

A Site Selection Methodology to Optimize Task Training

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ABSTRACT

Successful execution of missions is contingent upon learning a range of skills for a variety of tasks. The U.S. Army identifies common core tasks as well as tasks specific to each Military Occupational Specialty (MOS), and organizes them by skill level to support the learning progression throughout a Soldier's career. While operational units are ultimately responsible for ensuring Soldiers are trained, the Noncommissioned Officer Education System (NCOES) plays a crucial role in Soldier development by providing both institutional classroom training and computer-based structured-self development. Over the past decade, several tasks have emerged as a result of new operational requirements, and many are trained in institutional settings. Subsequently, questions have been posed regarding the optimal placement of tasks that may quickly become less relevant to the Warfighter, especially considering the resources required to update institutional and computer-based training. The purpose of this paper is to report on an effort to identify the characteristics of NCO (Noncommissioned Officer) tasks that are enduring across operational and mission environments versus non-enduring, and to identify the factors considered for optimal placement of tasks in training sites. A domain analysis was conducted to facilitate understanding of the Army's site selection process. Semi-structured interviews were conducted with subject matter experts (SMEs) from the NCO Academies. Qualitative analysis techniques were applied to ascertain the factors associated with selecting the institution, the operational unit, or structured self-study as the optimal training site. Twelve discriminating factors were identified and used to create a front-end analysis (FEA) methodology for site selection. To support the recommendations of Critical Task and Site Selection Boards (CTSSBs), an Excel-based site selection tool was created to implement the front-end analysis methodology and subsequently assessed. The methodology supports the Army Learning Model by supporting life long learning through the efficient placement of training.

ABOUT THE AUTHORS

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INTRODUCTION

The U.S. Army identifies critical tasks that are especially important for all Soldiers broadly, and within specific Military Occupational Specialties (MOSSs), to receive greater attention and resources for training. While the operational unit is ultimately responsible for ensuring Noncommissioned Officers (NCOs) are proficient in the critical tasks, both common and MOS-specific, Soldiers also receive task training through classroom instruction provided by the Noncommissioned Officer Education System (NCOES) via NCO Academies (institutional training) and via self-study. Strictly speaking, self-study need not necessarily be conducted through distance learning (dL), but dL is a common method the Army employs to provide structure to self-study tasks.

Once critical tasks are identified, they must be assigned an official training site: institution, unit, or self-study. One manner in which this decision can be made is on the basis of resource and time constraints alone. However, there remains a more fundamental concern regarding whether some tasks are differentially suited for training in the institution, at the unit, or via self-study, as a result of task characteristics and training demands. Traditionally, Army institutional training has been reserved for training enduring individual skills that represent the core skill sets of NCOs. The institutional schoolhouse environment trains skills emphasizing the doctrinally correct approach. In contrast, the operational unit traditionally trains its NCOs for particular knowledge or task requirements, and tactics, techniques, and procedures (TTP), specific to its mission. In short, the institution's traditional role has been to train doctrinally correct skills that all NCOs (either within or across an MOS) must know, while operational unit training may include Standard Operating Procedures (SOPs) and TTPs that reflect current mission sets and best practices in theater.

The rationale for distinguishing tasks that are enduring across mission and operational environments, from tasks that are required to respond to the demands of a particular theater or mission, stems from the time and resource demands associated with revising institutional programs of instruction (POI). Because POI changes

are labor intensive and time consuming, institutional curricula are not particularly conducive to addressing rapid and theater-driven additions or modifications to critical task lists. To make matters worse, it can be unclear which of the new or modified critical tasks reflect novel and enduring Soldier performance requirements, vice novel but temporary requirements.

Nonetheless, new operational requirements have produced changes to the institution's traditional role, and indications that tasks and their training sites are misaligned. Students and cadre have expressed concern that valuable institutional time is spent training theater-specific content unrelated to a course's primary mission or outside the MOS proponent's domain, and that institutions train material that NCOs have already learned on the job. This muddying of the traditional distinctions between training site purposes has led to redundancy when training content is repeated, at times identically, across multiple training sites. Conversely, there has been an inappropriate elimination of critical tasks from institutional training due to time and resource constraints, with a simultaneous resistance to increasing course length.

Therefore, an investigation is required into current processes for optimizing the selection of training sites for training tasks. Rapidly evolving operational requirements and the subsequent frenzy to ensure responsive and relevant training and education gives rise to the question of task durability. In other words, how can one distinguish between more permanent and enduring tasks and associated knowledge, skills, and abilities – those that remain consistent across operational environments – and those skill requirements that are temporary or continually evolving? Furthermore, what are the implications of a task's durability for where it should be trained, given limited time and funding resources? Other issues for training site selection also deserve examination. Can a set of task characteristics be identified that suggest training will be more effective or efficient in one delivery environment over another? As the Army transitions away from the heavy operational tempo of the past decade of war, it is poised to reevaluate the ideal placement of tasks across training venues.

OBJECTIVE

The objective of this research effort was to identify the factors associated with optimal placement of tasks for training, to support the process by which such decisions are made within the NCOES. The research was framed assuming durability to be a primary discriminating factor, but allowed for other factors or variables to discriminate between training site suitability. The goal was to aid the NCOES in developing a process for distinguishing tasks that are best suited for either institutional, operational unit, or self-study training sites, by thoroughly analyzing traits that characterize tasks ideally suited for an institutional training environment, an operational unit training environment, and a self-study training environment. In doing so, we would develop a front-end analysis (FEA) methodology to assist in identifying enduring tasks needed to develop Soldiers at the different levels of the NCOES from non-enduring tasks needed to conduct current and upcoming operations. This structured process would also consider other relevant site selection factors. The FEA methodology would support individuals involved in recommending training sites for individual tasks, by providing a simple way to systematically evaluate the characteristics of a task, and provide a process to determine optimal site placement selection.

The research questions were addressed in the data collection phase of the effort via interviews with domain subject matter experts (SMEs) and observations of Critical Task Site Selection Boards (CTSSBs). CTSSBs use semi-standardized processes to produce training site recommendations. Following the data collection, analysis efforts resulted in a set of the most critical factors for site selection, and an understanding of the CTSSB context in which site recommendations are made. The design phase of the effort then produced an FEA methodology for applying the site selection factors that best dictate training site identification, and embedded that methodology into a Site Selection Tool (SST) that would be immediately accessible and implementable by CTSSBs. Finally, the assessment phase of the effort evaluated the SST's usability and effectiveness, to both iterate its design and showcase its value to the NCO Academies.

CRITICAL TASK SITE SELECTION BOARDS

In TRADOC Pamphlet 350-70-6 (TRADOC, September, 2004), the Army outlines its process for reviewing and updating critical task lists. This process provides guidelines for selecting critical tasks and assigning them to training environment for each MOS

as part of the CTSSB process. First, a total task inventory of all possible critical tasks conducted in a specific MOS is developed from SMEs and formal documents. Using a job analysis, information is gathered to prioritize and rank the tasks in order of their importance in several different areas. The results of the job analysis survey are analyzed and prepared for presentation to the CTSSB members, to guide their decisions regarding task criticality. The board is comprised of FORSCOM (U.S. Army Forces Command) personnel with recent operational experience and representing a wide range of backgrounds. Either on the basis of the job analysis results and/or in conjunction with board member expertise, the board votes on the criticality of each task in the total task inventory. Specific voting procedures vary, but may rely on one of several models for producing numerical ratings or a simple yes/no vote. One popular model is the *Difficulty-Importance-Frequency Model*, in which tasks are identified as critical based on the difficulty, importance, and frequency with which they are performed. The *Eight Factor Model* is another prevalent method for judging task criticality. It leads board members to assess: percent of Soldiers performing the task; percent of time spent performing; consequence of inadequate performance; task delay tolerance; frequency of performance; task learning difficulty; probability of deficient performance; and immediacy of performance. Each factor is rated on a 6-point scale and the scores averaged to produce an overall criticality rating for each task. Other models and methods also exist, and their application at a CTSSB is at the discretion of the CTSSB chairperson and administrators.

After establishing a critical task list, boards move to the site determination phase. The process for this phase is less standardized and is given less emphasis, despite the resource and learning consequences associated with this decision. Unlike the criticality vote, no standard model or methodology exists for the site selection process within the CTSSB. While members of the CTSSB bring substantial operational experience and expertise to the board, seldom does a board member have any prior experience sitting on a CTSSB or selecting sites for task training. In other words, all board members are novice site selectors. Their MOS and duty position expertise is highly valued and gives them the necessary knowledge to properly characterize a task, but they may not know which characteristics about a task suggest that it is best suited to be trained at a specific training site. Thus, the FEA methodology and SST reported herein address a sizable gap.

The current site selection process involves a group discussion of site placement for those tasks identified

by the board's vote as critical. However, the discussion is typically driven by a combination of gut instinct and current practice (i.e., "where are we currently training this task?") to reach a site recommendation. Furthermore, the group dynamic may be such that one or two individuals monopolize the discussion by virtue of their assertive personalities. Since each individual represents one operational unit, the result may be limited contribution or no input at all from key operational elements across the force. Therefore, a secondary objective of the FEA methodology and SST was to facilitate equal representation across board members on site selection recommendations, as is the case with task criticality ratings.

Following the CTSSB, course personnel review the CTSSB's recommendations for the critical task list and site selection, apply their own knowledge and experience regarding appropriate site placement, and submit their recommendations to the NCOA Commandant. The Commandant revises the outcomes as necessary, accounting for his or her own expertise and understanding of Army needs and available resources. Finally, the new critical task list is published and the institution's POI is modified according to the final site determinations.

ANALYSIS OF SITE SELECTION FACTORS

Characteristics of enduring and non-enduring tasks, and factors considered for selecting optimal training sites, were identified through data collection in the form of SME interviews, CTSSB observations, and qualitative data analysis.

Data Collection

Interview participants were obtained telephonically and from three sites: Fort Bliss, TX, Fort Benning, GA, and Fort Huachuca, AZ. Interview candidates represented job roles such as NCOES course chiefs and course managers; NCO Academy former and current commandants and deputies; training and course developers; NCOES senior instructors; and other key individuals in the Army Task Analysis and Instructional Development branches. All interviewees were either active duty personnel, or retired Army officers or NCOs currently serving as government civilians. Additional interviewees were selected once on site, and these individuals were all first-time board members (active duty). As such, they were not SMEs in site selection per se, but represented a user population whose perspective warranted consideration. Finally, telephonic interviews were conducted with representatives from the Coast Guard's Performance

Technology Center. In all, 35 individuals were interviewed in 32 interview sessions.

Observations were conducted at two CTSSB meetings: (1) a Fort Bliss CTSSB, which reviewed common core tasks for criticality and inclusion in Warrior Leader Course; and (2) a Fort Benning Infantry Officer CTSSB, which reviewed infantry Lieutenant and Captain tasks for inclusion in the Infantry Basic Officer Leader Course and the Maneuver Captain's Career Course, respectively. Although the latter was not an NCOES board, we relied on observations of the board's process, which are sufficiently similar to NCO boards to warrant inclusion in the data collection.

Interviews were conducted by a research psychologist and supported by a military SME. In most cases, interviews were conducted with a single participant; however, in three cases, two SMEs were interviewed together. Every interview lasted 60-90 minutes. A semi-structured interview protocol was administered, addressing the SME's rationale for identifying tasks to be trained at particular sites, the relative advantages and disadvantages offered by each site, and the challenges associated with selecting sites for training, especially resource limitations. In addition, researchers elicited information about the CTSSB process and outcomes, current initiatives for improvement, and other barriers associated with maintaining task lists and updating institutional training.

Analysis

A three-stage qualitative analysis process ensued. Participant numbers were associated with data throughout the analysis, to ensure traceability.

In the first stage of the analysis, a sweep was conducted through observation and interview data to identify factors and task characteristics identified as pertinent to site selection, characteristics associated with enduring or non-enduring tasks, challenges associated with site selection, ideas for improving site selection, and other issues of relevance to the project goals. For each interviewee, relevant data were extracted and entered into data tables.

In the second stage, factors described in the data tables were identified to produce a single descriptor for the same concept communicated in different ways by interviewees. Each factor was then defined. Frequencies were calculated across the data set to determine how many interviewees reported each factor, regardless of whether they aligned the factor with institutional, unit, or self-study. Therefore, each factor was stated as a neutral element, such that it could be

rated as having a value across a continuum, or as a yes or no judgment. For instance, with regard to the *Universality* factor, a task could be judged as high, medium, or low as to the requirement for, and relevancy to, every unit across the MOS. Similarly, for the *Hands-On/Motor Skills* factor, a task could be judged as either requiring or not requiring hands-on motor skills to perform. Factors that were not reported by at least three SMEs were discarded from the set.

Characteristics of enduring and non-enduring tasks were also extracted from the data tables and listed. However, due to a lack of SME support for the application of task endurability as a site selection factor, frequency counts for these characteristics were not recorded. Rather, the concept of task endurability was more appropriately represented as a category of site selection factors, called Enduring Army Standards.

In the final analysis step, factors defined in the second stage were sorted into like categories, for two reasons. First, the groupings highlighted the relationships between factors and the clusters that often correlate with each other. With the end goal of developing a streamlined FEA methodology that does not rely on consideration of every factor, the categories of factors enabled selection of only the most discriminating factors for inclusion in the methodology. In addition, the large number of factors made the set unwieldy without an organizing framework.

Findings

A total of 36 site selection factors were identified across five categories:

- **Enduring Army Standards;** factors related to the task's nature as a foundational and universal requirement, for which standardized and controlled training is deemed necessary.
- **Instructional Affordances;** factors related to the degree to which training benefits from peer-to-peer learning, small group instruction, question and answer periods, observation-based assessment, and where task SMEs reside.
- **Site Affordances;** factors related to resourcing in the form of time, equipment, and ease of integration with other training.
- **Nature of the Knowledge;** factors related to task complexity, and whether the task is based on declarative knowledge, is procedural in nature, requires hands-on motor skills, or requires complex conceptual/critical thinking.
- **Task Performance;** factors related to the safety and risk associated with performing the task, as

well as current force proficiency and unit- or MOS-specificity.

Task endurability was largely defined as the longevity of the task, or its likelihood to remain constant over time. Endurability was frequently associated with the foundational nature of the task and its universal application across operational contexts – both of which were reported as site selection factors. Tasks perceived to be non-enduring fell into one of two classes. First, tasks can be non-enduring if they stem from a particular adversary or region of the world, and TTPs that are produced as a result. Tasks can also be non-enduring if they are associated with a specific technology-based system (as opposed to the outcome produced by the system) that is likely to be modified or replaced as a result of technological advances.

The concept of task endurability was considered by some SMEs to be theoretically sound. It made logical sense that institutional resources should not be applied to tasks whose criticality and relevance will not persist. However, in practice, no SME reported having considered task endurability in the past as a distinct factor for site selection, nor did SMEs identify endurability as relevant when assessing the task list provided as a part of the interview protocol. Large degrees of variability existed in other comments made by SMEs regarding endurability as a discrete factor for placing tasks for training. Ultimately, nine factors were identified as related to task endurability, and categorized as Enduring Army Standards. They are: *Universality; Core Task; Need for Standardization; Need for Control; Foundational; Leadership; Doctrinal; Task Criticality; and Train-the-Trainer.*

FEA METHODOLOGY AND SITE SELECTION TOOL

Once factors for site selection were identified, the research team produced an FEA methodology for site selection recommendations. The methodology was then instantiated in an SST that would be highly accessible and immediately usable for CTSSBs.

The primary objective of the methodology and SST was to support CTSSB members, who are novice site selectors, in making better use of their operational experience to make robust site selection recommendations. The SST was not envisioned as a replacement for the judgment of the board members. Instead, the goal was to improve the quality of human recommendations by ensuring all important factors are considered. We aimed to improve the efficiency of the group discussion by clearly differentiating the tasks on

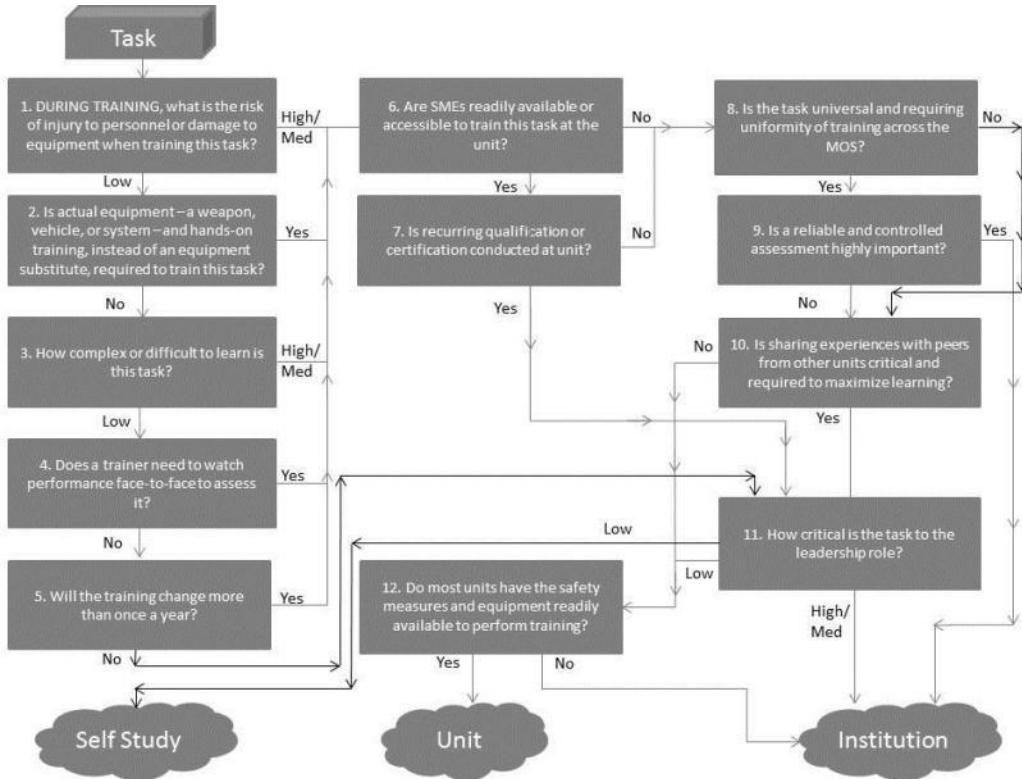


Figure 1. Flow Chart Depicting FEA Methodology

which board members agree, from those tasks for which there is variability across board member opinions, and thus discussion is required.

FEA Methodology

Since it would have been futile to produce a methodology that produced the “right” site selection in every instance, the design of the methodology and SST was instead driven by the need for a streamlined process that would produce a valid recommendation for most tasks except under outlier circumstances. With an aim to define a highly efficient methodology, therefore, only the factors that are principal discriminators for site placement were included in the methodology. Each of the five factor categories was reviewed to identify the factors that tend to be highly correlated (e.g., a task that is high on *Universality* is often also high on *Need for Standardization*) and thus, for the purposes of the methodology, redundant. In addition, tasks that were seen as critical and key determinants, such as *Safety* or *Peer Learning Benefit*, were identified as candidate discriminators for the methodology. Finally, factors deemed difficult for CTSSB board members to assess due to their limited knowledge of the institution’s POI and resources, such as *Time Available to Train* or *Integration Ability*, were excluded as candidates.

However, note that following receipt of the CTSSB’s recommendations and as part of the task analysis process, the course manager and other NCO Academy personnel consider factors like these two, which are beyond board member appraisal, in their final site selection recommendations to the Commandant.

A flow chart diagram (see Figure 1) was iteratively generated along with the identification of candidate discriminators. In some cases, two discriminating factors were combined to enhance the clarity or add emphasis to the discrimination the eventual user—the CTSSB board member—would be asked to make. Each candidate discriminator or discriminator duo was reframed as a yes/no question to be answered by the user about the task, and represented in the flow chart as such. Affirmative or negative responses would define the branch to the next discriminator in the chart. Later in the development process, the affirmative and negative response options were modified to allow for responses along a continuum – high, medium, or low – for a subset of the discriminators. The flow chart was conceptualized to begin with a series of questions designed to first recommend or eliminate self-study as the training site; then recommend or eliminate the institution as the site; and finally recommend the unit if the other two sites were eliminated, and if the unit was

equipped to provide the training. The final flow chart is depicted in Figure 1.

Fourteen factors were ultimately identified as principal discriminators for site selection and articulated in a series of 12 questions in the methodology (see Table

1). The methodology is intended to be applied to each task individually. Users begin with Question 1, regarding the *Safety* discriminating factor, and progress through the flow chart in Figure 1 based on the branching logic.

Table 1. Principal Discriminator Factors and Definitions

Discriminating Factor	SST Question	Definition
Safety	1. Safety concern?	The danger associated with training or performing the task. Significant risk (life, limb, eyesight) may be linked with incorrect performance, either in training or operational contexts. This question is about the degree of risk associated with conducting the task.
Risk		
Need for Equipment	2. Equipment and hands-on training required?	The extent to which task performance and training requires motor or hands-on performance, or physical manipulation of tools, equipment, or items. This question is about whether the training must employ the actual equipment that would be used operationally, or whether computer based training, a simulation, or a classroom-based substitute can be used instead.
Hands-on Motor Skills		
Task Complexity	3. Difficult to learn?	The effort required to learn the task, usually based on the degree of difficulty of the concepts or procedures involved. Tasks that are more complex require a human trainer for instruction, to provide examples, and to answer questions.
Need for Observation-Based Assessment	4. Assess performance by watching face-to-face?	The extent to which a Soldier's performance must be observed in order to evaluate it against the standard. This question refers to whether a trainer is required to watch NCOs perform the task, in person, in order to conduct an accurate assessment.
Training Updates	5. Updates needed more than yearly?	The likelihood that task standards will change and instruction will require modification to keep the pace with the evolving conditions. If the training content will change more than once a year, the task is probably not a good fit for self-study.
Residence of Expertise	6. SMEs available or accessible at unit?	The extent to which trainers, small unit leaders, or subject matter experts are training the task at the unit. This question refers to whether subject matter expertise typically exists at the unit, and also whether those SMEs are readily available to NCOs for training.
Annual training or qualification	7. Annual qual./cert. at unit?	Whether or not there is an annual training or qualification requirement that is satisfied at the operational unit. The rationale behind this question is that when annual testing occurs at the unit, there is a strong likelihood that NCOs receive the required training at the unit.
Universality	8. Universal task, uniform training required?	This question has two parts. Universality is about the extent to which the task is relevant to NCOs across the Force or across the MOS, regardless of job assignment. Standardization refers to how important it is that all Soldiers learn to conduct the task using the same procedure. This question asks whether most NCOs will employ the task on the job, and whether they must know or use the book standard to be effective.
Need for Standardization		
Need for Control	9. Reliable and controlled assessment?	The importance associated with ensuring task training has been delivered and performance has been assessed for each and every NCO. Some tasks require an extra degree of assurance that every Soldier who has gone through the training actually grasps the task and can perform it effectively. This question refers to the criticality that an instructor be present to ensure each and every NCO is trained to standard.
Peer Learning Benefit	10. Peer-to-peer learning critical and required?	The degree to which there is a learning advantage associated with exposure to the experiences of Soldiers from other units or backgrounds. When a task, such as a combat tactic, must be adjusted for execution in different mission types or operational environments, there is great learning value in hearing examples of the many ways to conduct the task. This question refers to whether there is a particular benefit from exposure to peers from different units who can speak to how mission or environmental factors impact task execution.
Leadership	11. Criticality to leadership?	The importance or centrality of the task for being an effective leader. This question is about whether or not the task is one of the core functions of a leader.
Access to Equipment	12. Safety/equipment available at unit?	Whether the necessary equipment or safety measures for training the task are present and available at most operational units. This question provides a check to ensure that if a task is recommended for training exclusively at the unit, most units across the Army will have the means to conduct that training.

Site Selection Tool

The SST development phase was initiated by identifying a platform that would best support both CTSSB members and the administrators of CTSSBs.

Web-based tools and survey platforms were considered for their potential to be accessible from any Army computer via Army Knowledge Online. However, we ultimately selected Microsoft Excel as the SST platform. Excel is currently used by most CTSSBs to manage the criticality ratings. Therefore, CTSSB administrators are familiar with the software's functionality, task list inputs would only require a simple copy and paste, and an Excel tool is conceptually consistent with the manner by which CTSSBs are conducted. Furthermore, a product built in Excel would not be subject to restrictions on software installed on Army computers, and would therefore be immediately accessible to the target audience. To accommodate sites where security requirements pose restrictions on software use, a paper-based version of the SST was also developed.

A User version of the SST (see Figure 2) in the form of a macro-enabled spreadsheet was created to lead board members through the series of questions comprising the site selection methodology, resulting in an SST recommendation based on the flow chart branching logic. Critical tasks and their numeric designators are inserted by the administrator in the first two columns of the spreadsheet. The third column is vacant for the

criticality rating to likewise be entered by the administrator; however, this column is optional.

The next 12 columns comprise the questions to be answered by the user about the task in question. They reflect the 12 principal discriminator questions from the FEA methodology. A short version of the question is viewable at all times. Users can mouse over a red caret to view a long version of each question, or they can access detailed definitions of each question via a separate tab in the workbook. When the cell corresponding to a question is selected in the spreadsheet, a drop down list appears revealing the answer choices. The user may click to respond, or use a keystroke corresponding to the first letter of the response (i.e., "y" for "yes").

The flow chart branching logic is replicated in the SST by greying out the cells for which an answer is not required. For example, if a user selects "high" or "medium" on Question 1, then Questions 2-5 will be greyed out and the cursor will appear in the box for Question 6. Once the user has input an answer to each question required for a given task according to the branching algorithm, the SST will automatically populate the "SST Recommendation" cell with one of three possible outcomes: Institution, Unit, or Self-Study.

If the user disagrees with the SST recommendation, he or she may identify a different site recommendation in

The diagram illustrates the User Site Selection Tool (Figure 2) as a Microsoft Excel spreadsheet. The spreadsheet structure is as follows:

- Task List:** The first column, labeled "Task Number", contains task identifiers such as "171-620-0002", "171-620-0011", "171-620-0027", "171-620-0055", and "171-620125".
- Short Version of Questions:** The second column, labeled "Task Title", contains brief descriptions of the tasks: "Conduct a Strongpoint Defense at Company-Troop Level", "Conduct Zone- Area Reconnaissance at Company- Troop Level", "Conduct an Attack by Fire at Company-Troop Level", "Conduct Actions on contact at Company-Troop Level", and "Conduct Pattern/Predictive Analysis".
- Red Caret for Long Version of Questions:** The third column, labeled "Question Definitions", contains 12 questions with red carets for long versions. The questions are: 1. Safety concern?, 2. Equipment & hands-on required?, 3. Difficult to learn?, 4. Assess performance by watching face-to-face?, 5. Updates needed more than yearly?, 6. SMEs available or accessible at unit?, 7. Annual dual/cert at unit?, 8. Universal task, uniform training required?, 9. Reliable and controlled assessment required?, 10. Peer-to-peer learning critical and required?, 11. Criticality to leadership?, and 12. Safety/equipment available at unit?.
- SST Recommendation:** The fourth column, labeled "SST Recommendation", contains the final recommendation for each task, such as "Institution", "Unit", or "Self Study".
- User Opinion, If Different from SST:** The fifth column, labeled "User Opinion, If Different from SST", contains a note: "If you disagree with recommendation, please indicate your personal recommendation".

Annotations with arrows point to specific features:

- Task Number:** Points to the "Task Number" column.
- Question Definitions:** Points to the "Question Definitions" column.
- Greysed Out Cells:** Points to the cells in the "Question Definitions" column that are greyed out for certain tasks (e.g., rows 2-5 for Task 1).
- Reset Buttons:** Points to the "Reset" buttons in the "SST Recommendation" column.

Figure 2. User Site Selection Tool

the next column, including a selection of “Institutional-Functional” to reflect the desire for the task to be trained in an institutional setting, but in a functional course vice the course being reviewed. A Reset button enables the user to clear the row of entries if he or she wishes to make adjustments to a response other than the last question answered. Finally, users may choose to insert comments about the task in the final column, if desired.

An Administrator SST was also created, enabling the CTSSB administrator to input the critical task list into the SST and disseminate it across CTSSB members (i.e., the computers they would use in an Army computer lab). Subsequent to user completion, the Administrator SST automatically merges the data of the board members, and provides a frequency count for site placement votes for the SST Recommendations and for the Board Member Opinions to produce a compiled set of recommendations. Prior to compilation, the administrator designates a threshold for consensus to be applied by the SST— 50%, 60%, 70%, or 80%. These choices are provided to ensure the SST is of value to CTSSBs regardless of the number of voting members or other group differences that may call for higher or lower agreement thresholds.

When consensus across the board members does not reach the threshold in either of the consensus columns (i.e., SST Recommendation or Board Member Opinion), the row is highlighted amber for group discussion. The completed Administrator version can be viewed by either the board as a group, or by the board chair alone, to facilitate discussion on low-consensus tasks. Both User and Administrator versions of the SST functionality and interface were modified as a result of four rounds of assessment and feedback (see Miller, Phillips, Gomez, & Finerson, in preparation, for a discussion of the assessment results).

Finally, to support SST utilization, an Implementation Guide was produced to advise as to the integration of the SST into the CTSSB process. For CTSSBs where computer use is constrained due to classification levels or other issues, instructions for use of the paper-based SST were also generated.

CONCLUSIONS

While CTSSBs are equipped with several task selection models and methodologies to support judgments about a task’s criticality on an MOS or common core task list, no such supporting methodology for training site recommendations has existed until now. The FEA methodology identifies 12 dimensions of primary

consideration for recommending a task be trained in an institutional setting, via self-study, or solely at the operational unit. Furthermore, the SST instantiates the methodology into an Excel-based tool; a tool which integrates easily and flexibly with the current CTSSB process. In light of budget cuts taking shape across the Department of Defense, the SST’s support to the generation of sound training site recommendations becomes even more valuable.

Early indications suggest that the SST is indeed useful to support, but not replace, human judgment for site selection recommendations. While the Army moves toward implementation of the Army Learning Model, which in part prescribes better use of technologies to support training requirements, the SST provides the force with a tool to make informed decisions as to tasks that can be trained via technology (i.e., structured self-development modules) versus those for which face-to-face classroom instruction with a skilled instructor remains preferable.

However, it is critical that the users view and use SST outcomes appropriately. The purpose of the tool is twofold: to ensure novice site selectors are cued to consider the full range of appropriate factors for site selection, and to discriminate between tasks that do and do not require group discussion. Regarding the latter, CTSSBs should view tasks for which consensus does not exist, or tasks for which board member opinions do not coincide with SST recommendations, as ripe for discussion. These instances should not be considered as failures by the SST, but rather examples of occasions in which human intelligence trumps an automated system.

Task Endurability

The concept of task endurability proved difficult to address, with SMEs exhibiting a great deal of variability in their ideas about enduring and non-enduring tasks, as well as their specification as to what makes a task enduring versus non-enduring. Task endurability was not necessarily viewed by SMEs to be a factor that, on its own, should dictate site placement. In other words, arguments can be reasonably made for training a particular non-enduring task in the institution. One of the benefits of institutional training is its ability to quickly reach a broad audience and provide standardized instruction across the population. In fact, institutions seem to be perceived as a primary and valuable vehicle for delivering required training to the Army at large in a quick and controlled manner, regardless of task relevance to the course subject matter. It follows that crucial threats to human life, such as IEDs or Soldier suicides, might be appropriate topics for institutional training. Tasks that might be defined as

enduring in nature, insomuch as they fall within the family of factors categorized as reflective of Enduring Army Standards, are in many cases better suited for institutional training than other sites. These are tasks that rate high on dimensions including universality, need for standardization, need for control, foundational, and doctrinal.

One set of SMEs representing task analysis activities reported ongoing efforts to modify the task descriptions in a manner that would minimize any discussion about permanent versus temporary, or enduring versus non-enduring tasks. Some tasks designate, in their title, a particular system or piece of equipment employed by the Soldier. This task analysis group argues that what is critical to Soldier performance is not the particular tool applied so much as the function and outcome the tool supports. Their task modification effort focus on stating the function performed vice the tool employed.

A group of interviewees re-framed the question of *enduring* tasks into one of *emerging* tasks. An emerging task might be defined as one that materializes as a result of global changes to how nations or other entities engage in conflict, or evolutions of political interests and national security policies. In contrast with the concept of task durability, task emergence might be considered to be more permanent in nature and associated with a phase of international conditions and common practices in global conflict, vice a specific regional task requirement. For example, the role of ground units has recently evolved from a maneuver to an asymmetric warfare mindset. Small unit leaders perform tactical questioning and other similar tasks related to human intelligence gathering; engagements with civilian leaders; and biometrics collections. These task areas were previously primarily associated with intelligence, civil affairs, and military police MOSs, respectively, but have emerged as infantry requirements. Furthermore, new tasks have emerged in the area of site exploitation and forensics collection, prompted by both operational needs and technological advances. These are likely to reflect a semi-permanent way of operating in asymmetric environments.

Limitations of the SST

The SST is designed specifically for use in the Army training context. Some, if not all, of the factors are likely to have relevance to the other military services, and the process embedded in the SST would be easily transferrable to meet the requirements of these site selection review processes. However, efforts to implement it outside of a military domain may be premature. In contrasting institutional settings with garrison unit settings, we found training capabilities to

differ largely on the basis of practical limitations—such as time limitations, equipment availability, access to subject matter expertise, and exposure to a diverse trainee population—vice a qualitative difference in the training capability. These differences may or may not coincide with the predicament of non-military domains. However, with regard to self-development, the discriminating factors have more to do with task complexity and the nature of the knowledge being addressed. Therefore, the SST's site recommendations for self-study may be more generalizable outside of military domains.

In applying the tool, we noted broader challenges associated with the conduct of CTSSBs. Most notably, leadership of the board is critical. With or without automated supports, the success of board outcomes depends on effective leadership to embrace the range of experiences resident in board members and facilitate a healthy debate that is not overtaken by a few strong personalities.

The quality of the board members selected to represent the operating force, and the knowledge they bring to the board, is likewise crucial to success. The SST cannot substitute for lack of board member knowledge. Some test users indicated a preference to specify their level of expertise on the task. Because the board composition is mandated by Army Pamphlet 350-70-6 and the same issues arise in the voting phase for task criticality, the decision was made not to include this functionality in the SST. However, the Implementation Guide offers recommendations for administrators who may wish to form subgroups of board members with varying expertise on a subset of critical tasks.

Many individuals noted a propensity to “game the system,” meaning that they attempted to figure out the algorithms so that they could answer the questions to produce their desired site recommendation. To better control against gaming behaviors, the research team built in a means of reporting one’s personal opinion in a way that was weighted equally to the SST recommendation. However, this modification did not seem to decrease the gaming behaviors. We considered displaying the SST recommendations only after all questions were answered for every task, and the user clicked a button to submit the answers. However, this approach was jettisoned due to the additional time requirement it would have produced. We deemed it crucial to collect user opinions in addition to SST recommendations; modifying the functionality as described would require users to review the task list a second time to examine the SST recommendation and respond as to its agreement with their own personal opinion. If the gaming behaviors persist, the impact on

the final site recommendations by the CTSSB is unclear. Presumably, any effect would be mitigated by the group discussion that occurs when board members fail to reach consensus on a task.

Future Research and Development

Although this effort conducted several assessments and attempted to garner representation across a wide range of Army MOSs and experiences, it was not possible to assess the SST under every possible MOS. The current version of the SST represents the combined lessons learned from the groups that were assessed, representing subject matter expertise of many years and several varied Army backgrounds. The SST is slated for distribution across the NCOES in FY13, and feedback collected from the broad population of users may result in future SST iterations containing additional features. Through the course of this project, several feature requests were considered but ultimately rejected, as they were either deemed outside of scope or lacking consensus regarding applicability across a significant number of MOSs. Future iterations of the SST should consider low-density MOSs, where a single Soldier may be attached to a broader unit but the individual's contact with the parent unit or SMEs is limited. The tool may also be useful for other NCO course CTSSBs, or for officer boards. As a result of SST assessment at an Armor Officer CTSSB reviewing lieutenant and captain tasks, it became apparent that modifications would be necessary under circumstances when the CTSSB is considering task placement for an entry-level population (i.e., lieutenants attending the Armor Basic Officer Leader Course, or ABOLC). Because operational units expect an incoming lieutenant to have at least introductory knowledge of a broad range of tasks required of the rank, site recommendations for the armor lieutenant tasks were substantially skewed toward institutional training, which translated into exposure at ABOLC. We expect to see the same effect with NCO skill level 1 tasks or other lieutenant boards, thus requiring a modified SST for those situations.

Additional considerations should be paid to the manner in which self-study is encouraged and/or delivered in the Army. Currently, self-study is generally construed as Army-developed dL. Strictly speaking, self-study includes any training that is not conducted by a formal instructor at the institution or delivered via face-to-face interaction with a unit trainer. The current iteration of the SST relied on the current conceptualization of the self-study as formal web-based training. As the Army continues to evolve its interpretation and expectations for self-study, the logic guiding the SST's placement of tasks into self-study will require revisiting.

Finally, as technology continues to play an increasingly important role in Army training, a greater number of tasks can be expected to be trained using simulations. Depending upon the complexity and expense of the technology needed to conduct simulated training, the ubiquity of access to the necessary training equipment will vary. The underlying logic and process for assigning tasks to training environments partially relies upon accessibility of equipment. The SST distinguishes between actual equipment and an "equipment substitute;" if access to the actual equipment is required, then the task should not be trained in self-study. However, as simulation technology continues to develop and offer higher fidelity simulations at lower cost, it will likely increase the availability of and access to simulation technology. Some MOSs (particularly those heavily utilizing computers) may place less value in distinguishing between *actual* technology and *simulated* technology in that there may be little difference from the perspective of the Soldier training. As a result, the question regarding whether equipment is required for task training may evolve into a query as to the required level of fidelity.

The SST is intended to aid the Army at large in making better training site determination decisions. As such, it will be made widely available to CTSSBs, course developers, and other populations. The future of the Army is dependent on conscientious members of each MOS collaborating to maintain relevant task lists and optimize the use of training sites and opportunities, to ensure every Soldier is optimally prepared for missions across the full spectrum of military operations.

ACKNOWLEDGEMENTS

The authors wish to acknowledge the direction and foresight provided by Dr. Gary Rauchfuss of the Institute for NCO Professional Development and Dr. William Bickley of the Army Research Institute, as well as the valuable contributions of SMEs at the U.S. Army Sergeant Major Academy and the NCO Academies at Fort Benning and Fort Huachuca.

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