Developing Remote Training Tools for Company Intelligence Teams

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Combating counterinsurgency involves acquiring and moving timely and detailed intelligence from the ground forces up to higher echelons. Company intelligence support teams (COIST) are critical for this effort. This paper describes the process used to create COIST home station remote training tools to provide sustainment training to current COIST members and access to training for new COIST members. Training needs were identified by reviewing doctrine, observing a field exercise, and conducting semi-structured interviews with novice and experienced COIST members. From those data, we developed a training taxonomy for COIST responsibilities and cognitive activities that included five major functions: information collection, information organization, analysis, dissemination, and collaboration. Based on that analysis, we developed a modifiable web portal and prototype training tools for remote COIST training while leveraging current research on expertise development, experiential training and multimedia learning. This modular, computer based, and internet-deliverable training tool has three components: a COIST web portal, an E-book that houses new and existing lessons and exercises, and an interactive scenario player for demonstrating COIST activities in current operations. The web portal serves as a pre-organizer of information, so people can quickly establish expectations for the kinds of activities a COIST team can support. Together, these training tools focus on enhancing COIST training at home stations or in theater when other methods are not available.

BIOS

Dr. Elizabeth S. Veinott is a Senior Research Psychologist at Applied Research Associates in the Cognitive Systems Engineering group. Dr. Veinott has been studying the effect of communication technology and virtual or networked environments on decision making, trust, and collaboration in a variety of domains for 15 years. At ARA, her research programs have focused on planning and decision making training, disaster response, culture, and collaboration. These programs have produced web-based training programs, system training evaluations, and field experiments with end-users. She received a B.A. in Psychology from Stanford University and a Ph.D. in Cognitive Psychology from University of Michigan.

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INTRODUCTION

Counterinsurgency operations by the United States military have led to changes in how small-unit teams and company commands operate by increasing their need to generate timely and accurate information. As part of the strategy for counterinsurgency (FM 3-24), units increasingly rely on intelligence-driven operations at the company level (Call, 2010; Liebman et al., 2010; Morgan, 2008). To support this strategy, the Army has established Company Intelligence Support Teams (COISTs). A COIST has up to six members who typically reside in the company command post and operate 24 hours a day (Colas, 2008; Cowan, 2008). Their main function is to collect and analyze information gathered from troops conducting operations in order to produce actionable intelligence for the company commander and higher echelons. COIST members are currently trained by experienced mobile training teams in a multi-day course either at their home station or at a training center. Our research sought to identify training opportunities where Soldiers could benefit from remote, web-based training to support initial and sustainment COIST training.

There are several beneficial reasons COIST could use remote training tools as a resource when other training methods are not available. First, COIST is a relatively new concept for the U.S. Army, and information pertaining to tactics, techniques, and procedures (TTPs) are emerging and evolving. A remote training tool can keep pace with the information and be easily updated as new tactics are developed. Second, the U.S. Army currently does not authorize independent intelligence sections to operate at the company level, meaning COIST is not a dedicated position. Consequently personnel turbulence is high and some COIST members miss the multi-day mobile team training because they are assigned after the training is over or while in theater. As a result, Soldiers are often assigned to a COIST with limited access to training prior to deployment. Remote training tools that are web accessible can be tailored to support this constant influx of new COIST personnel. Third, there are numerous higher order cognitive tasks COIST members must perform in order to collect, analyze, and disseminate actionable intelligence. Because of the complex nature of the job, it can be impossible to effectively teach all the tasks in an instructor-led short course format. In fact, Soldiers reported that 61 of the 143 identified COIST tasks received limited training (Sanders, 2009). Of those 61 tasks, approximately 41% involved pre-briefing or debriefing, 42% involved the information analysis process, and 17% involved intelligence analysis products. Finally, Soldiers using a web-based remote training tool can engage in self-paced learning to support deliberate practice (Ericsson, Krampe, & Tesch-Römer, 1993) which is essential for developing expertise and reflective practice (Sergiovanni, 2001). If the web-based training is engaging, people will spend more time practicing their skills. Together, these reasons suggest that company level training tools that can be flexibly employed at home or during deployment when other methods are not available would improve COIST skill development.

Multimedia Learning Theory

Research in multimedia learning provides instructional strategies to allow Soldiers to actively learn in remote environments. Mayer and colleagues (Mayer, 2005) define multimedia learning as the use of multiple sources of media such as text, video, graphics, and audio for conveying instructional messages to learners. Several topics in this area, such as pre-training., media modality effect, and the segmentation principle informed our tool design (Mayer, 2005, Renkl, 2005). Some questions that were answered from the literature review included:

- Which modality combinations, such as text, video, graphics, and audio improve learning?
- Is pre-training effective for learning?
- How does segmenting information and developing opportunities for deliberate and reflective practice help maximize learning and knowledge retention?

In this paper, we describe our research for identifying current COIST training needs and discuss recommendations that led to the design and development of several web-based COIST training tools. Finally,, we describe mission specific needs for each training tool developed, and explain how they support a Soldier's ability to construct knowledge, practice critical skills, and gain realistic experience prior to theatre operations.

METHODS

In order to identify and contextualize remote training opportunities, our team conducted observations and interviews with novice and expert COIST members. These focused on identifying current practices, uncovering current training needs, and determining where new remote home station training tools might be leveraged to complement the current training.

Participants

Eighteen novice COIST members and five experienced COIST members participated in our research. The novice COIST participants were privates or specialists, while two were Lieutenants. Of these, 40% had prior deployments, while 88% had prior COIST training. The five experienced COIST members p included one staff sergeant, one sergeant, and three privates first class, who had returned from deployment within the previous six months. None of our experienced COIST members received COIST training prior to their deployment and four of the five were chosen for COIST because they had previously deployed.

Procedure

Three members of the research team observed COIST members and company command post operations during the three days of a field exercise. These observations focused on identifying current practices for COIST members.

Interviews were conducted with Soldiers. A semi-structured interview guide was developed and approved by the U.S. Army Research Institute's Institutional Review Board. Participants were asked questions during these interviews such as when and how were pre-briefs and debriefs conducted? How was the information organized and analyzed? What tools were used? What makes this task challenging? Notes were taken during these observations and interviews and served as the basis for thematic analyses. From each set of notes, themes were complied, sorted, and organized by the data analysis team. A second pass through the data removed any themes which only came up once. Similar themes were grouped together and served as the basis of the training needs analysis.

RESULTS FROM TRAINING NEED AND RECOMMENDATIONS

To organize and facilitate instructional interpretation, our data collection findings and recommendations are summarized by the five function areas that a COIST performs. These functions include information collection, information organization, analysis, dissemination, and collaboration.

Function #1: Information Collection

During observations of novice COIST members, Soldiers spent the bulk of their time collecting and organizing information. COIST intelligence can only be as good as the quality of information they collect. Patrol debriefings are essential for information collection. This places a strong emphasis on training patrol debriefings. Providing patrols with pre-briefs should improve the quality of information obtained during the patrol debriefs. For example, if a patrol does not know to be on the lookout for a particular car from a patrol pre-brief, they will be less likely to recall the information during the debrief. While experienced COIST recognized that the pre-brief and debrief were critical, they did not find them difficult.

For information collection to be effective, remote training should focus on teaching pre-briefing and debriefing skills using interactive practical exercises and assessments. The information collection training should focus on teaching topics such as how to structure a pre-brief, different patrol debriefing strategies, and how Soldiers should phrase questions to elicit useful information. These training needs are consistent with earlier findings (Sanders, 2009).

Function #2: Information Organization

Once the information is collected, a COIST member enters it into a database of several systems or tools that aid in the analysis, reporting and dissemination of the information collected. Both novice and experienced COIST members reported that organizing and inputting the information was more time consuming than difficult because of the volume of information.

Novice and experienced COIST members reported that two aspects of organizing the information were difficult. The first is identifying which details from a patrol debrief report should be entered into the database. If a COIST member fails to enter critical details from a patrol debriefing, such as a name, a photo or the color of a car, it can adversely impact the overall intelligence picture. Second, novices found it hard to write good patrol summaries in a timely manner.

Remote training should focus on these two challenges by providing targeted practice identifying key information and writing summaries. One approach could be to provide interactive scenario-based examples of good patrol report summaries that include raw data for each summary. Another remote training activity could be to practice writing these summaries in a way that makes them easy to search (i.e., includes key terms, phrases, and information).

Function #3: Information Analysis

Effective information analysis requires both cognitive skills on the part of the soldier and effective analytic tool use (e.g., pattern analysis). Novice COIST members reported wanting help with analytical thinking skills more than with analytic tools. They were able to learn how to use the tools on their own with little supervision or through peer-to-peer training. From the interview data, analysis was difficult because the task can be overwhelming and the volume of data andrequirements for reporting left Soldiers with less time for analysis than they would like.

Remote training should provide short and manageable lessons and practice opportunities to support analytic skill development. Current information analysis training focuses on the procedural skills needed to employ analytic tools more than the cognitive skills needed to fully utilize a tool's capabilities. While procedural skills are important to learn, analytic training provides opportunities for exercising important cognitive skills. COIST members must sort, filter, combine, and interpret information from a variety of sources. They need to practice looking for patterns in the information and seeking information to confirm or deny the hypotheses they develop. They also need to practice developing information requirements to brief patrols and form and update the intelligence picture from available sources. Again, remote training tools could provide scenario-based simulation training that could be beneficial by immersing learners into complex realistic situations where they interact with artificial or live team members to practice analysis skills.

Function #4: Dissemination of Information

Once information is collected, organized, and analyzed, it needs to be disseminated. Soldiers reported that the main challenge for this activity was packaging the information in a useful way for the audience (e.g., patrol leader in the pre-brief, company commander, battalion intelligence section). There are no current templates for any of these standard briefs. A remote training tool could provide examples of templates that Soldiers could pull up and examine such as status boards, mission pre-brief/debriefs formats, and the daily intelligence summary. It would provide a valuable resource to assist COIST members in facilitating the exchange of information between the company, its subordinate units, adjacent units and higher headquarters.

Function #5: Collaboration and Coordination

Soldier's confidence varied in their ability to collaborate and coordinate effectively. For example, novice COIST members reported being concerned about communicating effectively with company commanders, battalion intelligences sections, and adjacent companies. For example, they wanted guidance on setting and managing expectations within the company and across echelons for what a COIST can do. Finally, they reported that building trust in order to better anticipate future requirements was difficult. A remote training tool could provide opportunities for Soldiers to watch role-playing versions of these collaborations and suggest different strategies.

COIST TRAINING TOOL DEVELOPMENT

We implemented a subset of the training recommendations and developed a modifiable web portal and training tools for remote COIST training. The design leverages current research on experiential training, multimedia learning, and technology adoption (Davis, 1993; Mayer, 2005; Yates, Veinott, & Patalano, 2003). The modular web-based training tool has three components: a COIST web portal, an Electronic or Ebook that houses new and existing lessons and exercises, and an interactive scenario player for demonstrating COIST activities in current operations. Together, these training tools focus on enhancing remote COIST training at home stations or in theater when other methods are not available. Each component of the COIST remote, home station training tool is described in more detail in the following sections.

COIST Web Portal

The COIST Web Portal (Figure 1) is designed to be a single point of access for training-related information for COIST and personnel who need an understanding of the COIST functions. The COIST portal houses an overview of each COIST function, training material and resources, an interactive sceanario, and a user guide. The COIST Portal is composed of Hyper Text Markup Language (HTML) pages, Adobe Flash ® components, and composite graphics. To make information more retrievable and identifiable, a navigation menu bar with five tabs was developed, one for each the main COIST functions (Information Collection, Organization, Analysis, Collaboration, and Dissemination). When clicked on, each primary tab activates a drop down menu with sub-links. The first sub-link provides users access to related resources (e.g., tactics, techniques, briefings, handbook, etc.) and a function description. The second link is a knowledge base of new lessons and practical exercises. Each of these links can be easily modified as new training exercises or lessons become available.

For example, the Overview tab includes a brief introduction on the training materials providing new COIST members with a sense of purpose and motivation for their role. Additionally, this section of the portal presents examples of the roles and functional connections to COIST that cross echelons and adjacent units. The Overview tab is designed to support command emphasis by providing commanders with useful information regarding COIST expected actions and best practices from different units.

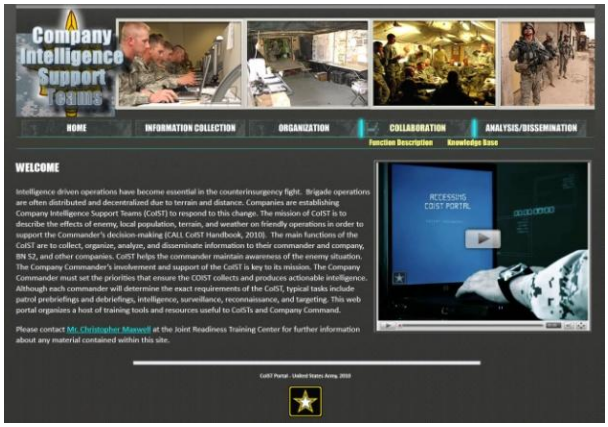

Figure 1. COIST Web Portal screen shot.

Moreover, the portal addresses several training recommendations and findings. First, COIST users needed a single location to upload and house COIST material that is easily searchable because of the extensive and diverse body of reference and training-related material that already exists. None of the interviewees used existing COIST material regularly because it was difficult to find or access. The portal provides a one-stop location for COIST material that can be accessed remotely via the Internet. It is an easily modifiable, single point location for COIST handbooks, briefing examples, procedures, and training material that provides a useful reference resource for COIST. Files can be updated as tactics, techniques, and procedures change or new after action material are generated from field exercises. This design feature supports the sharing of material with the larger community to provide new COIST members guidance to get them up to speed faster. It also reduces workload by providing a single location for both reference material and practical exercises allowing Soldiers to quickly answer any questions they may have as they develop and practice their skills.

Second, the portal serves as a pre-organizer of COIST information in two ways. As previously mentioned the web portal is organized by COIST functions and has an overview of each function. In addition, embedded into the portal are six, short (30-60 seconds) video and audio descriptions of each function in an interactive and moveable 3-D cube (Figure 2). The 3-D cube allows a company commander or others (e.g., Battalion intelligence section) to play, watch, and listen to

multimedia excerpts of each COIST function. This allows a user to get a good initial understanding of COIST (i.e., pre-organizing) in a few minutes by either reading the overviews or listening to the cube audio files. As a pre-organizer of COIST training-related material, the portal is designed to provide the key knowledge elements to support transfer of information to long-term memory for Soldiers. For example, key topics are outlined and provide an initial way to structure the information for new COIST members.

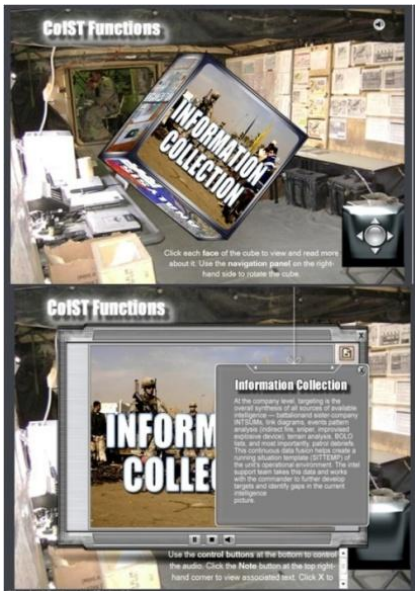

Figure 2. Screen shot of COIST overview cube

Third, several features of the COIST web portal design are geared toward encouraging soldiers to stay on the system to explore and can improve learning by increasing the number of opportunities for practice. Given that the typical COIST member is in his or her early-to mid-20s, it was important to design the portal with this demographic in mind. One example of a design feature included to engage this age group is a YouTube-style video on the portal's home page that provides tool orientation information. Another design feature is the interactive cube that was previously discussed. Consistent with training needs identified, we developed several opportunities for practice such as an interactive Afghanistan scenario highlighting pre-briefing activities, an information requirements development task, and a time-event analysis task. These training design features are intended to motivate soldiers to devote time to exploring the system content.

Together, these training features should improve long-term retention of material and skill development. They provide a logical high level organization of COIST information into five functions, key elements of each function, and opportunities for practice. These design features support the acquisition of new information by providing a knowledge framework on which the learner can subsequently build. Together, these features should facilitate the storage and retrieval of information in memory over time, the underlying processes necessary for skill retention.

COIST E-book

COIST tasks can be overwhelming for new users, so training materials should present manageable chunks of information with links to related material. Both the COIST portal and the E-book address this challenge. We developed an automated book with instructional lessons of different lengths to help users learn more effectively. Providing a variety of instructional lessons can be beneficial and useful for those who may only have limited blocks of time to dedicate for remote training.

The COIST E-book is a searchable knowledge base of training resources and lessons. This is one of two main delivery mechanisms for new lessons; the other is the interactive scenario tool. The E-book has a keyword search function and has an easy-to-access table of contents for COIST training-related products (e.g., articles and websites). The lessons developed in the present research focused on two COIST functions: information collection and analysis, and incorporate several recommendations from the training needs analysis. The information collection module focuses on pre-briefing strategies and debriefing strategies. The information analysis module includes two practical exercises, one for practicing time-event wheel analysis and one for developing company-level information requirements from the information requirements received from the battalion (e.g. priority information requirements and specific information requirement development). By segmenting the lessons into small units, learners can focus their practice time which should improve their learning. The E-book supports both initial training and sustainment training by allowing the learner to navigate directly to specific training lessons and provides opportunities to apply their training in practical exercise.

COIST Interactive Scenario Tool

Soldiers consistently stated the need for practical exercises to apply their training. The COIST interactive scenario tool addresses this need by allowing users to engage in an experiential learning opportunity in a cognitively-authentic learning environment (Ross, Halterman, Pierce, & Ross, 1998) by providing information that would be typically available in the field. The interactive scenario trains Soldiers in information collection and dissemination. Set in Afghanistan, the scenario focuses on preparing users to conduct a patrol pre-brief for a patrol mission to search for a safe house. A combination of audio and video was used for the multimedia presentation, which helps learners to mentally represent scenario content for better retention (Mayer, 2005). The interactive scenario tool incorporates: multimedia driven interactions (Adobe Flash® and action scripts) used to illustrate specific scenario events; a resources section (e.g, COIST reference material) for Soldiers to stop the scenario and research a question they may have; and knowledge and application assessment questions (e.g., multiple choice, multiple response, and open-ended responses) for evaluating and testing learning throughout the scenario.

The COIST portal and tools were designed to support a range of personnel needs to include a new COIST member building a basic set of skills, the experienced COIST member who wants to explore new tactics and techniques, and the commander who needs to understand the role of the COIST and how it can contribute to the unit's mission. Together the COIST portal tools were designed to support different learning opportunities from exploratory learning with the portal to more experiential learning through the interactive scenario.

CONCLUSIONS

This paper described the process used to create COIST home station remote training tools for new and current COIST members. We developed training products for some critical COIST tasks and tools for housing and organizing that training. The COIST portal and E-book were developed with a framework that can accommodate a broad range of training products and training lessons to demonstrate the capabilities of this type of training delivery product. Future research will focus on evaluation of the tool with COIST members.

This research contributes to a growing body of research and tools demonstrating the potential for remote, internet-based training to complement and augment classroom and field exercise training.

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REFERENCES

Center for Army Lessons Learned, C. (2010). *Company Intelligence Support Team Handbook*. (No. 10-20), January, 2010.

Colas, B. (2008). Suggestions for creating a company-level intelligence cell. *Infantry Magazine*, 4-6.

Cowan, D. (2008). The company intelligence section. *Armor, July-August*, 19-22.

Davis, F. (1993). User acceptance of information technology: system characteristics, user perceptions, and behavioral impacts. *International Journal of Man machine studies*, 38. pp. 475-487.

Ericsson, K. A., Krampe, R. T., & Tesch-Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review, 100*(3), 363-406.

Headquarters of the Army. *Counterinsurgency Field Manual* (FM3-24), December, 2006.

Kilcullen, D. (2006). Twenty-eight articles: Fundamentals of company-level counterinsurgency. *Military Review, 86-92.*

Liebman, D., Ploss, C., Hasselblad, S., Gunther, K., Collins, B., & Gonzalez. (2010). COIN and company fusion cell operations, *Infantry Magazine*: Retrieved from http://www.thefreelibrary.com/COIN+and+company+fusion+cell+operations.-a0238222517.

Mayer, R. (2005). Cognitive theory of multimedia learning (pp. 31-48). *The Cambridge Handbook of Multimedia Learning*. Cambridge, UK: Cambridge University Press

Morgan, R. (2008). Company intelligence support teams. *Armor, July-August*, 23-25.

Renkl, A. (2005). The worked-out examples principle in multimedia learning (pp. 229-245). In the *Cambridge Handbook of Multimedia Learning*. Cambridge, UK: Cambridge University Press.

Ross, K., Halterman, J., Pierce, L., & Ross, W., G. (1998). Preparing for the instructional technology gap-A constructivist approach. Paper presented at the 2004 Interservice/ Industry Training Conference, Orlando, FL.

Sanders, W. (2009). *Company intelligence support teams: An assessment of manning, training,* and performance (ARI Research Report 1242). Arlington, VA: U.S. Army Research Institute for the Behavioral Sciences.

Sergiovanni, T. J. (2001). *The principalship: A reflective practice perspective*. Needham Heights, MA: Allyn & Bacon.

Yates, J. F., Veinott, E. S., & Patalano, A. L. (2003). Hard decisions and bad decisions: On decision quality and decision aiding. (pp. 1-37). In (S. L. Schneider and J. Shanteau, Eds.) *Emerging Perspectives on Judgment and Decision Research*. Cambridge UK: Cambridge University Press.