



**Research Product 2014-04**

**Updates to the Trainer's Decision Aid:  
Developing the Electronic Scoring Tool**

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**April 2021**

**United States Army Research Institute  
for the Behavioral and Social Sciences**

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

**Department of the Army  
Deputy Chief of Staff, G1**

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<b>14. ABSTRACT</b>  Effective performance requires Soldiers to maintain proficiency across multiple tasks. Training on collective or individual tasks is a time-consuming process, and readiness status is compromised when units are not able to train these skills at the necessary frequency. The Trainer's Decision Aid (TDA) previously developed for the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) is designed to determine retention intervals of necessary skills in military populations. The TDA provides estimates of skill retention intervals based on the science of skill learning. However, to take full advantage of the tool requires consideration of decision-maker (commanders', trainers') preferences and updates to the TDA's format to enable use by trainers and decision-makers who may not experts in the learning sciences. This product describes the development of the TDA electronic scoring tool (TDA-EST), including initial assumptions that influenced its development and instructions for using the tool in its current state.				
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We would like to thank all the Soldiers and staff at Fort Hood who contributed to the development of these tools, in particular the Fort Hood Medical Simulation and Training Center and its leadership, both former and current. The creation of these tools would not have been otherwise possible. We also thank the developers of the original Trainer's Decision Aid for their insights.

# UPDATES TO THE TRAINER'S DECISION AID: DEVELOPING THE ELECTRONIC SCORING TOOL

## EXECUTIVE SUMMARY

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### Research Requirement:

This report describes the development of the Trainer's Decision Aid Electronic Scoring Tool (TDA-EST). The Trainer's Decision Aid (TDA) was developed as a paper-pencil assessment to capture data about factors that could affect skill retention on individual and collective skills. In this update to the tool, the paper version was ported to an Excel workbook to make the tool more accessible to users, provide automated scoring mechanisms and data storage for future reference, and to provide a mechanism to more easily incorporate user preferences and priorities.

### Procedure:

Combat medics ( $N = 33$ ) who were instructors from the Fort Hood MSTC or were combat medics serving in operational units completed the paper version of the TDA with reference to the skills trained in the TC3 course. As part of this exercise, they also completed semi-structured interviews in groups regarding: (a) the extent to which existing TDA items addressed skills trained in TC3, (b) considerations for assessing how well skills will be retained at a level sufficient to maintain readiness, and (c) the relationship between those considerations and TDA items. Interviews were also conducted during which many of the medical trainers emphasized leadership and unit characteristics' influence in developing motivation for trainees to learn medical skills.

### Findings:

Currently unit leaders determine how often the first responder medical training, examined in this research, is conducted based on generic training frequencies in doctrine, not on actual skill retention estimates or performance data. Trainers thought such standards are fine to use as a guide. However, using a one-size-fits-all approach is probably less effective than using more targeted training for those who may need some re-training and at more frequent intervals than currently prescribed. Thus, unit leaders may be able to take advantage of retention estimates as they decide when to provide additional training in their home unit and what type of training to provide, in order to maintain readiness. Similarly, leadership responsible for broader manpower, scheduling, and funding decisions could benefit from a science-based estimate of retention for these skills to consider along with other workforce development constraints, including trainee availability, job requirements, and funding. In terms of capturing necessary data, trainers generally agreed the categories in the tool, task characteristics, unit characteristics, and external factors should provide sufficient data for informing retention estimates.

## Utilization and Dissemination:

The TDA is intended to estimate retention for individual and collective skills over a period of about six months using a series of multiple-choice items. Scores produced by the tool are meant to indicate how likely readiness will be maintained after skills associated with a task are trained. Though we examined medical first responder skills in the present research, the TDA-EST was developed to be able to incorporate any task where skill retention and setting effective training and re-training frequencies are a particular concern.

# UPDATES TO THE TRAINER’S DECISION AID: DEVELOPING THE ELECTRONIC SCORING TOOL

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## **UPDATES TO THE TRAINER'S DECISION AID: DEVELOPING THE ELECTRONIC SCORING TOOL**

Understanding and estimating the extent to which individuals and collectives can perform mission-critical skills is essential to assessing readiness. Although many of these skills are trained (e.g., medical), skill decay is natural, making it important to think about maintaining skill competencies. Skill decay is an outcome characterized by diminished performance on skills and knowledge that were trained or acquired after some period of nonuse (Arthur, et al., 1998). Skill decay and skill retention could be represented as two sides of the same coin, such that more decay indicates less retention or less decay indicates more retention (Arthur & Day, 2013). The research surrounding skill retention prediction has improved in recent years (e.g., Carlin, et al., 2016; Jastrzembski, et al., 2009; Walsh, et al., 2018), and can provide good retention estimates. However, these studies require large volumes of data that may not be available to commanders and trainers responsible for scheduling training and developing curricula. A simple assessment based on key retention factors is needed to support commanders and trainers in making decisions on training program development, acquisition, and scheduling to circumvent this issue.

The Trainer's Decision Aid (TDA), developed by Cianciolo et al. (2010), is a means for commanders and trainers to estimate skill retention using information about the task that is readily accessible to those with expertise in the domain of interest. This simple assessment attempts to capture many of the characteristics that may influence skill retention or decay, including task characteristics (Annett, 1979; Arthur et al., 1998; Naylor & Briggs, 1961; Prophet, 1976), the length of the retention interval (Arthur et al., 1998; Weaver et al., 2012), evaluation criteria and methods (Arthur et al., 1998; Farr, 1987; Flexser & Tulving, 1978; Kirkpatrick, 1979), and retrieval conditions (Arthur et al., 1998; Farr, 1987; Tulving, 1983). It uses multiple-choice questions to develop 6-month retention estimates for individual and collective skills by assessing task characteristics, characteristics of the warfighter or unit, and external environmental factors. It was based on the earlier User's Decision Aid (UDA; Rose, Czarnolewski, et al., 1985) and shares some similarities in item content and structure. Where the UDA focused largely on individual-level skill retention, the TDA added questions to also capture collective retention estimates. The TDA also included questions that influence skill retention estimates aside from simple task performance estimates by including questions about commander's emphasis, frequency of training on skills, and whether technology played a role in task performance.

This Research Product describes the development of the TDA electronic scoring tool (TDA-EST). This update to the tool provides a level of automaticity not present in the original, paper-based version of the TDA by using an Excel template to both capture and store estimates of skill retention. It also gives the user more control over the process by allowing them weight or prioritize items within each of the major scales for individual and collective estimates. This tool is designed to be flexible and can accommodate a range of user preferences and calibration data from training courses or proficiency tests. This allows the tool to be adjusted by the individual user and to be updated as more data is added to it. The present research focus was on medical skill training conducted at the Fort Hood Medical Simulation Training Center (MSTC), but the tool is intended to be applicable to any domain in which quantitative measures of skill are

available. The extent of its flexibility across domains would, however, need further empirical testing. It is intended to account for user needs and priorities and provide outputs that are actionable based on retention estimates up to a 6-month period. For instance, this tool could assist leaders in developing Unit Training Plans by helping them to better assess how long a warfighter (or a collective) is likely to be able to perform each of a set of Mission Essential Tasks presumably learned through training. A brief summary of the detail on the purpose and motivations for the development effort, and a description of the development process and the current state of the scoring sheet are described below. Further review of the literature and research descriptions are detailed in Wood, Keeney, Bessey, Reynolds, Toumbeva, Leins, Kay, and Vowels (In Preparation).

### **Current Research**

The purpose of this research is to update the TDA, in order to better support decisions to train and retrain both individual and collective skills, focusing particularly on those skills in the medical domain. Specifically, we were interested in examining skills that Soldiers would need to perform as first responders to a medical emergency (treating a Soldier who was severely injured by an IED explosion, for example). Previous ARI research led to the development of the UDA (Rose, Czarnolewski, et al., 1985; Rose, Radtke, et al., 1985) and the more recent refinement of that tool into the TDA (Cianciolo et al., 2010). Those tools were built upon multiple years of effort with military populations to determine retention intervals of necessary military skills (Hagman & Rose, 1983; Rose, Czarnolewski, et al., 1985; Rose, McLaughlin, et al., 1981). The TDA added a capacity to also assess collective skills and incorporated factors external to simple task completion (such as commander emphasis on training the skills). The TDA, rigorously developed through a program of research, requires additional effort to enable users and decision-makers to more readily utilize the tool (developing an electronic version of the tool to both score and maintain estimates) for guiding decisions related to training schedules, curriculum development, and acquisition.

Therefore, one intent of the current research is to improve the usability of the TDA by porting the current paper instrument into an electronic scoring tool that is easier to use and more flexible to the preferences of military users who are responsible for training. Instructors from Tactical Combat Casualty Care (TC3) course at Fort Hood's MSTC were asked to complete the paper version of the TDA, as well as semi-structured interviews. They provided information about factors (such as experience level of the instructor, motivation of the students in the course, students' previous learning, etc.,) that should be considered related to either the TDA or medical training in general that could be used to improve the TDA. Medical training was selected as a target for improving the TDA with the intent of providing subject matter expert-based estimates, coupled with actual training performance data, to provide a more comprehensive picture of how frequently such skills should be trained.

### **Tactical Combat Casualty Care**

The Army TC3 Course was selected to assess TDA performance and develop the TDA-EST. The course focuses on teaching casualty care skills through classroom and practical lab-based instruction. These skills are performed individually and then later coordinated across team

members, with the final practicum assessing the ability of team members to deliver and coordinate care while transporting the patient. Warfighters are required to complete this course on a 3-year basis or 12-months before a deployment (DoDI 1322.24). Current policy does not provide recommendations for leaders to periodically assess or retrain TC3 skill readiness outside this cycle, though the intent of mandating training is to assure some level of competency with these skills.

### **Trainers' Decision Aid Feedback from Medical Simulation Training Center Personnel**

Combat medics ( $N = 33$ ) who were instructors from the Fort Hood MSTC or were combat medics serving in operational units completed the paper version of the TDA with reference to the skills trained in the TC3 course. As part of this exercise, they also completed semi-structured interviews in groups regarding: (a) the extent to which existing TDA items addressed skills trained in TC3, (b) considerations for assessing how well skills will be retained at a level sufficient to maintain readiness, and (c) the relationship between those considerations and TDA items. Due to a limited sample, and a limited number of data points per topic, we did not perform quantitative analyses.

During the interviews, many of the medical trainers emphasized leadership and unit characteristics' influence in developing motivation for trainees to learn medical skills. In general, individuals from units that are likely to use these skills while deployed (e.g., medical or armored divisions) were more motivated to learn TC3 skills than those who are less likely to use these skills as part of their routine duties. Trainers also stated that TC3 skill training or re-training is often done at the home unit at the discretion of local leadership. However, this is not explicitly within MSTC trainers' mission set unless unit leaders request it. In addition, Soldiers with more career experience, in general, tended to retain trained medical skills better. Some reasons provided included career and promotion incentives, increased opportunities to practice skills throughout the course of their earlier experience, and an increased likelihood to have salient examples from service experience as to the importance of these skills.

A few medical trainers noted that formal training schedules for TC3 skills were based on doctrine. However, trainers and unit commanders have flexibility in the way training is performed at the home unit beyond the TC3 certification requirement, including the extent of training or re-training frequency or memory aids are provided to support skill maintenance and retention. Currently unit leaders determine how often such first responder medical training is conducted based on generic training frequencies in doctrine, not on actual skill retention estimates or performance data. Trainers thought such standards are fine to use as a guide. However, using a one-size-fits-all approach is probably less effective than using more targeted training for those who may need some re-training and at more frequent intervals than currently prescribed. Thus, unit leaders may be able to take advantage of retention estimates as they decide when to provide additional training in their home unit and what type of training to provide, in order to maintain readiness. Similarly, leadership responsible for broader manpower, scheduling, and funding decisions could benefit from a science-based estimate of retention for these skills to consider along with other workforce development constraints, including trainee availability, job requirements, and funding. In terms of capturing necessary data, trainers generally agreed the

categories in the tool, task characteristics, unit characteristics, and external factors should provide sufficient data for informing retention estimates.

## **Tool Development**

The TDA is intended to estimate retention for individual and collective skills over a period of about 6 months using a series of multiple-choice items – 14 items for individual tasks and 12 for collective tasks. Scores produced by the tool are meant to indicate how likely readiness will be maintained after skills associated with a task are trained. Tasks that receive high TDA scores will decay at a slower rate and be retained for longer, whereas those that receive low TDA scores decay faster and are less likely to be retained throughout that 6-month interval. For each individual and collective scale, items are about evenly distributed across three subscales:

- Task Characteristics – factors related to the action(s) being performed in the task
  - TDA Individual Scale example: How much do memory aids reduce the memory demands of this task?
  - TDA Collective Scale example: What is the size of the collective that this task applies to?
- Unit Characteristics – factors related to the unit’s “emphasizing, training, and performing the task of interest” (Cianciolo et al., 2010, p. B-12)
  - TDA Individual Scale example: How often has this skill been used?
  - TDA Collective Scale example: How effective was the training on this task?
- External Factors – factors related to the task but are “outside the unit’s sphere of influence as they relate to conditions and technologies required to perform the task of interest” (Cianciolo et al., 2010, p. B-16)
  - TDA Individual Scale example: How reliable is the technology used in performing this task?
  - TDA Collective Scale example: How frequently has the technology involved in performing this task changed?

The TDA-EST was developed to allow flexibility in how item-level scores are combined. The current TDA-EST was developed using principles from multi-criteria decision analysis (Belton & Stewart, 2002; Bottomley & Doyle, 2001; Keeney & Raiffa, 1976) so that results from calibration or validation training data, when available, can be used to update scoring. Individual user expertise and preferences can also be built into the tool to inform estimates of skill retention and any subsequent recommended actions. For example, several trainers using the tool independently may have varying scores based either on experience and/or individual preference

## Final Products

The TDA-EST makes several updates to the original TDA. First, the tool digitizes all TDA items and provides dropdowns for all response items. This revision allows for more efficient and error-free completion of the instrument. Second, instructions and definition information for all items are provided as pop-up menus or tooltip text to draw more attention to item text. Cianciolo et al.'s (2010) technical report describing the TDA includes much of this expository text with each item. Although this report provides clear explanations of concepts measured by the TDA, it can be difficult to read the large blocks of text, and it is easy to accidentally overlook some response options. Third, the tool enables user-defined item and scale weighting using decision analysis methods (Bottomley & Doyle, 2001; Edwards & Barron, 1994; Kennedy et al., 2019; Rycroft et al., 2019). The tool combines responses from multiple users on the same task into a single score. Currently, item-level scores are combined across users by using the arithmetic mean across tasks, although other aggregation schemes and metrics could be incorporated (e.g., min/max, +/- 1 standard deviation) to better fit available skill retention data or user preferences. Bar graphs and tables are produced with scores by scale and task for relative comparison across tasks, across ways of executing or training the same task, etc.

A walkthrough of the TDA-EST follows. It is designed as a series of spreadsheets in a macro-enabled Excel workbook. Some of these worksheets can be hidden or password-protected depending on the use case. Instructions for most sheets are available via a button at the top left of the screen. The current values provided for some cells are notional and are for illustrative purposes only. Calibration data could be used to provide a better estimate of starting values for many parameters to provide better skill retention estimates, and associated decay curves before item scores or user preferences are considered.

### ReadMe Sheet

The ReadMe sheet (Figure 1) provides a brief description of and links to each subsequent sheet in the TDA-EST.

Figure 1

ReadMe sheet

Tab Name	Description
1 Title Page	The Title Page contains the Property Rights disclaimer and the distribution statement for the TDA tool.
2 Purpose & History	The Purpose & History tab provides an introduction on the TDA Tool, and details the purpose and history of the tool.
3 Task Dashboard	The Task Dashboard stores the names of specific tasks to be rated during evaluation. Any tasks entered on this tab will immediately appear in the Task Dropdown on the Training Evaluation Form tab. These names are used in subsequent sheets to group data across users. When clicked, the "Click Here for Instructions" button at top-right provides some annotated graphics on how to add information to the Task Dashboard.
4 Weighting Dashboard	The Weighting Dashboard allows decision makers to make changes to a default profile that is used to produce a weighted sum of item-level scores. This allows leaders to use their subject matter expertise to emphasize specific characteristics of the task or skill being trained. This sheet can be hidden from individuals completing the Training Evaluation Form. Weights are provided using a Max100 procedure to combine scores for items on each subscale, or to combine subscale scores into Individual or Collective main scales. With this approach, individuals are asked to rank-order items within a tier, and then assign a value [0,100] to each item which indicates how important it is relative to the most important item. The most important item always receives a value of "100". Those scores are then normalized across all items within the tier to provide a weight [0,1] that captures the relative importance of that item within the tier. Once validation experiments are completed, these weights can be set in such a way as to produce results that are consistent with those findings. The "Click Here for Instructions" button at top-right provides some guidance on how to add information to the Weighting Dashboard.
5 Scoring Dashboard	The Scoring Dashboard allows decision makers to create a scoring key for each rating scale prior to evaluation. Users may: adjust the wording of rating scales; adjust the wording, order, and number of response options for each scale; reorder response options for scoring purposes; and indicate whether each scale should be scored normally or reverse scored. Based on these settings, the tool will automatically calculate the values in the "Adj" and "Norm" columns--and update this information on the Training Evaluation Form. Scores are normalized on a [0, 1] scale, where higher values are associated with increased likelihood that the learned task will decay over time. Although rating scales and response options must be finalized before evaluation, the scoring key can be adjusted at any time. If the key is changed after evaluation, the tool will automatically recalculate existing results based on the new settings. Note: This sheet can be hidden from individuals completing the Training Evaluation Form. As with the other Dashboards, a "Click Here for Instructions" button at top-right left provides guidance on how to add information.
6 Training Evaluation Form	The Training Evaluation Form allows decision makers or individuals selected by the decision maker to provide assessments of the to-be-trained task. This form pulls question and response items from the Scoring Dashboard, allows users to complete the TDA items, and allows users to provide comments justifying their responses for each item. These comments are rolled up in the Comments Dashboard. When clicked, a "Click Here for Instructions" button at top-right left provides some annotated graphics on how to add information.
7 Raw_DB	The Raw_DB stores all ratings submit via the Training Evaluation Form. It also automatically scores each criterion based on the relative weights established on the Weighting Dashboard and the scoring key created on the Scoring Dashboard. This scores on this tab update automatically when changes are made to the Weighting/Scoring dashboards.
8 Task_DB	The Task_DB aggregates the scores across raters for each criterion/task. The results from this tab (including the

### Task Dashboard

The Task Dashboard (Figure 2) stores the names of specific tasks. These names are used in subsequent sheets to group data across users. When clicked, the *Click Here for Instructions* button at the top right provides some annotated graphics (Figures 3-5) showing how to add information to the Task Dashboard.

**Figure 2**

*Task Dashboard*

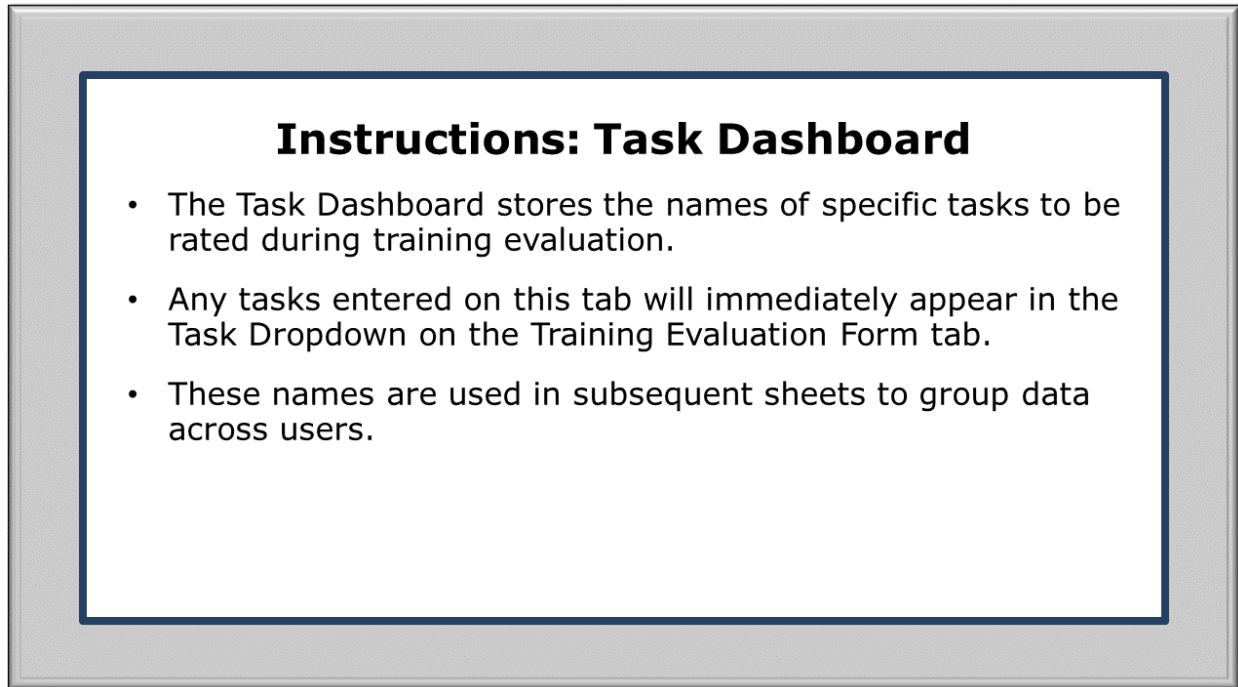
Click Here for Instructions

Enter Tasks to be Rated Below	
1	Task A
2	Task B
3	Task C
4	Task D
5	Task E
6	Task F
7	Task G
8	Task H
9	Task I
10	
11	
12	
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30	

Task Dashboard | Weighting Dashboard | Scoring Dashboard | Training ...

**Figure 3**

*First page of Task Dashboard instructions (this opens when Click Here for Instructions is clicked)*



**Instructions: Task Dashboard**

- The Task Dashboard stores the names of specific tasks to be rated during training evaluation.
- Any tasks entered on this tab will immediately appear in the Task Dropdown on the Training Evaluation Form tab.
- These names are used in subsequent sheets to group data across users.

**Figure 4**

*Second page of Task Dashboard instructions*

### Step 1: Enter Tasks in Table on Task Dashboard

- 1 Enter the first task in row 1 of the table.
- 2 Enter the second task in row 2 of the table.
- 3 Repeat until all tasks have been entered.
- 4 You may add, edit, or delete tasks as needed **prior to training evaluation.**

Enter Tasks to be Rated Below	
1	Task A
2	Task B
3	Task C
4	Task D
5	Task E
6	Task F
7	Task G
8	Task H
9	Task I
10	Task J
11	Task K
12	Task L
13	Task M
14	Task N

**Figure 5**

*Third page of Task Dashboard instructions*

### Step 2: Tasks Appear in Dropdown on Training Evaluation Form

Click Here for Instructions
Click Here to Save Form

Make Selections			
Date	First Name	Last Name	Task
			<div style="border: 1px solid red; padding: 5px;"> <div style="display: flex; justify-content: space-between;"> <span>Task A</span> <span>Task Dropdown</span> </div> <ul style="list-style-type: none"> <li>Task B</li> <li>Task C</li> <li>Task D</li> <li>Task E</li> <li>Task F</li> <li>Task G</li> <li>Task H</li> </ul> </div>

**Task Characteristics (individual)**  
 The seven questions in this section ask about the characteristics of the task and the implications of this task's characteristics for performance. Therefore, you will be asked to rate the task on a scale of 1 to 5 for each question.

Task Characteristics		Confidence	Comments
Questions	Select answers via dropdown menu	How confident are you?	Enter any comments below
1	How much do memory aids reduce the memory demands of this task?		
2	How many performance measures is the task divided into?		
3	Are the steps in the task required to be performed in a definite sequence?		
4	How complex are the mental demands of this task?		
5	How many facts, terms, names, rules, and/or ideas must a Soldier or leader memorize in order to earn a "GO" on this task?		
6	How difficult are the facts, terms, rules and/or ideas that must be remembered?		
7	How severe is the time pressure under which this task must be performed?		

## Weighting Dashboard

The Weighting Dashboard (Figure 6) allows users to produce a weighted sum of item-level scores by changing a default profile (unweighted mean). This allows leaders or trainers to use their subject matter expertise to emphasize specific characteristics of the task or skill being trained, e.g., the extent to which properties of the task itself contribute to its difficulty and subsequent retention independently, in comparison to the environment in which it is performed. This sheet can be hidden from individuals completing the Training Evaluation Form (p. 15). Weights are provided using a Max100 procedure (Bottomley & Doyle, 2001) to combine scores for items on each subscale, or to combine subscale scores into Individual or Collective main scales.

With this approach, the user is first asked to rank-order items within a tier to anchor subsequent ratio estimates of the relative differences between those items in terms of importance. The user provides ratio estimates of importance by assigning a value [0,100] to each item that indicates how important it is relative to the most important item. The most important item always receives a value of 100. Those scores are then normalized across all items within the tier to provide a weight [0, 1] that captures the relative importance of that item within the tier. Though somewhat subjective, especially initially, this allows users to emphasize what items are most important to them. Although the current default weights are set to provide the same value as an unweighted mean across scales and subscales, these weights can be adjusted to fit available calibration data, and associated scores and ranks can be inferred and set as a default on this sheet. If the user does not plan to evaluate either individual or collective tasks, they can set these weights to zero to ignore that part of the instrument. We also expect that users new to such a process will require some familiarity with the entire process in order to become more accurate in the weighting process, and make best use of the TDA-EST overall. The [Click Here for Instructions](#) button at the top left provides some guidance (Figures 7-11) on how to add information to the Weighting Dashboard.

**Figure 6**

*Weighting Dashboard. Weights and scores above are provided for illustrative purposes only*

Key	Main Criteria	Ranking	Weight	Score
I-I	Individual Tasks	1	100	56%
I-II	Collective Tasks	2	80	44%
			180	100%

Key	Individual	Ranking	Weight	Score
I-I	Task Characteristics (Individual)	1	100	41%
I-II	Unit Characteristics (Individual)	3	60	24%
I-III	External Factors (Individual)	2	85	35%
			245	100%

Key	Collective	Ranking	Weight	Score
C-I	Task Characteristics (Collective)	1	100	37%
C-II	Unit Characteristics (Collective)	2	86	32%
C-III	External Factors (Collective)	3	86	32%
			272	100%

Key	Task Characteristics (Individual)	Ranking	Weight	Score
I-I-1	How much do memory aids reduce the memory demands of this task?	1	100	23%
I-I-2	How many performance measures is the task divided into?	5	60	14%
I-I-3	Are the steps in the task required to be performed in a definite sequence?	4	65	15%
I-I-4	How complex are the mental demands of this task?	3	70	16%
I-I-5	How many facts, terms, names, rules, and/or ideas must a Soldier or leader memorize in order earn a "GO" on this task?	2	85	19%
I-I-6	How difficult are the facts, terms, rules and/or ideas that must be remembered?	6	60	14%
I-I-7	How severe is the time pressure under which this task must be performed?	7	0	0%
			440	100%

Key	Unit Characteristics (Individual)	Ranking	Weight	Score
I-II-1	How strongly has the battalion commander emphasized the importance of learning this skill?	1	100	37%
I-II-2	How closely did the initial training conditions of this skill match its performance conditions	2	90	33%

**Figure 7**

*First page of Weighting Dashboard instructions*

## Instructions: Weighting Dashboard

The Weighting Dashboard allows decision makers to make changes to a default profile that is used to produce a weighted sum of item-level scores.

- This allows leaders to use their subject matter expertise to emphasize specific characteristics of the task or skill being trained.
- Weights are provided using a Max100 procedure to combine scores for items on each subscale, or to combine subscale scores into Individual or Collective main scales. With this approach, individuals are asked to rank-order items within a tier, and then assign a value [0,100] to each item which indicates how important it is relative to the most important item. The most important item always receives a value of "100."
- Those scores are then normalized across all items within the tier to provide a weight [0,1] that captures the relative importance of that item within the tier. Once validation experiments are completed, these weights can be set in such a way as to produce results that are consistent with those findings.

**Figure 8**

*Second page of Weighting Dashboard instructions*

### Step 1: Rank/Weight the Main Criteria

- 1 Rank the Main Criteria in order of importance from 1 to 2 in the **Ranking** column.
- 2 Second, give the criterion ranked #1 a weight of 100 points in the **Weight** column.
- 3 Third, assign the criterion ranked #2 a weight relative to 100 points (between 0% and 100%).
- 4 The tool will convert this data into a score (or relative weight) for each criterion in the **Score** column.

Key	Main Criteria	Ranking	Weight	Score
I-I	Individual Tasks	1	100	53%
I-II	Collective Tasks	2	90	47%
			190	100%

? **Tips and Notes:**

**Ranks/Weights:** Evaluations should be made within the context of your expert opinion of the criteria's contribution. Ties are allowed and there is no set total number of points. The weight should be set to zero only in the case that an item or scale should be totally ignored, e.g., the task can only be done individually so "Collective Tasks" is not relevant.

**Changes:** The relative weights may be adjusted at any time, including before or after training evaluation. If the weights are adjusted after training evaluation, the tool will automatically recalculate existing results based on the new settings.

**Figure 9**

*Third page of Weighting Dashboard instructions*

### Step 2: Rank/Weight the Individual and Collective Criteria

**1** **Individual:** Rank criteria in order of importance from 1 to 3. Give the criterion ranked #1 a weight of 100 points. Then, assign the other criteria weights relative to 100 points (between 0% and/or 100%).

**2** **Collective:** Rank criteria in order of importance from 1 to 3. Give the criterion ranked #1 a weight of 100 points. Then, assign the other criteria weights relative to 100 points (between 0% and/or 100%).

Key	Individual	Ranking	Weight	Score
I-I	Task Characteristics (Individual)	3	67	27%
I-II	Unit Characteristics (Individual)	1	100	40%
I-III	External Factors (Individual)	2	80	32%
			247	100%

Key	Collective	Ranking	Weight	Score
C-I	Task Characteristics (Collective)	2	86	32%
C-II	Unit Characteristics (Collective)	3	86	32%
C-III	External Factors Collective	1	100	37%
			272	100%

**? Tips and Notes:**  
**Score Column:** The tool will convert the ranks/weights into a score (or relative weight) for each criterion.  
**Ranks/Weights:** Evaluations should be made within the context of your expert opinion of the criteria's contribution. Ties are allowed and there is no set total number of points (i.e., the lowest ranked criterion does not have to have a weight of 0).

**Figure 10**

*Fourth page of Weighting Dashboard instructions*

### Step 3: Rank/Weight the Individual Sub-Criteria

	Key	Task Characteristics (Individual)	Ranking	Weight	Score
<p><b>1</b> <b>Task Characteristics (Individual):</b> Rank criteria in order of importance from 1 to 7, and then assign weights.</p>	I-I-1	How much do memory aids reduce the memory demands of this task?	1	100	23%
	I-I-2	How many performance measures is the task divided into?	5	60	14%
	I-I-3	Are the steps in the task required to be performed in a definite sequence?	4	65	15%
	I-I-4	How complex are the mental demands of this task?	3	70	16%
	I-I-5	How many facts, terms, names, rules, and/or ideas must a Soldier or leader memorize in order earn a "GO" on this task?	2	85	19%
	I-I-6	How difficult are the facts, terms, rules and/or ideas that must be remembered?	6	60	14%
	I-I-7	How severe is the time pressure under which this task must be performed?	7	0	0%
				440	100%
<p><b>2</b> <b>Unit Characteristics (Individual):</b> Rank criteria in order of importance from 1 to 3, and then assign weights.</p>	<b>Key      Unit Characteristics (Individual)      Ranking      Weight      Score</b>				
	I-II-1	How strongly has the battalion commander emphasized the importance of learning this skill?	1	100	37%
	I-II-2	How closely did the initial training conditions of this skill match its performance conditions under combat conditions?	2	90	33%
	I-II-3	How often has this skill been used?	3	80	30%
				270	100%
<p><b>3</b> <b>External Factors (Individual):</b> Rank criteria in order of importance from 1 to 4, and then assign weights. (Not Pictured)</p>					

Figure 11

Fifth page of Weighting Dashboard instructions

### Step 4: Rank/Weight the Collective Sub-Criteria

**1** **Task Characteristics (Collective):** Rank criteria in order of importance from 1 to 4, and then assign weights.

**2** **Unit Characteristics (Collective):** Rank criteria in order of importance from 1 to 4, and then assign weights.

**3** **External Factors (Collective):** Rank criteria in order of importance from 1 to 4, and then assign weights.

Key	Task Characteristics (Collective)	Ranking	Weight	Score
C-I-1	What is the size of the collective that this task applies to?	4	25	10%
C-I-2	How complex are the mental demands of this task?	2	75	30%
C-I-3	How interdependent are the roles of the people who perform this task?	1	100	40%
C-I-4	How severe is the time pressure under which this task must be performed?	3	50	20%
			250	100%

Key	Unit Characteristics (Collective)	Ranking	Weight	Score
C-II-1	How strongly has the battalion commander emphasized the importance of learning this skill?	1	100	45%
C-II-2	How effective was the training on this collective task?	4	2	1%
C-II-3	How often has this task (or similar tasks) been performed by the collective?	3	50	23%
C-II-4	How much have the SOP applicable to this task reduced the difficulty of coordination?	2	70	32%
			222	100%

Key	External Factors (Collective)	Ranking	Weight	Score
C-III-1	On average, how user friendly are the information displays that are most important to performing this task?	1	100	29%
C-III-2	How frequently has the technology involved in performing this task changed?	2	90	26%
C-III-3	How reliable is the technology involved in performing this task?	3	80	24%
C-III-4	What level of information overload does the leadership or overall collective performing this task typically operate under?	4	70	21%
			340	100%

### Scoring Dashboard

The Scoring Dashboard (Figure 12) allows for changes to items and ordering or scoring of response options. Scores are normalized on a [0, 1] scale, in which higher values are associated with increased likelihood that the learned task will decay over time. This allows some flexibility for the users to best match items to the task to be evaluated. This normalization feeds, ultimately, into the final TDA scores and provides a standardized, though flexible, metric to arrive at those final scores. This sheet can be hidden from individuals completing the Training Evaluation Form (p. 14). As with the other Dashboards, a *Click Here for Instructions* button at the top left provides guidance (Figures 13-16) on how to add information.

**Figure 12**

*Scoring Dashboard*

Click Here for Instructions

Key	Task Characteristics (Individual)	Order	Reverse?	Adj	Norm
<b>I-I-1</b>	<b>How much do memory aids reduce the memory demands of this task?</b>				
I-I-1-1	Aspects of the equipment/technology used for this task actually increase memory demands.	1	Yes	5	1.00
I-I-1-2	Existing memory aids for this task don't get used/There are no memory aids.	2	Yes	4	0.75
I-I-1-3	Memory aids somewhat reduce memory demands on critical task components.	3	Yes	3	0.50
I-I-1-4	Memory aids significantly reduce memory demands on critical task components.	4	Yes	2	0.25
I-I-1-5	Memory aids totally eliminate memory demands.	5	Yes	1	0.00
I-I-1-6					
I-I-1-7					
<b>I-I-2</b>	<b>How many performance measures is the task divided into?</b>				
I-I-2-1	More than 10 steps.	1	Yes	4	1.00
I-I-2-2	6 to 10 steps.	2	Yes	3	0.67
I-I-2-3	2 to 5 steps.	3	Yes	2	0.33
I-I-2-4	1 step.	4	Yes	1	0.00
I-I-2-5					
I-I-2-6					
I-I-2-7					
<b>I-I-3</b>	<b>Are the steps in the task required to be performed in a definite sequence?</b>				
I-I-3-1	Task has only 1 step.	3	No	3	0.67
I-I-3-2	Some are and some are not.	2	No	2	0.33
I-I-3-3	All are.	1	No	1	0.00
I-I-3-4	None are.	4	No	4	1.00
I-I-3-5					
I-I-3-6					
I-I-3-7					
<b>I-I-4</b>	<b>How complex are the mental demands of this task?</b>				
I-I-4-1	Very complex mental demands.	1	Yes	4	1.00
I-I-4-2	Complex mental demands.	2	Yes	3	0.67
I-I-4-3	Simple mental demands.	3	Yes	2	0.33
I-I-4-4	Almost no mental demands.	4	Yes	1	0.00
I-I-4-5					
I-I-4-6					

Navigation: Title Page | ReadMe | Purpose & History | Task Dashboard | Weighting Dashboard | **Scoring Dashboard** | Training ...

**Figure 13**

*First page of Scoring Dashboard instructions*

## Overview: Scoring Dashboard

The Scoring Dashboard allows decision makers to create a scoring key for each rating scale prior to training evaluation. Users may adjust the wording of rating scales; adjust the wording, order, and number of response options for each scale; reorder response options for scoring purposes; and indicate whether each scale should be scored normally, or reverse scored.

Based on these settings, the tool will automatically calculate the values in the "Adj" and "Norm" columns--and update this information on the Training Evaluation Form. Scores are normalized on a [0, 1] scale, where higher values are associated with increased likelihood that the learned task will decay over time.

Changes: Although rating scales and response options must be finalized before training evaluation, the scoring key can be adjusted at any time. If the key is changed after training evaluation, the tool will automatically recalculate existing results based on the new settings.

Figure 14

Second page of Scoring Dashboard instructions

### Instructions: Scoring Dashboard

The Scoring Dashboard allows decision makers to create a scoring key for each rating scale prior to training evaluation.

- **Rating Scales:** You may adjust the wording of the rating scales as needed.
- **Response Options:** You may also adjust the wording, order, and number of response options under each scale. If you adjust the rating scales or response options on this tab, the changes will automatically appear on the Training Evaluation Form.
- **Order Column:** To adjust the order of response options for scoring purposes only (rather than change the order the options are presented in the dropdown), use the Order column instead. This column provides a way to make sure all scales are rated in the same direction (for example: 5 = most complex, 1 = least complex for all scales).
- **Reverse Column:** You can indicate whether each scale should be reverse scored (or not) in the "Reverse?" column (yes = reverse score; no = normal scoring).
- **Adj/Norm Columns:** Based on the settings in the Order/Reverse columns, the tool will automatically calculate the values in the "Adj" and "Norm" columns. The "Adj" column contains the final order of response options. The "Norm" column contains the normalized score for each item.

Figure 15

Third page of Scoring Dashboard instructions

### Step 1: Adjust Rating Scales and Response Options

**1** Adjust the wording of the green rating scales as needed.

**2** Adjust the wording and number of response options under each scale as needed.

Key	Task Characteristics (Individual)	Order	Reverse?	Adj	Norm
<b>I-I-2 How many performance measures is the task divided into?</b>					
I-I-2-1	More than 10 steps.	1	Yes	4	1.00
I-I-2-2	6 to 10 steps. <b>2</b>	2	Yes	3	0.67
I-I-2-3	2 to 5 steps.	3	Yes	2	0.33
I-I-2-4	1 step.	4	Yes	1	0.00
I-I-2-5					
I-I-2-6					
I-I-2-7					
<b>I-I-3 Are the steps in the task required to be performed in a definite sequence?</b>					
I-I-3-1	Task has only 1 step.	3	No	3	0.67
I-I-3-2	Some are and some are not. <b>2</b>	2	No	2	0.33
I-I-3-3	All are.	1	No	1	0.00
I-I-3-4	None are.	4	No	4	1.00
I-I-3-5					
I-I-3-6					
I-I-3-7					
<b>I-I-4 How complex are the mental demands of this task?</b>					
I-I-4-1	Very complex mental demands.	1	Yes	4	1.00
I-I-4-2	Complex mental demands. <b>2</b>	2	Yes	3	0.67
I-I-4-3	Simple mental demands.	3	Yes	2	0.33
I-I-4-4	Almost no mental demands.	4	Yes	1	0.00
I-I-4-5					

Figure 16

Fourth page of Scoring Dashboard instructions

### Step 2: Choose Settings in Order and Reverse Columns

**1** **Order Column:** Change order of response options as needed for scoring purposes.

**2** **Reverse Column:** Indicate whether the scale should be reverse scored in the Reverse column.

**3** **Adj/Norm Columns:** Based on the settings in the Order/Reverse columns, the tool will automatically calculate the values in the "Adj" and "Norm" columns.

Key	Task Characteristics (Individual)	Order	Reverse?	Adj	Norm
<b>I-I-2 How many performance measures is the task divided into?</b>					
I-I-2-1	More than 10 steps.	1	Yes	4	1.00
I-I-2-2	6 to 10 steps.	2	Yes	3	0.67
I-I-2-3	2 to 5 steps.	3	Yes	2	0.33
I-I-2-4	1 step.	4	Yes	1	0.00
I-I-2-5					
I-I-2-6					
I-I-2-7					
<b>I-I-3 Are the steps in the task required to be performed in a definite sequence?</b>					
I-I-3-1	Task has only 1 step.	3	No	3	0.67
I-I-3-2	Some are and some are not.	2	No	2	0.33
I-I-3-3	All are.	1	No	1	0.00
I-I-3-4	None are.	4	No	4	1.00
I-I-3-5					
I-I-3-6					
I-I-3-7					
<b>I-I-4 How complex are the mental demands of this task?</b>					
I-I-4-1	Very complex mental demands.	1	Yes	4	1.00
I-I-4-2	Complex mental demands.	2	Yes	3	0.67
I-I-4-3	Simple mental demands.	3	Yes	2	0.33
I-I-4-4	Almost no mental demands.	4	Yes	1	0.00
I-I-4-5					

### Training Evaluation Form

The Training Evaluation Form (Figure 17) allows the user to provide assessments of the to-be-trained task. This form pulls question and response items from the Scoring Dashboard, allows users to complete the TDA items, and allows users to provide comments justifying their responses for each item. Currently, the comments are to provide qualitative context to the user. However, such qualitative responses might be quantifiable and integrated with the numerical estimates, if that enhances the overall understanding of retention estimates for the evaluated tasks. These comments are rolled up in the Comments Dashboard (p. 24). When clicked, a *Click Here for Instructions* button at the top left provides annotated graphics (Figures 18-22) showing how to add information.

**Figure 17**

*Training Evaluation Form*

File Home Insert Page Layout Formulas Data Review View Developer Help Search Share Comment

9

Click Here for Instructions Click Here to Save Form

Make Selections			
Date	First Name	Last Name	Task
11/4/2020	Sarah	Hope	Task I

**Task Characteristics (individual)**  
 The seven questions in this section ask about the characteristics of the task (e.g., how difficult the task is). In general, these questions ask: "On average (i.e., across units), what are the implications of this task's characteristics for performance?" Therefore, task characteristics are to be judged largely independently of knowledge of the individuals to be trained.

Task Characteristics		Confidence	Comments
Questions	Select answers via dropdown menu	How confident are you?	Enter any comments below
1 How much do memory aids reduce the memory demands of this task?	Aspects of the equipment/technology used for this task actually increase memory demands.	Totally confident.	C-1
2 How many performance measures is the task divided into?	More than 10 steps.	Totally confident.	C-2
3 Are the steps in the task required to be performed in a definite sequence?	Task has only 1 step.	Totally confident.	C-3
4 How complex are the mental demands of this task?	Very complex mental demands.	Totally confident.	C-4
5 How many facts, terms, names, rules, and/or ideas must a Soldier or leader memorize in order to earn a "GO" on this task?	Very many (more than 8).	Totally confident.	C-5
6 How difficult are the facts, terms, rules and/or ideas that must be remembered?	Extremely difficult.	Totally confident.	C-6
7 How severe is the time pressure under which this task must be performed?	Very severe.	Totally confident.	C-7

**Unit Characteristics (Individual)**  
 The three questions in this section ask about the characteristics of the unit as they relate to emphasizing, training, and performing the task of interest (e.g., the quality of initial training of the task). In general, these questions ask: "In your unit, how are training and operations conducted for the task in question?" Therefore, unit characteristics are to be judged using knowledge of the particular unit to be trained and the task of interest.

Unit Characteristics		Confidence	Comments
Questions	Select answers via dropdown menu	How confident are you?	Enter any comments below
1 How strongly has the battalion commander emphasized the importance of learning this skill?	This skill is not a command priority.	Totally confident.	C-8

Weighting Dashboard Scoring Dashboard Training Evaluation Form Results Dashboard Skill Decay Dashboard

**Figure 18**

*First page of Training Evaluation Form instructions*

**Overview: Training Evaluation Form**

- The Training Evaluation Form allows decision makers or individuals selected by the decision maker to provide assessments of the to-be-trained task.
- This form pulls question and response items from the Scoring Dashboard, allows users to complete the TDA items, and allows users to provide comments justifying their responses for each item.
- These comments are rolled up in the Comments Dashboard.

Figure 19

Second page of Training Evaluation Form instructions

### Instructions: Training Evaluation Form

- Steps for completing ratings:
  - Enter date, first name, and last name.
  - Select a task from the Task Dropdown.
  - Rate the selected task on all criteria.
  - Select a confidence level for each rating.
  - Enter an optional comment.
  - Save ratings to the database.
  - Repeat rating process as needed.

Figure 20

Third page of Training Evaluation Form instructions

### Step 1: Enter Date, Name, and Desired Task to Rate

- 1 Enter current date in the following format (MM/DD/YYYY).
- 2 Enter your first name and last name.
- 3 Select the desired task from the Task Dropdown.

[Click Here for Instructions](#)

			Make Selections
Date	First Name	Last Name	Task
11/22/2019	Mark	Smith	

**Task Characteristics (individual)**  
The questions in this section ask about the characteristics of the task. The questions are: "How difficult are the facts, terms, rules and/or ideas that must be remembered?" Therefore, the implications of this task's characteristics for performance?" Therefore

Task Characteristics		
Questions	Select answers via dropdown menu	How c
1	How much do memory aids reduce the memory demands of this task?	
2	How many performance measures is the task divided into?	
3	Are the steps in the task required to be performed in a definite sequence?	
4	How complex are the mental demands of this task?	
5	How many facts, terms, names, rules, and/or ideas must a Soldier or leader memorize in order to earn a "GO" on this task?	
6	How difficult are the facts, terms, rules and/or ideas that must be remembered?	
7	How severe is the time pressure under which this task must be performed?	

**Figure 21**

*Fourth page of Training Evaluation Form instructions*

### Step 2: Rate Task on All Criteria

- 1 For each criterion, select the desired option from the dropdown menu. To view rating guidance for a particular criterion, double click on the corresponding question text.
- 2 Select a confidence rating from the Confidence column.
- 3 Enter an optional comment in the Comments column.
- 4 Repeat the rating process for the remaining criteria. Scroll down to see all scales.

Questions	Select answers via dropdown menu	Confidence	Comments
Aspects of the equipment/technology used for this task actually increase memory demands.		Totally confident.	C-1
More than 10 steps.		Totally confident.	C-2
More than 10 steps.		Totally confident.	C-3
Very complex mental demands.		Totally confident.	C-4
Very complex mental demands.		Totally confident.	C-5
Very complex mental demands.		Totally confident.	C-6
Very complex mental demands.		Totally confident.	C-7

**Figure 22**

*Fifth page of Training Evaluation Form instructions*

### Step 3: Save Ratings to Database and Repeat

- 1 To save ratings to the database, click the "Click Here to Save Form" button in the top, right-hand corner of the form. The form will clear.
- 2 To rate another task, select the desired task from the Task Dropdown and repeat the rating process.

Make Selections		
Task		
Task B		

Questions	Confidence	Comments
Aspects of the equipment/technology used for this task actually increase memory demands.	Somewhat confident.	Enter optional comment here.
More than 10 steps.	Totally confident.	Enter optional comment here.
More than 10 steps.	Somewhat confident.	Enter optional comment here.
More than 10 steps.	Not at all confident.	Enter optional comment here.
More than 10 steps.	Totally confident.	Enter optional comment here.
More than 10 steps.	Totally confident.	Enter optional comment here.

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## Results Dashboard

The Results Dashboard (Figure 23) provides a visual display of scores by subscale and task. The scores represent the relative likelihood that someone trained in the task will be able to perform it within 6 months of initial training. The overall score is the sum of individual and collective scores. If the user set weights for one of the scales (Individual or Collective) to zero earlier to ignore it, the scale of interest will have the same value as the overall score. An *Instructions* button at the top center provides some text and annotated graphics (Figures 24-25) showing how to read, filter, and export this information.

**Figure 23**

### Results Dashboard

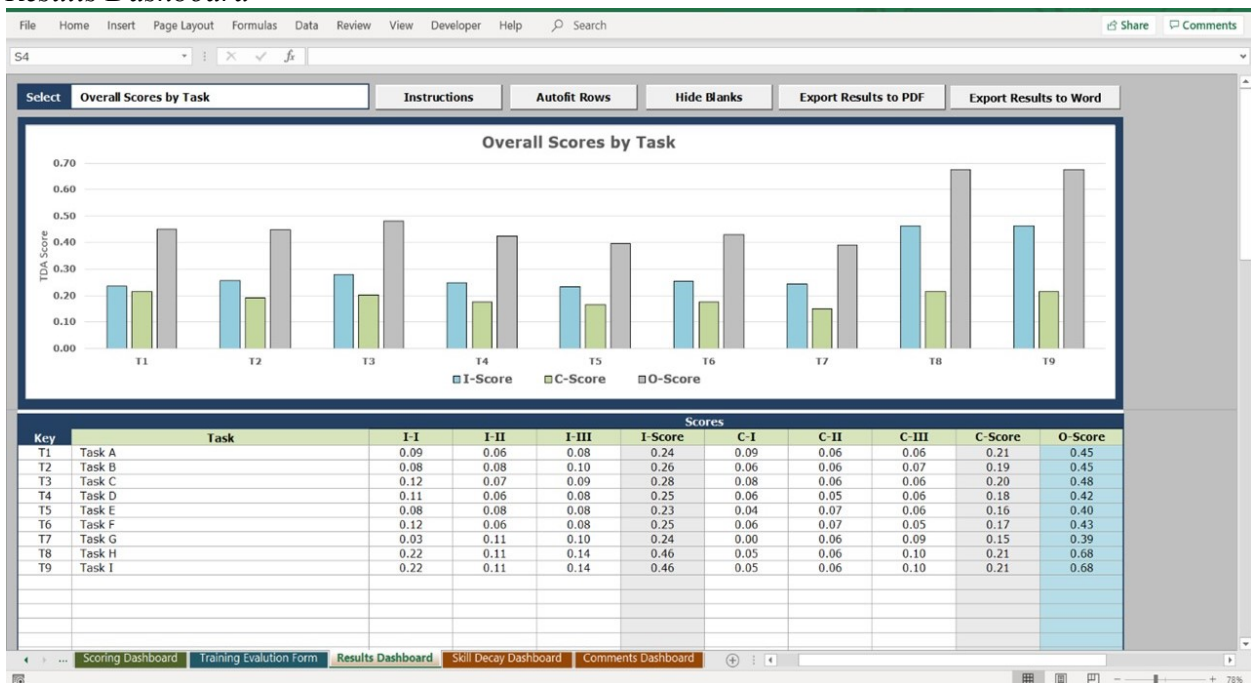


Figure 24

First page of Results Dashboard instructions

## Instructions: Results Dashboard

- The Results Dashboard provides a visual display of scores by subscale and task. As new tasks are rated, the charts on this tab will update dynamically to include new results.
- Users may change the chart view by selecting a different chart from the dropdown menu. They may also hide/show blank rows, autofit row height, and export the results to Word or PDF.
- These scores are inputs to the Skill Decay Dashboard to help estimate retention over a six-month period after training, and future versions may provide suggestions for training or other interventions in the Results or Skill Decay Dashboards depending on the distribution of scores across scales.

Figure 25

Second page of Results Dashboard instructions

## Step 1: Select Chart and Export Results for Printing

- 1 Select the desired chart from dropdown menu in the top, left-hand corner of the tab. The chart area will dynamically update based on your selection.
- 2 To ensure all tasks are fully visible for printing, click the "Autofit Rows" button.
- 3 To hide blank rows in the table for printing, click the "Hide Blanks" button.
- 4 To export the contents of the tab to a PDF for printing purposes, click the "Export Results to PDF" button.

Row	Task	I-I	I-II	I-III	I-Score	C-I	C-II	C-III	C-Score	O-Score
T1	Task A	0.09	0.06	0.08	0.24	0.09	0.06	0.06	0.21	0.45
T2	Task B	0.08	0.08	0.10	0.26	0.06	0.07	0.19	0.45	
T3	Task C	0.12	0.07	0.09	0.28	0.08	0.06	0.20	0.48	
T4	Task D	0.11	0.06	0.08	0.25	0.06	0.06	0.18	0.42	
T5	Task E	0.08	0.08	0.08	0.23	0.04	0.07	0.16	0.40	
T6	Task F	0.12	0.06	0.08	0.25	0.06	0.07	0.05	0.17	0.43
T7	Task G	0.03	0.11	0.10	0.24	0.00	0.06	0.09	0.15	0.39
T8	Task H	0.22	0.11	0.14	0.46	0.05	0.06	0.10	0.21	0.68
T9	Task I	0.22	0.11	0.14	0.46	0.05	0.06	0.10	0.21	0.68

- 5 To export the contents of this tab to Word, first **close any open Word docs** (very important!), then select the desired chart on the Results Dashboard, and finally click "Export Results to Word."

## Skill Decay Dashboard

The Skill Decay Dashboard (Figure 26) uses a line graph to show how skills are retained using the TDA score as input. This element is currently for visualization purposes as it would require empirical data to be inputted to ensure the lines more accurately represent decay of relevant skills. The three lines represent expected skill decay from learners who achieved a high, medium, or low degree of initial proficiency from training. The slider allows the user to increase or decrease the TDA score in order to see how sensitive decay is to the TDA score input. The TDA score influences the value at the time of training (month one), and a decay parameter that can be fit to calibration data from training influences how quickly the curve approaches zero. An *Instructions* button at the top left provides information on how to use or interpret each panel (Figure 27-32).

Figure 26

### Skill Decay Dashboard

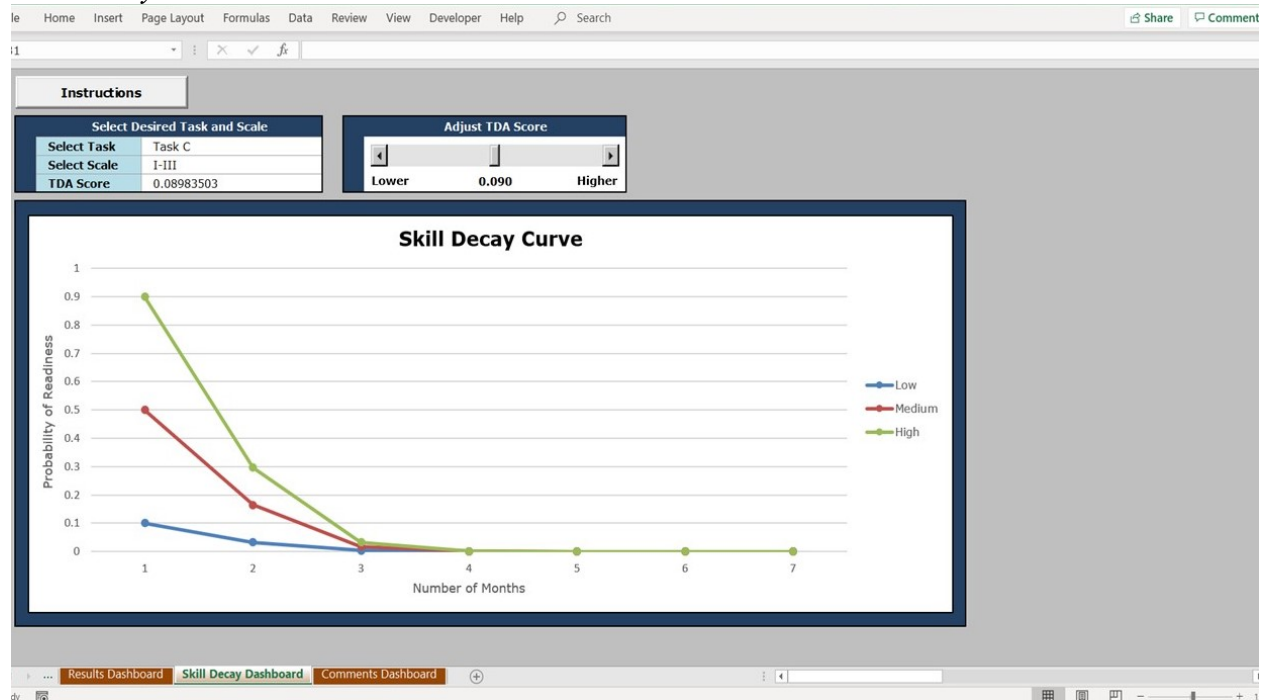


Figure 27

First page of Skill Decay Dashboard instructions

### Instructions: Skill Decay Dashboard

- Select a task and TDA scale/subscale using the dropdown menus. Then, use the slider to adjust that TDA score up/down for 'what-if' analysis.
- The graph at bottom will show the expected probability of retention given the TDA value present in the slider for an individual that was trained to a high, medium, or low degree of proficiency.
- NOTE: The TDA will require calibration before it can be used for prediction. This feature is provided for illustrative purposes only.

Figure 28

Second page of Skill Decay Dashboard instructions

### Step 1: Select Desired Task

- 1 To view the skill decay curve for a particular task, click the down arrow to the right of the "Select Task" field.
- 2 When the task dropdown menu appears, click on the desired task.

Task Number	Green Curve (Probability)	Red Curve (Probability)	Blue Curve (Probability)
1	0.9	0.5	0.1
2	0.4	0.25	0.05
3	0.1	0.05	0.02
4	0.02	0.01	0.01
5	0.01	0.01	0.01
6	0.01	0.01	0.01

25

**Figure 29**

*Third page of Skill Decay Dashboard instructions*

### Step 2: Select Desired Scale

- Next, click the down arrow to the right of the "Select Scale" field.
- When the scale dropdown menu appears, click to select the desired scale.
- The "TDA Score" fields will automatically populate based on your selections.

**Scale Descriptions**

- I-I: Task Characteristics (Individual)
- I-II: Unit Characteristics (Individual)
- I-III: External Factors (Individual)
- I-Score: Overall Individual Score
- C-I: Task Characteristics (Collective)
- C-II: Unit Characteristics (Collective)
- C-III: External Factors (Collective)
- C-Score: Overall Collective Score
- O-Score: Overall Combined Score

Time Unit	I-I	I-II	I-III	I-Score	C-I	C-II	C-III	C-Score
1	0.90	0.50	0.10	0.10	0.10	0.10	0.10	0.10
2	0.40	0.20	0.05	0.05	0.05	0.05	0.05	0.05
3	0.10	0.05	0.02	0.02	0.02	0.02	0.02	0.02
4	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01
5	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
6	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

**Figure 30**

*Fourth page of Skill Decay Dashboard instructions*

### Step 3: Adjust TDA Score Up/Down Using Slider

- To adjust the TDA score up/down for "what-if" analysis, click the arrow keys on the slider.

**NOTE:** The higher the TDA score, the more likely that readiness will be maintained after it is trained. Tasks that receive high TDA scores decay at a very slow rate, whereas those which receive low TDA scores decay at a fast rate and therefore are less likely to be ready if called upon.

Time Unit	I-I	I-II	I-III	I-Score	C-I	C-II	C-III	C-Score
1	0.90	0.50	0.10	0.10	0.10	0.10	0.10	0.10
2	0.30	0.15	0.05	0.05	0.05	0.05	0.05	0.05
3	0.05	0.02	0.01	0.01	0.01	0.01	0.01	0.01
4	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
5	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
6	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Figure 31

Fifth page of Skill Decay Dashboard instructions

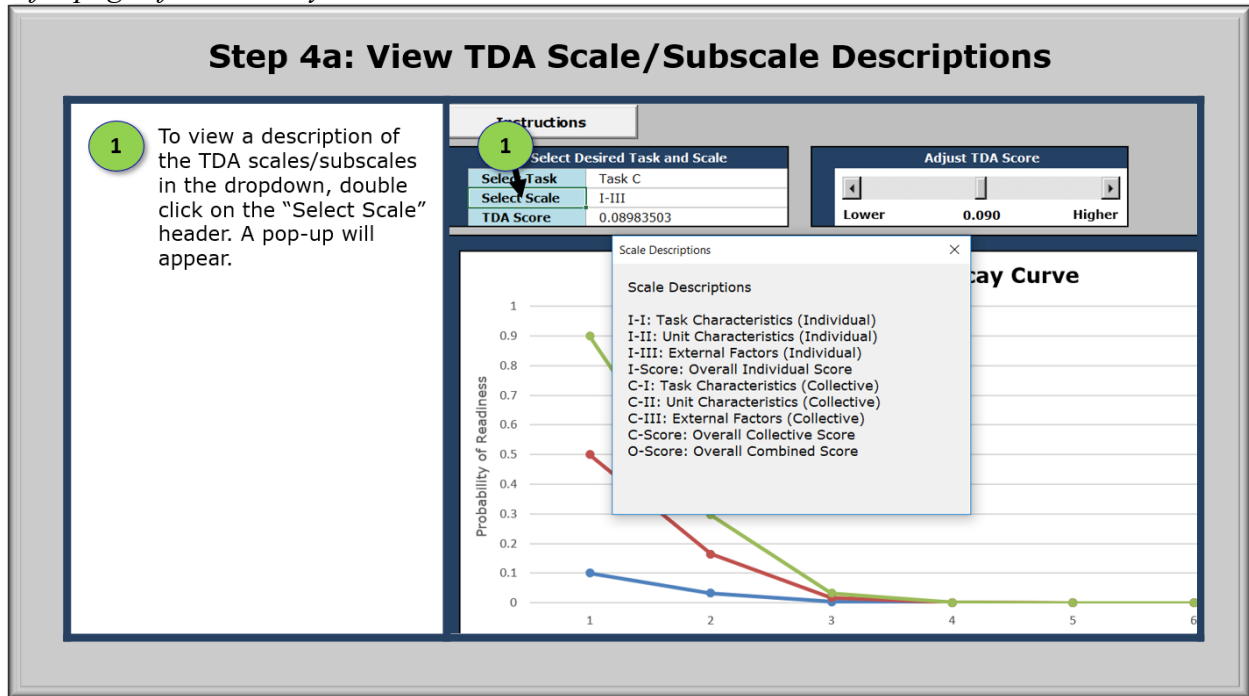
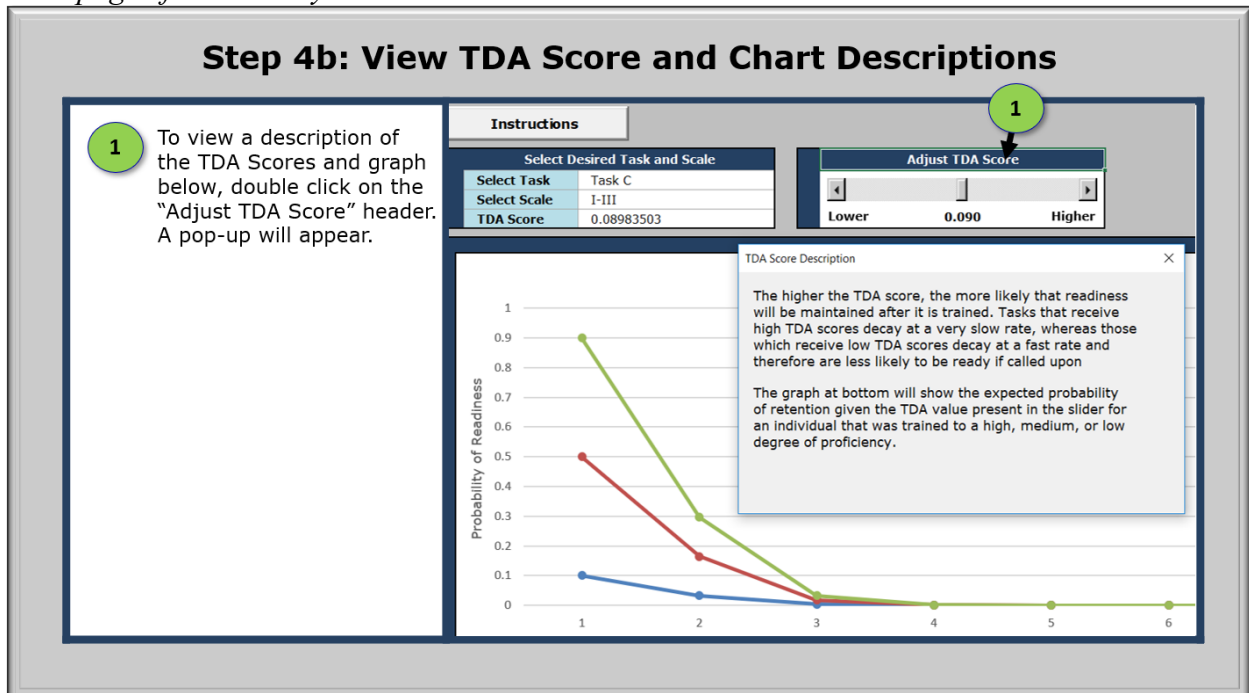


Figure 32

Sixth page of Skill Decay Dashboard instructions



## Comments Dashboard

The Comments Dashboard (Figure 33) collects comments provided by individual users for each item. This can provide greater context or justification for ratings, as needed, in order to serve as a memory aid for the individual user or to facilitate discussion between several independent raters. Each comment for an item appears in a cell of this sheet, with individual user responses separated by semicolons. A *Click Here for Instructions* button at the top left provides information on how to filter and export comment data (Figures 34-35).

Figure 33

### Comments Dashboard

Key	Task	Aggregated Comments
1	Task A	C-1; C-1 / C-2; C-2 / C-3; C-3 / C-4; C-4 / C-5; C-5 / C-6; C-6 / C-7; C-7 / C-8; C-8 / C-9; C-9 / C-10; C-10 / C-11; C-11 / C-12; C-12 / C-13; C-13 / C-14; C-14 / C-15; C-15 / C-16; C-16 / C-17; C-17 / C-18; C-18 / C-19; C-19 / C-20; C-20 / C-21; C-21 / C-22; C-22 / C-23; C-23 / C-24; C-24 / C-25; C-25 / C-26; C-26 /
2	Task B	C-1; C-1 / C-2; C-2 / C-3; C-3 / C-4; C-4 / C-5; C-5 / C-6; C-6 / C-7; C-7 / C-8; C-8 / C-9; C-9 / C-10; C-10 / C-11; C-11 / C-12; C-12 / C-13; C-13 / C-14; C-14 / C-15; C-15 / C-16; C-16 / C-17; C-17 / C-18; C-18 / C-19; C-19 / C-20; C-20 / C-21; C-21 / C-22; C-22 / C-23; C-23 / C-24; C-24 / C-25; C-25 / C-26; C-26 /
3	Task C	C-1; C-1 / C-2; C-2 / C-3; C-3 / C-4; C-4 / C-5; C-5 / C-6; C-6 / C-7; C-7 / C-8; C-8 / C-9; C-9 / C-10; C-10 / C-11; C-11 / C-12; C-12 / C-13; C-13 / C-14; C-14 / C-15; C-15 / C-16; C-16 / C-17; C-17 / C-18; C-18 / C-19; C-19 / C-20; C-20 / C-21; C-21 / C-22; C-22 / C-23; C-23 / C-24; C-24 / C-25; C-25 / C-26; C-26 /
4	Task D	C-1; C-1 / C-2; C-2 / C-3; C-3 / C-4; C-4 / C-5; C-5 / C-6; C-6 / C-7; C-7 / C-8; C-8 / C-9; C-9 / C-10; C-10 / C-11; C-11 / C-12; C-12 / C-13; C-13 / C-14; C-14 / C-15; C-15 / C-16; C-16 / C-17; C-17 / C-18; C-18 / C-19; C-19 / C-20; C-20 / C-21; C-21 / C-22; C-22 / C-23; C-23 / C-24; C-24 / C-25; C-25 / C-26; C-26 /
5	Task E	C-1; C-1 / C-2; C-2 / C-3; C-3 / C-4; C-4 / C-5; C-5 / C-6; C-6 / C-7; C-7 / C-8; C-8 / C-9; C-9 / C-10; C-10 / C-11; C-11 / C-12; C-12 / C-13; C-13 / C-14; C-14 / C-15; C-15 / C-16; C-16 / C-17; C-17 / C-18; C-18 / C-19; C-19 / C-20; C-20 / C-21; C-21 / C-22; C-22 / C-23; C-23 / C-24; C-24 / C-25; C-25 / C-26; C-26 /
6	Task F	C-1; C-1 / C-2; C-2 / C-3; C-3 / C-4; C-4 / C-5; C-5 / C-6; C-6 / C-7; C-7 / C-8; C-8 / C-9; C-9 / C-10; C-10 / C-11; C-11 / C-12; C-12 / C-13; C-13 / C-14; C-14 / C-15; C-15 / C-16; C-16 / C-17; C-17 / C-18; C-18 / C-19; C-19 / C-20; C-20 / C-21; C-21 / C-22; C-22 / C-23; C-23 / C-24; C-24 / C-25; C-25 / C-26; C-26 /
7	Task G	C-1 / C-2 / C-3 / C-4 / C-5 / C-6 / C-7 / C-8 / C-9 / C-10 / C-11 / C-12 / C-13 / C-14 / C-15 / C-16 / C-17 / C-18 / C-19 / C-20 / C-21 / C-22 / C-23 / C-24 / C-25 / C-26 /
8	Task H	C-1 / C-2 / C-3 / C-4 / C-5 / C-6 / C-7 / C-8 / C-9 / C-10 / C-11 / C-12 / C-13 / C-14 / C-15 / C-16 / C-17 / C-18 / C-19 / C-20 / C-21 / C-22 / C-23 / C-24 / C-25 / C-26 /
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Figure 34

First page of Comments Dashboard instructions

## Instructions: Comments Dashboard

- The Comments Dashboard aggregates comments provided by individual users for each item.
- All comments for an item appear in a cell of this sheet, with individual user responses separated by slashes.
- Users may filter or sort the comments using the autofilter, hide/show blank rows, autofit row height, and export comments to a PDF.

Figure 35

Second page of Comments Dashboard instructions

### Step 1: Filter, Sort, and Export Comments for Printing

- To filter, search, and sort comments, click the down arrow (Autofilter) to the right of the desired header name.
- To ensure all tasks are fully visible for printing, click the "Autofit Rows" button.
- To hide blank rows in the table for printing, click the "Hide Blanks" button.
- To export the contents of the tab to a PDF for printing purposes, click the "Export Comments to PDF" button.

## Conclusions and Future Research

The TDA-EST is intended to provide users with the ability to complete the Trainer's Decision Aid (Cianciolo et al., 2010) for each of several tasks, compute results for each scale or subscale, and make updates to items and the way they are scored or weighted to produce those retention estimates. Users are guided through each step of the training evaluation process. Parts of the tool can be locked or hidden from users depending on their role. This information is intended to help trainers and decision-makers estimate the extent to which individuals' or teams' ability to perform these tasks decays over time, with the hope that this information will facilitate systematically scheduling training based on expected task performance. The tool identifies the likelihood that a task can be performed at a future time as an important consideration when scheduling training. It leaves decisions about the type of training needed (classroom, ad-hoc drill, etc.), the relative importance of each skill to be trained, and other factors, to the trainer or decision-maker's discretion. To make the most informed scheduling decisions, trainers or decision-makers with experience in the domain of interest can then use their best professional judgment and TDA outputs against the backdrop of typical constraints (personnel, budget, etc.).

Further, the TDA-EST allows for changes to individual items and to the extent to which individual items or subscales influence total TDA scores. This will allow researchers and unit leaders in the future to update specific items or use additional calibration data to set better default scoring policies. Users can take scores from the Results Dashboard table to create their own visual presentations of data as needed. Users may also export scores to PDF for inclusion in reports. Since TDA scores are meant to estimate the probability that a skill will be retained, once calibrated, it should be possible to multiply criterion scores from skill assessment instruments by TDA scores to estimate likely scores on those assessment instruments after training. This tool is also flexible enough to accommodate future research intended to calibrate it to available data such as training course tests from TC3 or administrative sources such as personnel records of training histories and associated tests. At the time of this writing, these data are under development for TC3 courses from Fort Hood MSTC to help support their current training mandate in the interest of improving medical skills readiness.

Future research on this tool could provide actionable recommendations for training based on values of TDA scales or subscales. For example, a low score for a task on the Individual Task Characteristics subscale could trigger a message that recommends occasional drilling or self-guided practice at the home unit to aid retention. Differences between subscales could suggest other kinds of training or prioritize training types depending on the task of interest and other constraints, such as cost or time available. Future research should gather input from medical trainers, and unit leadership to better understand available training practices and constraints to best mitigate skill decay on critical skills.

Future work is also needed to develop best practices for how high variance or other disagreement among individuals who are scoring tasks should be handled when evaluating training. Currently, the mean score across evaluators is used by the TDA-EST, which does not consider variance that may signal a need to revise items or develop consensus among evaluators with regard to how those items are being applied in this context. In extreme cases, additional

items may be needed to better capture important factors to consider for retaining and maintaining skills in a specific context.

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