XML data be available to the Assessment SCO. An additional benefit is that it simplifies the reuse of the SCORM components with any other simulation.

There are 3 XML files that define the interface between the SCOs and the simulation:

- Scenario Setup – provides the player information, scenario selection, and other configuration parameters to the simulation.
- Game Log – a detailed log of the simulation that is generated by the simulation and used for assessing performance against the learning objectives.
- Assessment Results – a summary of the assessment of learning objectives are recorded in the LMS and are used for After-Action-Review.

As a design goal, the XML schemas are applicable to combat simulation in general and avoid RDT specific constructs. Doing this has made re-using the SCO/Simulation interface with other simulations much easier.

Assessment

Defining the learning objectives for the training was a critical step during the initial phase of the project and was essential in developing the assessment component of the learning environment. SMEs from the Infantry School played a key role in helping to define these learning objectives. Once the learning objectives were defined, the challenge from a systems design perspective was to determine how to measure performance against those objectives. The following set of data types was established:

- Time (Events)
- Distance
- Area
- Identity
- Enumerated (type, color, etc.)
- Numeric (quantity, health, etc.)

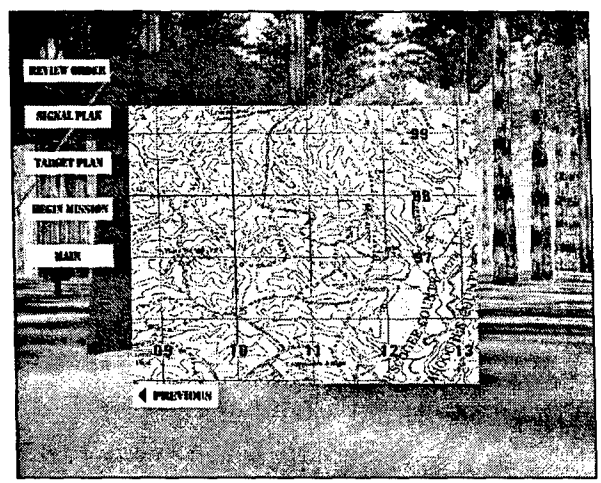
Using these base data types, the developers were able to express the measure of performance in terms of these data types. An assessment engine was developed to interpret the criteria and apply it to a game log. The results are written to the Assessment Results XML file, the Assessment SCO, and the LMS to support AAR functions.

Course Structure

The Teaching SCOs are organized around each of the learning objectives. Each objective is based on Army doctrine and is described using official Army field manuals as references. Publicly available copies of the manuals are provided on the CD-ROM for fast, easy access.

FUTURE RDT DEVELOPMENT EFFORTS

The current version of the RDT includes two basic scenarios that replicate the squad and platoon live-fire exercises at Ft. Benning's Ware and Griswold Firing Ranges. The two scenarios have met the initial USAIS training objectives; however, the quality and effectiveness of the RDT can be enhanced by modifying the trainer and expanding its capabilities.



Additional research is planned in FY04 to incorporate changes in the current virtual environment. Examples of the changes being contemplated include adding man-made or natural obstacles in the terrain database (e.g., hilltops, swamps, rivers, and minefields); introducing the threat of NBC (Nuclear, Biological, and Chemical) operations; adding new weapon systems to those used in the current exercises; and conducting operations under reduced visibility and nighttime conditions.

Lessons learned from recent operations in Afghanistan and Iraq will help structure future scenarios. The basic format for both exercises will remain the same; however, changes in the virtual environment will create new and more complex scenarios. These will further challenge the students and improve the overall effectiveness of the trainer.

The second area of additional research will include extending the PC-based, platoon-level exercise, to a web-enabled, SCORM-compliant application. Operating this simulation on the web and allowing multiple students to participate in key leadership positions in a collaborative environment will greatly enhance the usefulness of the trainer.

The third area of additional research will focus on the development of an Intelligent Tutoring System (ITS) and incorporating the ITS in the RDT. An ITS is an evolving form of technology that can evaluate and track a student's performance in a training environment. It can provide coach-like or instructor-like assistance to students during a training session. It can also modify future training scenarios based upon a student's past performance. An ITS can produce an individualized educational experience through "instructor-less" mentoring, thereby advancing the ADL goal of providing tailorable training for Soldiers anytime, anywhere.

The fourth area of research will be to evaluate the effectiveness of the trainer in improving student knowledge and decision-making skills. Initial feedback provided by the USAIS suggests that the RDT has been an effective and useful tool in helping to prepare students for live-fire exercises. Students are able to train repeatedly on each scenario using the RDT, and there is anecdotal evidence from platoon trainers that suggests a marked improvement for those who use the trainer. Additional research in this area is needed to capture statistical data to strengthen our understanding of how ADL technologies and products can affect unit and individual Soldier readiness.

CONCLUSION

Advanced distributed learning technologies are playing an increasingly important role in the way DOD will train Soldiers in the 21st century. Advances in computer technology and telecommunications are providing trainers with new options for overcoming a variety of constraints that previously hampered our ability to provide the most effective training possible. The research and development project conducted by the USAIS and the RDECOM STC to develop a low-cost, rapid decision trainer in support of IOBC live-fire exercises is a good example of the progress being made in this area.

Groundwork for the successful development of the RDT was established early on by SMEs from the USAIS and software designers and engineers. Having the developers walk through several live-fire exercises, videotaping one practically from the eyes of a squad leader, allowed the entire development team unparalleled insight into what the final product would look like. A highly effective, SCORM-compliant trainer was created using relatively low cost, open-sourced, game engine technology. The trainer was developed at low cost and in a short timeframe (seven months). Most importantly, the trainer was delivered on time and has been effective in training Soldiers.

Additional research and development of the RDT that will build on previous accomplishments is projected in the future. The addition of enriched scenarios and an Intelligent Tutoring System will enhance the RDT and further demonstrate the value of ADL technologies to help transform the way the Army will train Soldiers in the future.

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