# Rapid Training Development Tools for Operational Units

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## ABSTRACT

As an organization that promotes training and education, the U.S. Army strives to ensure that its Soldiers are constantly improving performance throughout their careers. The fundamental experience for a Soldier is an operational assignment. Army units, however, are facing a growing challenge in planning, developing, and implementing training needed for full spectrum readiness in the contemporary operational environment while still maintaining core competencies. The rate of change in the modern operational environment requires U.S. Army trainers to deliver effective training in less time than ever before. Research and development to support Soldier training therefore must explore not only advanced learning environments and instructional strategies but also advanced training-development processes. Advanced training-development processes may enable the rapid generation of training activities that are responsive to immediate training needs. Thus, research and development was initiated to create a "one stop" solution to enable the creation, delivery, and management of web-enabled multimedia training exercises.

This paper presents an overview of the Army training and education process; describes methods for relieving the constraints on rapid, contextualized training development; presents behavioral research to examine the target user characteristics and likely user environment; and discusses the development of structured training templates, generic base content, and tools to increase the speed with which unit trainers can create quality training products. Further, the development and evaluation of a flexible training development tool is presented. Evaluation of the tool was conducted using Soldiers from Fort Hood and Fort Carson. Results from the evaluation were favorable, indicating that trainers would use the tool to rapidly develop interactive multimedia exercises for individuals and small groups, and suggest that the tool will support the creation of training exercises for a wide variety of critical task, skills, and behaviors. In addition, research on other initiatives to develop rapid training development tools will be introduced and discussed.

## ABOUT THE AUTHORS

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## INTRODUCTION

The rate of change in the modern operational environment requires U.S. Army trainers to deliver effective training in less time than ever before. Among the changing environmental conditions are enemy tactics, new vehicles and equipment, updated command, control, and communications systems, unit composition, and even unit structure. Each of those changes produce new requirements for training, such that knowledge acquired from the operational environment can be transformed into skilled, automatized behavior (Shadrick, Lussier, & Fultz, 2007). Growth in training requirements outpaces formal educational milestones, which provide structured education but which also occurs only a handful of times in a Soldier's career. For Soldiers, most learning occurs on the job and is specific to the unit in which the Soldier is operating, so trainers keeping pace with environmental change must be able to quickly develop tailored training in order to foster human capital in their unit.

There are, however, individual differences in trainers' abilities to design and produce effective training. First, trainers themselves are often unfamiliar with the content to be trained. This situation is common as Soldiers take on tasks that traditionally have fallen outside of their functional area (Gerber, 2007) or tasks that are new to the Army altogether (e.g., U.S. Center for Army Lessons Learned, 2007). Second, many trainers are unfamiliar with the principles of effective instructional design, having not had formal training in this area. Indeed, the doctrine-endorsed instructional strategy to "train-as-you-fight" (e.g., U.S. Department of the Army, 2003a), adopted by most trainers, contrasts with best practice in skill development as identified by scientific research. That research has shown that experiential learning is not sufficient for optimizing skill development, but that deliberate practice (i.e., structured, coached exercise on specific, challenging learning objectives with performance assessment and feedback; Ericsson, Krampe, & Tesch-Röemer, 1993) is required (Shadrick et al., 2007).
There are other challenges facing trainers who take the initiative to create training for emerging skill areas. Chiefly, trainers often are unaware of the resources available to build training content (or how to quickly find them) because these resources are widely distributed. These resources include the Center for Army Lessons Learned (CALL), Battle Command Knowledge System (BCKS) professional forums, Army Knowledge Online (AKO), the Reimer Digital Library (RDL), the Combined Arms Research Library (CARL), and unit networks, and the Army Training Network, to name a few. Limited time prevents an in-depth search of this information. The same time constraints limit trainers' ability to modify the information for specific unit training purposes.

Therefore, research to support training development must explore not only advanced learning environments and instructional strategies but also advanced *training development processes* that may enable the rapid generation of training that is responsive to immediate unit training needs. This paper documents a series of research and development efforts to produce an integrated platform of technologies support a "one-stop" creation, delivery, and management of Web-enabled multimedia training exercises. The paper begins by summarizing the research and development efforts, followed by evaluative information. Finally, additional efforts to produce a rapid training development methodology for operational unit training needs are discussed.

### Initial Concepts and Research

Initial research was conducted to analyze the Army training process to identify methods for relieving the constraints on rapid, contextualized training development, and to translate those methods into a prototype "Training Assistant" (TA) capability. The Initial objectives were to:

- Determine the *design requirements* for an Internet-enabled TA that supports the rapid development of contextualized training, to include identifying the (a) mission tasks and training objectives, activities, and format to be supported; (b) user interaction with the tool for generating structured training; (c) integration of generic content and operational

digital products into the training development process; (d) format of tool output; and (e) other features to enhance usability and acceptance.
- Determine the *technical requirements for building the TA architecture*, to include identifying the (a) search-and-retrieval functions to access operational database resources; and (b) communication modules necessary to enable the tool to communicate with multiple operational databases.
- Determine the *technical requirements for developing the TA front-end*, to include the order and links among Web pages to structure user interaction and generation of output.
- Determine the *feasibility of a full-scale TA capability* based on the initial research and development, to include identifying (a) challenges to full-scale development; (b) barriers to full-scale implementation; and (c) areas of greatest potential impact of the full-scale capability and their implications for managing tool development.

The analysis consisted of a review of relevant doctrine (U.S. Department of the Army, 1984, 2002a, 2002b; 2003a, 2003b; U.S. Training & Doctrine Command, 1999, 2004), literature reviews, interviews of unit trainers, observations of pre-deployment training, and the application of in-house subject matter expertise.

The literature review included scholarly and technical literature regarding interactive multimedia instruction design, evaluation, and authoring (e.g., Hays, Stout, & Ryan-Jones, 2005; Herrington & Oliver, 1995; Lee & Boling, 1999; Park & Hannafin, 1993). The intent of this literature review is to capture the human factors issues that were taken into consideration when designing the TA, including interface features, training performance assessment, and promotion of trainee engagement in higher-order thinking.

Interviewees included an infantry battalion commander recently returned from deployment, Army instructors located at Fort Leavenworth, KS, and training mentors at the National Training Center at Fort Irwin, CA, 14 archived interviews with veterans of Operation Iraqi Freedom; two focus groups conducted with 20 Soldiers of the prior to their deployment to Iraq; and interviews with 10 observer/controllers at the Joint Readiness Training Center (JRTC) at Fort Polk, LA. The majority of the interviewees and focus group members (33/44) were enlisted Soldiers ranging from specialist to command sergeant major. The remaining interviews (11/44) were conducted with platoon leaders (lieutenants) and company commanders (captains). Interviewees and focus group members were armor, cavalry, infantry, military police, and field artillery Soldiers.

Results from those interviews suggested that the TA concept has great potential for saving time, increasing productivity, and improving training. A full-scale capability enabling the development of several collective exercises and individual, small-group training activities would have broad impact. Additional findings from those interviews, using a prototype TA system for experimentation and user input, led to additional objectives for research and development. Those objectives were to:

- Determine the architecture required for the TA to enable the development and use of interactive multimedia instruction that addresses rapidly changing conditions.
- Determine the algorithms necessary to develop an Internet crawler that enables the population of a self-updating, adaptable working operational database using products from unit databases.
- Determine the algorithms necessary to limit the searchable space of the working operational database based on individual user preferences.
- Develop the architecture and crawler/search algorithms, implement these components in a coherent whole system
- Test and evaluate the system functionality.

**Unit Trainers**

A review of the Army training process revealed that the "unit trainer" can be conceived broadly to include tactical unit commanders, operations staff officers, non-commissioned officers, schoolhouse instructors, and civilian contractors, among others.

**Training Activities**

Unit trainers directly involved in unit readiness generate a variety of training activities that fall into one or more of three categories of training: individual, collective, and leader. The unit trainer's selection of a particular training activity depends on who is being trained and the resources available to conduct training. Conducting training in this way is consistent with the Army's crawl, walk, run progression of training difficulty, with the expectation that trainees would be challenged at a level that optimizes the trade-off between resource expenditure and training benefit.

A TA designed to rapidly developing training for any activity requires one of two possible functionalities. First, the TA must allow unit trainers to create new training from scratch, assembling novel and existing materials to create a variety of training activities. Second, the TA must allow unit trainers to modify

existing training that has been developed by others who have used the TA to create their own new training. This second functionality helps trainers avoid duplication of effort by making the efforts of others easy to access and build upon (Kilner, 2002). Figure 1 depicts the training activities supported in the initial TA concept.

**The Conduct of Training**

Training may be conducted in a variety of ways, with differing implications for what unit trainers must develop to conduct a particular training activity. Individual training often is administered in the form of a computer-based training package, which can be delivered via the Web or on a compact disc, seminar/lectures, and training on individual practical skills. Collective training may be conducted as live exercises, computer-simulated exercises, tabletop exercises, or as simple thought exercises. In any case, the unit trainer must develop background materials to set the conditions for the exercise and to situate the trainees.

The TA concept was designed to produce a different output, depending on the training activity and format selected. Output ranges from printable background materials to seminar/lecture presentation materials, to interactive computer-based exercises. For easy access, all output can be in the form of Web pages. These could be printed, presented, shared, and viewed simultaneously without specialized software. The Internet format of the output allows trainers and trainees alike to access the content from any computer that has Internet access, even when deployed.

**Doctrinal Support for Training**

Unit trainers generally attempt to make their training as doctrinally sound as possible. The Army supports their efforts by providing numerous resources for planning, conducting, and assessing training activities. The length and quantity of doctrinal training manuals slows down the training development process because substantial time is required to locate appropriate manuals and implement their guidance in training exercises. Moreover, many training developers may be unaware that doctrinal support exists and therefore do not seek it out. Currently, there is no simple way for unit trainers to locate *segments* of doctrine for relevant training guidance, although searching for entire manuals is relatively straightforward. Many doctrinal manuals, including training publications, are well over 200 pages long, requiring non-trivial download times and significant review time to locate topics of interest.

Interview findings indicated that the TA could significantly enhance the training development process by making doctrinal resources readily available via a centralized source and in a format that enables easy insertion into training activities. The selection of a training activity by the unit trainer determines could guide set of queries to support the development of training materials for that activity. Through this interaction with the TA, the trainer provides training content to the system for assembly into a complete set of training materials, including the content of the training activity itself as well as performance assessment criteria and feedback or after action review (AAR) materials, where applicable. The TA concept also provides content for the trainer. This content is based directly or indirectly on doctrinal resources and is relatively generic and modifiable to ease the training development process.

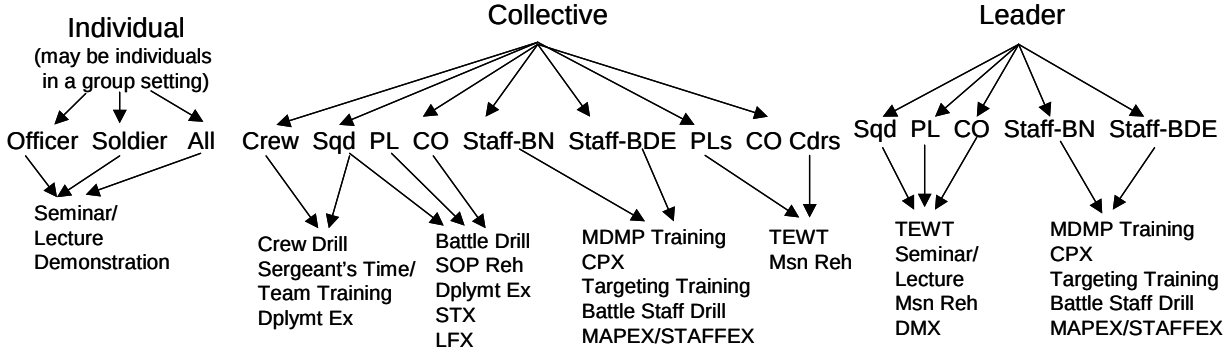


**Figure 1. Training Activities Supported in the TA Concept.**

**Operational Databases and Training**

Unit trainers contextualize training by matching the conditions and (to some extent) the standards used in a training activity to those conditions and performance requirements expected to characterize a particular operational setting. There are two ways in which resources from operational databases can be used to provide context for training. First, elements in a database can be embedded directly into the training activities themselves. Training developers at the Fort Lewis (WA) Battle Command Training Center use this approach to integrate theater conditions and lessons learned directly into the training for units preparing to deploy (Jean, 2005).

Second, multiple elements in an operational database, such as informal documents and text messages, can be synthesized to inform the development of training conditions and standards for mission tasks that are not well established in doctrine (i.e., new techniques and procedures). Synthesized operational database material may also be used to customize the conditions for established mission tasks, but in a more indirect way. Training developers at the National Training Center adopt this second approach. They use lessons learned from theater to determine opposing force tactics, civilian behaviors, and urban terrain characteristics that form the learning environment.

In order to support the development of contextualized training, therefore, the TA must enable users to embed operational products within a training activity and must provide easy access to the other materials available in the operational database for review and synthesis. Because a single operational database does not yet exist, the TA concept capability was designed to communicate flexibly with different databases so that it can be implemented easily in a variety of locations. As TA queries request content from the user, the user may provide content by selecting digital products that are then embedded into the training.

**When the TA Will Be Used**

Trainers can use the TA to develop, use, or adapt exercises in response to a recognized training or educational need. Triggers for this need will include (1) changes in the operational environment; (2) receipt of a mission; (3) unit or individual performance deficits (e.g., as revealed by an after-action reviews); (4) gaps between unit skill sets and mission requirements; (5) the need to illustrate an instructional point; and (6) recognition that training will boost morale and cohesion in the operational environment.

Several types of changes in the operational environment may trigger a training requirement. Those most frequently occurring changes include:

- Changes in enemy tactics due to the adaptability of a thinking enemy or changes in the enemy itself [e.g., changes in IED employment methods (including location, time of day, delivery and/or triggering mechanism, strength, etc.), changes in IED technology].
- Changes to task type due to a greater demand for certain skill sets than are present in a particular task organization, requiring the development of established skill sets in novel functional areas (e.g., infantry Soldiers doing military police or medic tasks, field artillery or engineers doing infantry tasks, etc.).
- Changes in mission type due to adaptive, last-minute changes given by higher, last-minute notification of mission, and sudden changes in the operational environment (e.g., enemy contact in the context of security or reconstruction missions or public affairs reaction in the context of combat missions, etc.).
- Changes in the equipment used to perform mission tasks due to the receipt of new equipment in the field.
- Changes in personnel in the unit due to adaptive, last-minute task organizations or personnel arrangements, the execution of combat missions while some personnel are on leave, or casualties.
- Changes in coordination requirements due to joint operations with host nation security or military forces, with sister service units (e.g., Marines), and/or with allied forces.

## General Overview of Training Assistant

Several principles exist to support the design of interactive computer-based instruction that were applied to the TA authoring output. The principles address interface characteristics to enhance usability, utility, and attractiveness and instructional design features that promote self-directed learning, reflective practice, collaboration, and retention. The key elements of TA training products therefore include (a) advanced organization of instructional content (including learning objectives, overview of the training product, etc.); (b) a doctrine-based tutorial on the basic training/educational concepts; (c) expert perspectives on the learning topic; (d) alternative approaches to executing the task to be learned (i.e., demonstrations of the task to be trained under varying conditions); (e) a summary of the learning material presented in the tutorial, expert

perspectives, and alternative approaches; and (f) an interactive practical exercise (or set of exercises) for the learner to conduct for practice, assessment, and feedback (Hays et al., 2005; Herrington & Oliver, 1995; Park & Hannafin, 1993).

The TA helps trainers address a subset of the training needs most frequently identified by deployed or recently deployed leaders and Soldiers engaged in full-spectrum operations. Although the TA would be useful for enhancing particular skills in specific contexts (e.g., identify the location of enemy snipers during a dismounted patrol) or coordinating collective activity (e.g., as in mission rehearsal or synchronization training) the ideal use of the TA is for developing adaptive responses to sudden changes in the operational environment during the execution of a variety of mission tasks, including high-intensity conflict. The TA is useful for developing adaptive responding because its design enables trainers to create exercises that require the same skill sets under a variety of conditions. That use of the TA leverages its technological capabilities to accomplish learning outcomes that are more difficult or impossible to achieve using other means.

The TA is not be used to address the subset of common training needs that are either better trained using accessible, higher-fidelity simulation (e.g., small arms marksmanship) or that are already addressed via interactive multimedia instruction used in Army distributed learning (e.g., equipment simulations). The top-level categories of skills that should addressed by the TA include, (a) adaptive thinking/contingency planning, (b) application of rules of engagement and rules of interaction, (c) communications skills, (d) information management, (e) interpersonal/cultural skills, (f) medical skills, (g) procedural skills, (h) rapid reaction to enemy contact, (i) synchronization and coordination, (j) tactical decision making, (k) tactical perception, (l) various mission tasks (as in mission preparation or rehearsal), and (m) visual communications skills.

**Creating Practical Exercises**

The focus of the TA training authoring function was on the development of scenario-based practical exercises. Two major components of practical exercises must be authored–scenario content and interactivity. The TA allows scenario content to be authored using an interface in which trainers can insert text, photos, video, and audio to create a dynamic presentation. Addition and modification of training content is achieved via direct manipulation so that trainers may see the immediate effect of their actions on the training product. This component of the authoring capability enables trainers to decide the degree of technical sophistication they wish to apply to their training exercise, ranging from text only to full-scale multimedia.

Interactivity is authored using one of several standardized activity templates. Templates facilitate authoring by providing a means to focus and constrain author actions in a way that produces useful, standardized, and structured training. Templates also allow instructors with no programming skill to easily create interactive exercises. The templates identified cover a wide range of learning objectives (LOs):

- Overlay Creation – An exercise that requires the trainee to drag and drop icons and/or draw figures on specific locations on a background graphic (e.g., map, sketch, photo, etc.). General feedback from the trainer is provided and the trainee self-evaluates the correctness of his/her answer.
- Test Question – An exercise that requires the trainee to answer one or more multiple-choice, true/false, or "select all that apply" questions. Student answers are assessed automatically and explanatory feedback written by the trainer is displayed.
- Self-Evaluation – An exercise that requires the trainee to create a free-text response to an open-ended scenario provided by the trainer. General feedback from the trainer is provided and the trainee self-evaluates the correctness of his/her answer.
- Situational Judgment – An exercise that requires the trainee to review a situation and rate the quality of a number of ways of handling the situation. This template is particularly useful for exercising trainees' ability to think through "non-tactical" problems (e.g., dealing with uncooperative civilians) that do not have a single correct answer or where no appealing answer is available. Feedback from the TA involves showing a trainee's ratings compared to those of the trainer and other trainees.
- Synchronous Collaboration – An exercise that requires multiple trainees to move/add/remove icons on a shared whiteboard. This template provides a simple means for conducting collaborative rehearsals.
- Location Selection – An exercise that requires the trainee to point-and-click points on a 2D graphic (e.g., map, photo, sketch, etc.) to demonstrate knowledge of where things are or should be located. Trainees receive visual feedback on the

points that were not correctly identified, along with the trainer's overall rationale for the preferred solution.

The TA also has an architecture that links template types to the trainer's development objectives. The present research indicated such an architecture must allow flexible entry into the system and must fit with user expectations regarding the structure of training exercises. To meet those requirements, a background task can be used to situate one or more learning objectives. In this way, trainers can build multiple practical exercises using the same background materials. This format also enables deliberate practice of selected elements of larger training tasks by breaking the tasks down into their component parts.

The background tasks included were selected based on (a) the frequency of their occurrence as reported by combat veterans; (b) their centrality in pre-deployment training conducted at the combat training centers; (c) their representativeness of full-spectrum operations tasks; and (d) their presence in emerging doctrine.

Recommended learning objectives were derived by reviewing doctrinal training plans and selecting performance measures and/or supporting collective tasks associated with each background task. Performance measures or collective tasks were not selected if they were (a) difficult to address with interactive multimedia instruction or better addressed using some other medium; or (b) not strongly associated with common training challenges experienced at home and in the field.

To summarize, each learning objective is associated with a particular activity template. Trainers may arrive at a learning objective and associated activity template by first selecting a background task or a general competency. Templates associated with a particular combination of background task and learning objective(s) feature generic content to accelerate the authoring process. Authors may also choose to introduce a new background task and/or learning objective, but generic content cannot be supplied for novel task-learning objective combination templates.

The training creation process facilitates the rapid development of targeted training packages and exercises through (a) the provision of generic, modifiable content; and (b) the ability to search for up-to-date training artifacts and information on trends in the operational environment. Resources that the TA can provide to trainers for enhancing training development should include:

- Reference materials (e.g., doctrine, professional articles, discussion posts, other archived exercises, existing CBT) related to the training topic
- A searchable database of training artifacts (including photos, maps, documents, illustrations, video, etc.)
- Generic content [e.g., training advance organizers with objectives, topic tutorials, practical exercise descriptions, etc., and practical exercise materials (e.g., scenario content, generic rules of engagement, signal operating instructions, etc.)] meant to be widely applicable to many training situations.

Even though the TA provides base training content, the trainer has complete control over the content and can edit or delete anything that is not applicable to their training. When viewing the course, the trainer will have the option to edit the text and images appearing on the page.

Text is edited through a simple text-editor that appears inline on the page (Figure 2). The editor contains easily recognized icons allowing the trainer to change the font, size, color, alignment, and other properties of the text. The text-editor also allows the trainer to insert a hyperlink to another website or search for content using the built-in search feature, which is described in a later section of this report.

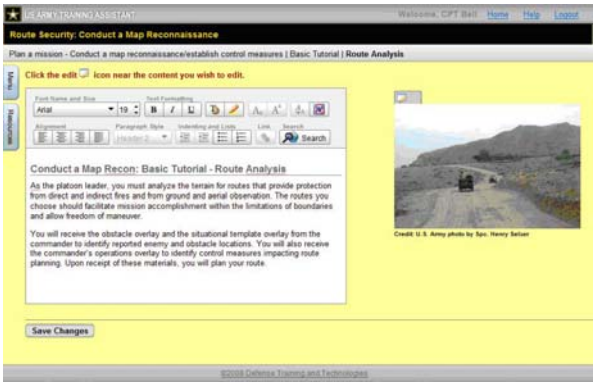


**Figure 2. The Inline Text-Editor.**

## METHODS

Once the initial prototype was developed it was necessary to evaluate the effectiveness of the tool for training development during alpha testing.

### Participants and Procedures

Thirty-nine Soldiers participated in alpha testing: 11 non-commissioned officers (10 sergeants and 1 master sergeant) and 28 commissioned officers (7 lieutenants, 15 captains, 5 majors, and 1 lieutenant colonel). All but three of the participants had deployment experience, with 79% ($N$ = 31) having had multiple deployments. Sixteen (41%) participants held current duty positions in branches representative of the TA target audience (i.e., infantry, armor, cavalry). Eighteen participants tested the Map Overlay template, eleven participants tested the Test Question template, and ten tested the Self-Evaluation template.

Evaluation sessions lasted 2 to 4 hours long and consisted of a demographic survey, followed by a short demonstration of the TA capabilities, user testing of the TA, a follow-up impressions survey, and a focus group. Some participants also completed a training module as a training participant. Additionally, some participants conducted more in-depth testing of the authoring functions.

## RESULTS

The user impressions survey indicated that test participants generally found the Army TA to be easy to use (46-86%, depending on the feature assessed) with the majority reporting that they could and would use it (75% and 66% respectively). Some test participants suggested that the tool be used to rapidly generate training that *does not* change frequently because taking the time even to modify existing training would not be feasible. Another suggestion was that the tool would be helpful for providing training to people who have changed branch or need to get up to speed on new tactics, techniques, and procedures (TTP).

Consistent with the purpose of alpha testing, users also identified a number of technical issues with the TA that represented the normal glitches in the development process of complex technologies. Issues ranged from features not displaying properly on the page, to images not saving to the database, to code that needed to be optimized for multiple simultaneous users. With such a complex system, and so many possible ways to accomplish the same task, the alpha testing played a crucial role in identifying these issues.

### Usability Issues Identified

Test participants generally found the "My Training" page very simple to use. The only common issue observed was that participants did not seem to grasp the distinction between "Training I'm Taking" and "Training I've Authored." This issue may have arisen because test participants relied on experimenters more so than exploration to figure out the interface. Among the common training pages, some users confused the Introduction page with other components of the training (e.g., Introduction, Basic Tutorial, etc.).

Once reaching the text editor, testers (80%) found it simple to modify generic content text. Difficulties arose getting the page into Edit mode and figuring out how to bring up the text editor once in Edit mode. Test participants had to look around for some time before finding the Edit button in the upper right toolbar. They did not seem to fully understand the difference between Preview Mode and Edit Mode. Once in Edit mode, most users had trouble figuring out how to bring up the text editor. When they saw the gray box, they did not know that they had to click on it or the edit icon in order to start making changes. The explanatory "tool-tip" only came up after the mouse had been still for a relatively long period of time.

Some users had difficulty figuring out how to add a hotlink to the text. It may be the case that they found it difficult to imagine how a link would be used in an actual training product, and it was not obvious that text had to be highlighted in order to make it a link. Once this was explained, users typed in text and generally figured out how to activate it as a link. There was occasional confusion between adding hyperlinked text and adding a URL to underlie the text. Users had trouble with closing the add link box because they were unsure whether their entries would be saved. This confusion arose because the method for closing the add link box (an "x" in the upper right corner) is the typical convention for closing an application. Closing applications does not automatically save changes, but closing the add link box does.

Test participants (86%) found editing image properties quite simple, once they got into the image edit mode. Users had difficulty, however, figuring out how to get into image edit mode. Under uncertain conditions, users tried to edit the image by (1) clicking on the image; (2) right-clicking on the image; or (3) clicking on the Internet Explorer (IE) icons that appear when an image is moused over.

Test participants (65%) generally found the search capability easy to use. The search capability was slow, however, and many of the results were not relevant to the training topic at hand or quite some time out of date. When in the search mode, users found it somewhat unintuitive to open and close panels (and determine whether a panel was open or closed).

Test participants found both the Self-Evaluation template and the Test Question template easy to use. One common problem encountered was that users expected to be able to save each component of the question individually (rather than having to scroll to the bottom to save the entire question). Users of the test question template did have some difficulty understanding the different feedback types. Testers who talked about feedback type indicated that they would not give feedback independently of student answers.

Editing the map overlay template was a little more difficult (46% rated it easy to use). When editing the overlay template, testers had the same issues as testers of the other templates with regard to saving individual components. They wanted to be able to do this instead of having to scroll down to the bottom of the page and save the whole question. In general, test participants seemed a little confused about base overlays versus the answer overlay. They did not seem to understand what they were working on – question content or answer key. There were also a number of usability issues identified with the map drawing tool itself, as testers found that some features did not behave in the way that they expected. However, once these features were explained, most testers had no difficulty using the tool.

## DISCUSSION

Test participants were supportive of the TA concept and provided numerous constructive comments on how to enhance the usability and applicability of the tool. The key implications of their input for future development can be summarized as follows:

1. The TA generally is easy to use, but it represents something new to learn so the degree to which the tool advances the training development process will be key to adoption.
2. Training content generated by the TA will be most relevant to the operational environment if it is classified. This information is the most up to date and the most important to deployed and pre-deployed trainees.
3. Limited access to classified computers makes it infeasible to deliver large-scale classified training with the TA.
4. The best application environment for the TA if classified content cannot be used is the schoolhouse, particularly for cadets and junior enlisted personnel and/or officers, for providing standardized training that does not change frequently, for supporting hands-on training with "crawl-phase" procedural instruction, and as self-development training following branch changes (e.g., armor to infantry).
5. The quality of generic content and search findings will be critical to the adoption of the tool. Trainers have limited time to create training and will fall back on current alternatives unless the TA can be used very quickly and easily.

Further research and development will help provide the base content that is crucial to improving the speed with which training can be generated, will ensure that all relevant resources are easily searched and accessed, will make the tool more flexible and customizable to a trainer's needs, and will ensure that the tool is accessible by transitioning the tool to an Army network. With these enhancements, the TA will allow Army trainers to leverage the knowledge and experience of other trainers to quickly create customized, instructionally sound training that meets their needs.

### Other Rapid Training Development Initiatives

The need for rapid training development methods and tools becomes more critical once a unit deploys to theater. The increased speed of change makes training development and knowledge transfer difficult to do without the required time and resources. This is particularly the case when a unit identifies a training gap while deployed to theater. That is, there are no efficient and effective training development methods available to operational units that allow them to create critically needed training while deployed.

Video-based training represents a possible solution. For example, video-based training is being used in the medical field to provide "expertise on demand." The method enables medical professions in disciplines of general practice, dentistry, pharmacy, obstetrics and gynecology, and pathology to access video-based training to improve their skills whenever and wherever they want (http://www.edcastmedical.com). Similarly, a host of Internet sites have emerged providing a network of community-based "learn by seeing," how-to training videos (c.f., www.youtube.com, www.playsportstv.com, www.expertvillage.com, www.ehow.com, and www.teachertube.com).

Expert Village, for example, is centered on models of good practice and expert performance where professionals from a wide-range of fields transfer expert knowledge and procedures. Similarly, PlaySportsTV, provides video-based instruction from a range of professional coaches and athletes. These sites often provide additional resources to assist the learner

in obtaining additional expert advice and coaching. Those resources may include communities of practice, discussion groups, video tagging and annotations, question and answer forums, and learner-to-expert interactions.

Since video-based training allows experts to develop and publish video-based materials within a matter of minutes, it represents a possible approach for deployed Soldiers to use to transfer knowledge, expertise, lessons learned, and new TTP (Shadrick, 2009a). A number of digital video tools are available to support the Soldier in developing content. For example, V.I.O. (http://www.vio-pov.com) provides an affordable helmet-mounted, point-of-view wireless camera for capturing performance during execution. Capturing video-based accounts of performance can be used not only for developing training, but may also support performance improvement through the After Action Review process. Other tools, such as MediaNotes (http://www.medianotes-app.com), provide ways to annotate and tag video content with expert reasoning, discussion, and coaching. However, a simple video of actual performance with annotations does not necessarily transfer to a valuable learning experience.

The ARI is currently working with deployed units using helmet-mounted video cameras to determine the most effective way to use these technologies for rapid training development (Shadrick, 2009a). For example, how do we instruct Soldiers how-to embed the expert, tacit-knowledge required for performance into the video demonstrations and training? What tools do we provide Soldiers to annotate and tag videos? How do we manage the video-based training environment and allow access to additional resources used to assess performance? What are the skills that could be addressed with video-based training? Those questions represent just a few of the questions that must be answered as the Army considers this potentially valuable training method.

Implementation of a Home Station Operations Center (HSOC) capability provides a possible solution to a deployed unit's rapid training development needs (Shadrick, 2009b). The HSOC has been envisioned as a resource to provide the deployed force with additional command and control assets, collaborative planning resources, and a reach back capability. In addition to those critical functions, the HSOC can also include a knowledge center and training development capability required for the rapid development of critically needed training for the deployed force, creating an HSOC-Training (HSOC-T) function. Thus, the HSOC-T may provide a rapid response team to address deployed, operational unit training requirements and needs. By expanding the HSOC-T capability, it is possible to provide the HSOC-T with resources needed to rapidly develop training products required by deployed units.

To that end, the ARI is also working with deployed units to identify training needs during deployments to evaluate an experimental HSOC-T in order to implement a rapid training development program focusing on actual unit training needs (Shadrick, 2009b). That training can then be implemented with the deployed unit and training effectiveness can be assessed. In the process, the research and development effort will evaluate the ability of the HSOC-T's capability to provide a rapid training development for deployed units and develop an increased understanding of the HSOC-T concept.

## SUMMARY

The operational environment is in a state of constant change. That change requires units to produce training materials and resources in order to develop appropriate levels of prophecies. Thus, operational units (both at home station and deployed) require more efficient and effective training development tools and methodologies.

This paper highlighted several current efforts to produce tools and resources to address the rapid training development need. Ultimately, rapid training development tools and resources will allow operational units to more effectively address training needs. In addition, these tools will allow units to spend more time training by reducing the front-end training development time requirements. The focus on tools to support operational units is paramount as the Army continues in an environment of persistent conflict and multiple deployments. It is also critical to providing units with the tools required to prepare for upcoming counter-insurgency missions while still maintaining core major combat operational skills.

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