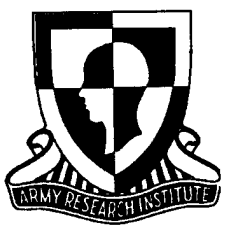
Study Report 96-05

# Training Aids, Devices, Simulators, and Simulations Study

Robert H. Sulzen
U.S. Army Research Institute

November 1995



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14. ABSTRACT *(Maximum 200 words)*:

The requirements for this study were: to identify how the available Training Aids, Devices, Simulators and Simulations (TADSS) are integrated into training programs, to evaluate user perceptions of TADSS, and to provide recommendations for a procedure to periodically gather this information. The methodology employed structured interviews given at eight posts selected for both Forces Command (FORSCOM) and Training and Doctrine Command (TRADOC) installations. Personnel were selected to represent the providers of TADSS and the users, from individual solder to training administrator. Virtual Simulation was employed by the combat maneuver arms where available. Constructive Simulation is widely used by companies and battalions and not often by platoons. The TADSS most often used at platoon level was the multiple integrated laser engagement system or MILES. MILES was not consistently employed in a manner that would ensure realism or objective casualty assessment. Unit Conduct of Fire Trainer (UCOFT) and Weaponeer are the simulators most often used. The Standard Army Training System (SATS) is used mostly to prepare training schedules, but the software is unfriendly and needs considerable revision to reach its full potential. TADSS information should be collected on a periodic basis by TRADOC using a modified set of these study procedures.

15. SUBJECT TERMS

Training Aids, Devices, Simulators, and Simulations (TADSS) Constructive Simulation Virtual Simulation
Multiple Integrated Laser Engagement System (MILES) Live Simulation

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Study Report 96-05

# Training Aids, Devices, Simulators, and Simulations Study

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## FOREWORD

The study was conducted at the request of Training and Doctrine Command (TRADOC) to find out how training aids, devices, simulators, and simulations (TADSS) are integrated into training, how the users perceive them, and how this information can be gathered periodically.

The study found strong command emphasis placed on TADSS training. The TADSS most frequently used was MILES. The study also found difficulties with TADSS use and problems with the Standard Army Training System (SATS). For example, the SATS is difficult to use; therefore, its full potential value was not realized.

Recommendations are provided to the Army Training Support Command (ATSC), TRADOC, on how to accomplish their goal of periodic data collection on TADSS.

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TRAINING AIDS, DEVICES, SIMULATORS, AND SIMULATIONS STUDY

## EXECUTIVE SUMMARY


Research Requirement:

The requirements for this study were: to identify how the available TADSS are integrated into training programs, to evaluate user perceptions of TADSS, and to provide recommendations for a procedure to periodically gather this information.

Procedure:

Soldiers and their superiors were interviewed at eight posts in the United States. Interview guides were developed, and interviews were conducted and transcribed with both units and students using TADSS and the offices providing the TADSS. A database was developed, and the information in the database was extracted and analyzed.

Findings:

TADSS are supported by strong command emphasis and are centrally controlled and managed on all posts. Constructive Simulation is widely used by companies and battalions and not often by platoons. Virtual Simulation or the use of the Simulation Network (SIMNET) is employed only by the combat arms units on the posts where it is available. The TADSS most often used at platoon level was the multiple integrated laser engagement system or MILES, and it was the TADSS most often mentioned by other echelons. MILES was **not** consistently employed in a manner that would ensure realism or objective casualty assessment. UCOFT and Weaponeer are the simulators most often used. The Standard Army Training System (SATS) is used mostly to prepare training schedules, but the software is unfriendly and needs considerable revision to reach its full potential.

Utilization of Findings:

The nature of MILES control problems should be investigated as to how rules of engagement are enforced at home station and at the Combat Training Centers (CTCs). SATS might be modified and improved as a means of periodically collecting TADSS information; however, extensive software development would be necessary first. TRADOC could conduct periodic interviews using a modified set of the procedures developed for this study as a means of collecting the TADSS information desired.

TRAINING AIDS, DEVICES, SIMULATORS, AND SIMULATIONS STUDY

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# TRAINING AIDS, DEVICES, SIMULATORS, AND SIMULATIONS STUDY

## Requirement

The requirements for this study were to identify how the available TADSS are integrated into the installation training programs, to evaluate user perceptions of TADSS, and to provide recommendations for a procedure to periodically gather this information.

## Method

The basic methodology consisted of conducting structured interviews at eight posts with: (a) the training resources offices, and (b) key individuals in TADSS usage chain. The structured interviews were used to assess perceptions from soldier through commander and the differences between them. In the case of soldier perceptions, they were assessed using group interviews. The data were then analyzed by compiling responses to interview questions into different categories.

The initial entry into the installation was coordinated through the installation operations director. Two researchers conducted taped interviews with selected individuals or groups. Following each visit taped interviews were transcribed.

To ensure that the participants and researchers were working on the same definition of TADSS, a description of TADSS was presented to the participants (Appendix A) with specific examples of each type of TADSS. The prime TADSS reference was the manual for battle focused training (Headquarters Department of the Army, 1990).

There were a number of problems experienced in the methodology (see Appendix B), which led to a simplification or to concentrating on selected specific TADSS for this report. Training aids and devices, or the TAD part of TADSS, have not changed substantially for many years and, although some detailed information was collected on the use of these TADSS, details on their use are not included in this study. Instead the study focused on simulations and simulators, or the SS part of TADSS, and the study includes the Standard Army Training System (SATS) because of the role it now plays or could play in the employment of TADSS.

In recent developments simulations have categorized into three types: Constructive Simulation, Virtual Simulation, and Live Simulation ("This Month's Cover," 1995). The term Constructive Simulation relates basically to war games, often assisted with computer models ("STOW--A Force XXI Building Block," 1995). Virtual Simulation makes use of simulators

linked together and opposed by a common computer-generated opposing force (OPFOR). The often used example of Virtual Simulation is the SIMulation NETwork or SIMNET ("STOW--A Force XXI Building Block," 1995). Live Simulations make use of soldiers in a field exercise where the simulated battles they engage in are made possible by the laser devices known as MILES. These exercises take place both at unit home stations and the Combat Training Centers ("STOW--A Force XXI Building Block," 1995). For ease of understanding, these simulation categories will be employed in reporting the findings of this study.

## Participants

There were approximately 176 participants in the study (see Table 1). The number of participants is approximate because the 22 soldier interviews were group interviews consisting of between four to ten individuals. The participants were from eight Army posts in the United States. Posts were selected to be generally representative of Army posts in the states, with three TRADOC posts (Forts Benning, Bliss, and Knox) and five FORSCOM (Forces Command) posts (Forts Campbell, Hood, Lewis, Riley, Stewart).

FORSCOM participants included: the Division G-3 (operations officer or his representative), a brigade S-3 (operations officer), three battalion commanders or their S-3s, three company commanders or their training officers, three platoon leaders and/or platoon sergeants. Also, these posts included: infantry, armor, cavalry, field artillery, engineer, military police, military intelligence, or support branches from the forward support battalion. On TRADOC posts students and instructors were selected from basic enlisted courses, basic officer courses, advanced officer courses. Other installation personnel sought for interviews included: Chief, Battle Simulation Center (or equivalent); Foreman, Training Aid Warehouse (or equivalent); and Foreman, MILES Warehouse (or equivalent).

## Analysis

Transcripts were organized by type of interview, responses to items, and by installation. In this form they were placed into a database. Interview guides transcribed by post are shown in Table 1.

# Findings

## Overview

Training aids and devices were most often housed by the post at a central location, usually the Training and Audiovisual Support Center (TASC), available on request on a first-come

Table 1

Interview Guide by Location Matrix with Count of Interviews Transcribed

| | Interview Guides | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location[a] | SATS | Division | Separate BDE | BDE | Battalion | Company | Platoon | Soldiers | Warehouse | MILES Sldr | MILES Leader | Simulation Center | Total |
| BENNING | 0 | 1 | 0 | 1 | 2 | 2 | 2 | 1 | 1 | 3 | 4 | 2 | 19 |
| BLISS | 0 | 0 | 2 | 0 | 5 | 5 | 7 | 4 | 1 | 5 | 9 | 0 | 38 |
| CAMPBELL | 6 | 1 | 0 | 1 | 6 | 7 | 6 | 6 | 2 | 7 | 10 | 2 | 54 |
| HOOD | 0 | 1 | 0 | 2 | 6 | 8 | 6 | 2 | 2 | 5 | 11 | 1 | 44 |
| KNOX | 0 | 1 | 0 | 3 | 8 | 8 | 8 | 5 | 2 | 7 | 13 | 1 | 56 |
| LEWIS | 0 | 0 | 2 | 0 | 7 | 3 | 2 | 2 | 2 | 0 | 3 | 1 | 22 |
| RILEY | 0 | 0 | 1 | 0 | 3 | 4 | 4 | 2 | 1 | 3 | 5 | 1 | 24 |
| STEWART | 0 | 0 | 0 | 0 | 4 | 4 | 1 | 0 | 1 | 2 | 5 | 0 | 17 |
| Totals | 6[b] | 4 | 5 | 7 | 41 | 41 | 36 | 22 | 12 | 32[b] | 60[b] | 8 | 274[b] |

Note. Interview Guide abbreviations are as follows: SATS = Standard Army Training System Interview Guide (InGu) [Employed only at Fort Campbell; Integrated into other guides thereafter]; BDE = Brigade InGu; MILES (or multiple integrated laser engagement system) Sldr (Soldier) InGu.

[a]Locations are posts in the continental United States, i.e., BENNING = Fort Benning, Georgia.

[b]Total Participants for the study was approximately 176. The SATS and MILES InGu were answered by other participants in the study, therefore, these totals should be subtracted from the total Interview Guides to estimate Participants (274-[6+32+60]=176). The total is approximate because the soldier interviews were group interviews consisting of between four to ten individuals.

first-served basis. Simulators and simulations (the SS in TADSS) were usually controlled at a In the case of simulators, if there were larger numbers, they were spaced out on post with the prime users and controlled by those users. Constructive and Live Simulations were centrally located and managed in a simulation center. Live Simulation was conducted in a decentralized manner, but the key devices (MILES) were centrally controlled and issued at a MILES Warehouse.

A question was asked of the users about command emphasis on TADSS (see Table 2). A clear emphasis on TADSS by installation commanders emerges.

Table 2

Percentage of Answers by Echelon to the Question: Is there a command emphasis on TADSS at this installation?

| Echelon | Yes | No | No Response |
|---|---|---|---|
| Platoon (N=36) | 69 | 19 | 11 |
| Company (N=41) | 83 | 0 | 17 |
| Battalion (N=41) | 83 | 5 | 12 |
| Brigade Plus[a] (N=16) | 81 | 6 | 13 |

Note. All responses do not add to 100 percent due to rounding errors.

[a]Brigade Plus includes Brigade, Separate Brigade, and Division.

The remainder of the Findings Section is organized into five parts: the three categories of simulation (constructive, virtual, and live), simulators, and SATS.

## Constructive Simulation

When respondents in this study were asked if they had participated in a simulation, they responded by stating a specific Constructive Simulation (BBS, First Battle, JANUS, Warfighter, Eagle Talon II, etc.), SIMNET (Virtual Simulation), MILES (Live Simulation), or the UCOFT or Weaponeer simulators. The latter two are not technically simulations, but at least some of the respondents had difficulty making the distinction between simulations and simulators.

From Table 3, we can see that Constructive Simulation is widely used by companies and battalions for training, with the response rate for use by these echelons at more than half. Since the nature of the training with Constructive Simulation is focused primarily on command and control, it is not surprising that the smaller platoon echelon rarely reported participation in Constructive Simulation. Basically, companies and battalions participate in Constructive Simulation, while platoons seldom do. The high No or No Response rate for platoons was, in the opinion of the author, related to the low use of constructive simulation by platoons.

Table 3

Percentage of Answers by Echelon on Simulations Utilized

| Echelon | Constructive Simulation | SIMNET | MILES | UCOFT Weaponeer | No or No Response[a] |
|---|---|---|---|---|---|
| Platoon (N=36) | 13 | 7 | 6 | 3 | 72 |
| Company (N=41) | 59 | 4 | 1 | 5 | 32 |
| Battalion (N=41) | 52 | 9 | 1 | 6 | 32 |

Note. All responses do not add to 100 percent due to rounding errors.

[a]It was not possible to determine "No" and "No Response" from the transcripts, and for this reason both are included in this category. Further, there were methodological problems that probably led to the high no response rate, see Appendix B.

## Virtual Simulation

The SIMNET or Virtual Simulation participation recorded in Table 3 may be a little misleading. SIMNET was available only at three posts visited: Forts Knox, Stewart, and Benning. Soldiers at Fort Riley participated in SIMNET by traveling to Fort Knox. The soldiers available for interview at Fort Benning did not include any of the FORSCOM tactical units, and as a result no SIMNET use was reported in the sample from Fort Benning.

Considering only the three posts making use of SIMNET (Forts Knox, Stewart, and Riley), its use was reported 46 percent of the time by combat arms maneuver branches (armor and infantry; N=17) and none by all other branches (N=27). Availability of specific TADSS and their branch relevance are apparent variables related to TADSS usage.

Live Simulation

MILES was centrally located in a MILES warehouse or warehouses on all posts visited. Each post had detailed procedures to account for the MILES, package it, issue it, and turn it in. Although the posts were familiar with the MILES Army-wide Training System (MATS), it was used as the primary system on only two posts.

MILES needs to be employed in a manner that ensures realism or objective casualty assessment (Fobes, Roberts-Gray, Ritenour, 1986). Not to do so invites all the problems experienced by youth playing war with no "gotcha" (Bang! Bang! You're dead!; No, I'm not!). Soldiers and their leaders differed widely in their views on MILES usage, especially in the degree to which realism or objective casualty assessment was maintained during MILES exercises.

The interview answers relating to MILES usage constituted the greatest perceptual differences between soldiers and their superior non-commissioned and commissioned officers. By a small majority, the leaders are of the opinion that there is not a problem with MILES availability. Soldiers by a larger majority are convinced that MILES availability is a problem, see Table 4.

The author feels that while leaders believe that sufficient MILES devices are available for training, soldiers know that individual sets of equipment are missing for a specific exercise and compromises are made. These compromises often lead to degraded realism, and with that degradation is a diminished motivation of soldiers.

In order to realistically or objectively assess casualties during live simulation on both sides, it is imperative that the MILES devices are aligned (zeroed and test fired). Leaders and soldiers were asked about the alignment of MILES transmitters on individual weapons, tank weapons, tracks? Most of the leaders responded that some form of alignment method was accomplished a large proportion of the time (Table 5). However, soldier responses related to zeroing indicated that although it occurred more often than not, it was in a much lower proportion of the time than perceived by their leaders.

Table 4

Percentage of Answers Acknowledging MILES Equipment Shortages by Soldiers and Their Leaders

| Organizational Position | No or Little Problem of Shortage | Problem Acknowledged |
|---|---|---|
| Leader (N=50) | 54 | 46 |
| Soldier (N=23) | 26 | 74 |

Table 5

Percentage of Leader and Soldier Answers Related to Zeroing [Aligning] Weapons

| Organizational Position | Weapons Zeroed | Weapons NOT Zeroed |
|---|---|---|
| Leader (N=43) | 91 | 9 |
| Soldier (N=14) | 57 | 43 |

While leader and soldier answers are in agreement that zeroing takes place, there is still a large difference between them. Further, when soldiers (N = 14) were asked: Have you ever trained in the field with MILES when you didn't zero your [weapon], 80 percent said yes and 20 percent said no. Soldier perception then is that MILES zeroing generally takes place, but a large majority of soldiers have experienced a situation when they did not zero. MILES training is, thus, very similar to the way MILES was first employed over a decade ago (Roberts-Gray, Nichols & Gray, 1984).

In a review of Interview Guide questions related to TADSS management from Division to individual soldier level, the most frequently mentioned TADSS was MILES. At brigade through division echelons, MILES was mentioned as often as UCOFT, and more frequently than the constructive Simulation of JANUS and BBS. At the platoon level, MILES was mentioned more often than any other TADSS by a wide margin.

At the soldier level, MILES was the TADSS most frequently commented about, but in more than half the cases it was cast in a

negative light with soldiers making derogatory comments about MILES. For example, soldiers stated: "MILES is not realistic because there are so many ways to beat it." "I don't like MILES because it's too heavy and too awkward...doesn't stay on you right. The helmet pieces are always falling off all the time." "Concealment becomes cover, you can fire without firing your weapon, not too accurate."

The apparent disagreement between the high frequency of mentioning MILES in the TADSS management questions and the low frequency reflected in Table 3 relates to the nature of the questions. Recall that the responses in Table 3 were made when the soldiers were asked if they had participated in a simulation. Most responded about participation in Constructive Simulation and platoon respondents had "No or No Response" a high proportion of the time. In all probability that high platoon no or no response rate is related to low platoon participation in Constructive Simulation.

A count of different TADSS mentioned in all platoon responses are shown in Table 6. MILES was the TADSS most often used by platoons, and most often mentioned by other echelons.

Table 6

Frequency of TADSS Mentioned by Platoon Participants (N=36) when Asked about TADSS Training in the Past Year

| TADSS Mentioned | Frequency |
|---|---|
| MILES | 19 |
| Weaponeer | 8 |
| Mines | 8 |
| UCOFT | 4 |
| SIMNET | 3 |
| BBS | 1 |

The author, very familiar with MILES, asked additional questions of soldiers related to MILES use. Although there were many practices reported by soldiers that would lead to degraded realism and poor casualty assessment, most of those practices were reported as a part of home station training. When specifically asked about objective casualty assessment at the Combat Training Centers (CTCs), few soldiers reported any serious problems. In the opinion of this researcher, the biggest problem

is degraded realism at home station through a lack of objective casualty assessment and enforcement of the Rules of Engagement by leaders charged with this responsibility. This problem was first reported in 1984 (Roberts-Gray, Nichols & Gray). The reported discrepancy between soldier and leader views of MILES availability and alignment practices points to a continuing problem.

Simulators

Simulators include approximations of weapons and crew stations of major systems, such as aircraft and tanks. UCOFT and Weaponeer were the two most frequently recorded responses in the posts visited. The UCOFT represents the gunner and tank commander positions in a tank and provides a computer-generated display of terrain and potential enemy targets. Weaponeer is a representation of a rifle and targets. It is an instructional aid in preliminary rifle marksmanship.

Table 7 provides the findings of this study as related to the use of these two high-use simulators by tactical units from platoon to battalion. The Weaponeer has the highest use rate in all units interviewed. However, the UCOFT is peculiar to the maneuver arms, and is available primarily to tank and mechanized infantry units. Review of the UCOFT data verified that FORSCOM units using the UCOFT were armor or mechanized infantry with one exception (an air defense artillery battery at Fort Stewart, Georgia). The TRADOC use of UCOFT was all at Fort Knox, Kentucky, the home of Armor Branch.

The Weaponeer was reported by respondents to be especially helpful in training those experiencing difficulty in basic rifle marksmanship. However, it is the author's opinion that training with this simulator is related to the idiosyncrasies of the individuals responsible for the training. Only in organizations responsible for basic training does there seem to be any consistency in using the Weaponeer for remedial marksmanship training.

Standard Army Training System

Battalion commanders and/or their training officers answered questions related to SATS usage; the results are summarized in Table 8. "No Response" was the most frequent transcript answer on the use of SATS, see Appendix B. Planning and Scheduling was at a relatively higher rate of SATS use. During the course of the interviews, it became apparent to the author that SATS is used primarily as a format for training schedules, it is not particularly user friendly, and users prefer a commercial system for most training software. It is for this reason, in the author's opinion, SATS was rarely used to develop METL or training assessment.

Table 7

Percentage of Affirmative Answers by Echelon to the Question: Do you use UCOFT/Weaponeer in your training?

| Echelon | Weaponeer | UCOFT[a] | Unknown[b] | No Response |
|---|---|---|---|---|
| Platoon (N=27) | 50 | 13 | 22 | 11[c] |
| Company (N=31) | 66 | 15 | 3 | 16 |
| Battalion (N=29) | 50 | 22 | 14 | 14 |

[a]UCOFT is peculiar to the maneuver arms, and since the interview population included branches other than the maneuver arms, the relatively lower use rate is due primarily to this factor.

[b]With open-ended responses transcribed, in some cases neither Weaponeer nor UCOFT were mentioned, so the category is unknown.

[c]One negative response; Total does not sum to 100 percent.

How often SATS was used by battalions is recorded in Table 9. As with SATS usage, the most frequently recorded answer on SATS frequency of use was No Response. SATS was used both every day and weekly with some frequency. However, the author believes that this finding is probably reflective of units being directed to have training schedules in the SATS format.

Table 8

Percentage of Answers to a SATS Use Question

| Question: How do you use SATS in this office? Do you use [SATS] in... (N=28) | Yes | No | Other[a] | No Response[b] |
|---|---|---|---|---|
| Developing METLs[c] | 7 | 32 | 18 | 43 |
| Planning and Scheduling | 43 | 11 | 14 | 32 |
| Managing Resources | 21 | 14 | 7 | 57 |
| Executing and training assessment | 4 | 29 | 7 | 61 |
| Coordinating | 11 | 18 | 14 | 57 |

Note. All responses do not add to 100 percent due to rounding errors.

[a]Open-ended transcript responses that were neither Yes nor No.

[b]Very high "No Response" is probably due in part to a methodological problem, see Appendix B.

[c]Mission Essential Task Lists.

Table 9

Percentage of Answers to a Frequency of SATS Use Question

| Question: How often do you use the system? Do you use [SATS] (N=28) | Percent |
|---|---|
| Routinely, every day | 16 |
| Weekly | 20 |
| Less often | 14 |
| No Response | 50 |

## Conclusions and Recommendations

### Conclusions

TADSS were centrally controlled and managed at all the posts visited. There was strong command emphasis on using TADSS at these posts. These findings indicate that TADSS was well integrated into the training program of the post.

Constructive Simulation was widely used at battalion and company level, while it was seldom used by platoons. Virtual Simulation was employed by the combat maneuver arms when available.

Soldier perceptions are that MILES is the most widely used TADSS, but often fails to meet the minimum requirements of realism during Live Simulation exercises. Soldiers are particularly critical of MILES and its employment at home stations. From additional questions asked by the author, it seems that leaders at home station were willing at times to compromise realism when equipment was not available. The leaders also did not consistently require zeroing of the MILES equipment. These practices led to degraded realism and with it degraded motivation. It is the author's opinion that these problems exist at home station because leaders are not adequately trained in the duties of Observer/Controllers (O/Cs).

The method of MILES control, issue, turn-in, and maintenance varies considerably from post to post, but is accomplished consistently. The main complaint with the MILES Army-wide Training System (MATS) was the time consuming bar-code reading required by the system. Although bar-code reading would seem to have the potential for reducing the time required, not all passes are read by the bar-code reader and two passes are required when using the MATS.

Next to MILES, the Weaponeer was perceived to be the most widely used TADSS. However, utilization for remedial marksmanship training varied considerably by organizations responsible for training.

The SATS computer software is used on a fairly regular basis, but mostly for planning and scheduling. It is the of the opinion of the author that SATS use for training schedules is primarily dictated required by regulation, but SATS suffers from the fact that it is not user friendly. It is the author's contention that although the government software contractor may meet the minimal requirements (the software does what it is required to do), it does so in a convoluted manner from the user point of view. There is no competitor producing a similar product for the government that is easier to use and presents a

more pleasing appearance. However, there are commercial products that do this, and they are preferred by the government users.

This study conducted is of value to FORSCOM units when using Live Simulation. Objective casualty assessment and realism are degraded by the practices followed by units in conducting MILES exercises. These same problems do not appear to be a problem at the Combat Training Centers (CTCs). If FORSCOM units adopted more completely the CTC practices, it seems likely that realism would be enhanced rather than degraded.

TRADOC could benefit from this study by providing further guidance or lessons learned documents on how to conduct effective objective casualty assessment at home station. TRADOC could also support or conduct further studies related to the effect of improving home station training on CTC unit performance.

## Recommendations

There would be considerable benefit in reviewing the nature of objective casualty assessment in Live Simulation as it is conducted at the Combat Training Centers and at home stations. If such a study were conducted, it could point to improved O/C training and exercise support as carried out at home station.

Since MILES is the basis of Live Simulation, the most widely used TADSS, and the cornerstone of training at the CTCs, any action implemented to improve Live Simulation training could have Army-wide influence on combat readiness. It is therefore recommended that the proposed study of Live Simulation be carried out and the findings implemented.

It is recommended that a more explicit policy be prescribed for simulator use in the Army. Both the UCOFT and Weaponeer are used by units, but the use seems to be highly dependent upon the idiosyncrasies of the using organization. Weaponeer appears to be very useful for remedial rifle marksmanship, a specified policy statement for its use with those failing to qualify in rifle marksmanship seems appropriate. By the same token, UCOFT use at the higher levels of reticle aim has been shown to have a positive effect on crew performance at the National Training Center (Keesling, Ford, and Harrison, 1994); it seems reasonable that a policy on reticle aim attainment by gunner-vehicle commander pairs would be a reasonable way to increase the effectiveness of this member of the TADSS family.

The Standard Army Training System (SATS) has computer software designed to assist unit trainers in planning and carrying out their training program. As such, it could be utilized to document in the training schedules the TADSS that need to be included for training. The portions of SATS that deal

with resources and the execution of training could include guidance about the use of specific TADSS, such as those recommendations included above. There is a tremendous potential for employing SATS as a training management tool to improve Army training.

SATS also has the potential to aid in collecting TADSS information on a periodic basis. In the opinion of the researchers conducting this study, there is no existing mechanism that could be easily tapped for this objective. A modified form of SATS might be adapted to assist in this processes. However, if this approach is taken, there needs to be a proactive software revision cycle to make sure the product is user friendly and meets user requirements (actions not typical of government software contracts).

Another potential for periodical collection of TADSS information would be the procedures developed for this study. The interview guides developed have been pilot tested. Face-to-face interviews are necessary to gain accurate information on user perceptions, even the modified SATS would be a self-report subject to protective results. The procedures developed in this study included interview procedures with the recording of responses, preparation of transcripts, and development of a database with quires for handling results. The final recommendation of this study is that those having a need for TADSS utilization adopt these procedures.

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# APPENDIX A

## Description of Training Aids, Devices, Simulators, and Simulations as Given to Participants

Training Aids, includes VISMOD sets, Graphic Training Aids (GTAs), models, displays, slides, pictures, Training Films (TFs)

Training Devices, includes practice mines, suitcase Saggers, MILES, practice grenades

Simulators, includes COFT for M1 Tank and BFV, Flight Simulator, Weaponeer, SIMNET

Simulations, includes Tanker, FB:BC, ARTBASS, BBS

APPENDIX B
Methodological Problems in the Study

## Pilot Test

It was not possible, in the time available for the study, to pilot test either the procedures or the interview guides before the study began. In view of these constraints, it was decided to use the first three sites as a test of procedures and interview guides. After the first three data collection visits, additional questions were added to interview guides and some were modified. The SATS questions were integrated with other guides.

Under these circumstances, there is some lack of continuity between the two periods of data collection. Similar but different questions may elicit differing responses. Answers to additional questions developed are not available for the entire population of the study.

## Interview Guide Transcription

To speed the data recording and analysis process, it was decided to contract for transcription of the interview guide tapes. These transcripts were recorded in the Word Perfect 5.1 records for later analysis. However, due to the continuing need to conduct additional visits and interviews, the transcription task was inadequately supervised.

The transcribers found many tapes or parts of tapes inaudible. Some tapes were either blank or portions of the tapes were blank [perhaps due to using the play instead of record button on the recorder]. From the nature of responses, interviewers may have made the decision to skip portions of the interview guide. Prompt review of tapes may have alleviated problems of this nature, but it did not occur in a consistent manner.

## Data Reduction and Analysis

When the visits were complete, the research staff was reduced and the transcription contract was complete. The primary researcher suffered a heart attack, and the responsibility for the report was shifted to another researcher. Although some clerical assistance was available, it was also reduced. The physical interview guides and tapes were in one location, and the transcript database was available at two locations. It was decided to work with the transcribed database, even though it was incomplete.

Data were reduced from the transcribed database for analysis. It was decided to focus on Simulations and Simulators

and the Standard Army Training System (SATS). Due to incomplete transcription, the "No Response" rate was high. The "No Response" category was a case of no transcribed response available in the database. The "No Response" may be due to failure of the interviewer to ask the question, inaudible response not recorded, or failure of the participant to respond. It may be, in some cases, that the answer was essentially understood by interviewer and interviewee to be "no" or "not applicable," but no such answer was recorded for the record. In many cases the taped interviews were inaudible and the interviewer had no notes. These were eliminated from the analysis.

Although the database was incomplete and the staff was reduced, there was still a need to complete the report. A strategy was adopted to select interview guide areas most relevant to the training community needs as perceived and to accept the incomplete database.

Methodological Lessons Learned

The author's experiences suggest that interview-based survey research be postponed or canceled unless some minimal requirements are met. These include:

o Availability of professional quality recording equipment. Use of such equipment should be supplemented by note taking.

o Well designed interview instructions and guidelines with follow-up and probe questions, so that check-list responses can be interpreted and explained.

o Training and rehearsal of interviewers in use of equipment and interviewing techniques. Operational and sound checking should be included in the training. Interviewers need especially to be trained to spot responses that are inaudible, unintelligible, or irrelevant and take corrective action.

o Pilot testing of interviewing, transcription, and data analysis. Pilot-test data should be reported separately, if at all.

o Prompt review of tapes and transcriptions by principal investigator (PI) to determine quality of data. With minimal delay, the PI or interviewer should 'scrub' transcriptions.

Consider purchasing professional, experienced interview service, as an alternative to training in-house personnel.