

Technical Report 1252

**Operational Assessment of Tools for Accelerating
Leader Development (ALD): Volume I,
Capstone Report**

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

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OPERATIONAL ASSESSMENT OF TOOLS FOR ACCELERATING LEADER DEVELOPMENT (ALD): VOLUME I, CAPSTONE REPORT

EXECUTIVE SUMMARY

Research Requirement:

To support Army transformation efforts, the U.S. Army Research Institute's Fort Leavenworth Research Unit (FLRU) conducts research and development to advance the state of the art for building excellence among Army leaders. Today's operational environment makes it very difficult for leaders to pursue robust professional development. Yet leaders are expected to master more skills earlier in their careers than ever before. To meet the need, FLRU researchers have developed an innovative toolkit under a program known as ALD—Accelerating Leader Development. The final phase of the program entailed a field assessment of the toolkit.

Procedure:

The research team installed the toolkit on a Web site server with learning management and database capabilities. Following a pilot test, the team recruited tactical units and user juries to provide feedback on the tools. Two combat battalions (142 commissioned officers and non-commissioned officers) participated in the operational test. In addition, user jury sessions at six different installations drew 140 company grade officers and non-commissioned officers. Data collection methods included Web site logging, pre- and post-testing (online), embedded testing (online), surveys (online and hardcopy), and interviews. The resulting data were analyzed to assess the suitability, acceptability, effectiveness, and impact of the toolkit.

Findings:

Of the unit participants, 62 worked with one or more online ALD tools for varying amounts of time, while more than 90 took part in offline group training with filmed vignettes. The pressures of the operational environment seriously limited the time available to work with the tools. The user satisfaction results indicated the toolkit provides a reasonable mix of diagnostic and training capabilities, but completeness remains an open question. The tools appear to be more suitable for use in pre-commissioning and military education programs. The various modules offer moderately favorable acceptability, learning effectiveness, and value. However, the toolkit's online learning methods may need expanded capabilities for interpersonal interaction with mentors and peers to become fully suitable for leader self-development.

Utilization and Dissemination of Findings:

The findings and lessons learned from this research (including the appendices in Volume II) can help decision makers, program architects, training developers, and research investigators enhance self-development programs for the Army's junior leaders. Unit trainers and training managers can use the toolkit to expand their leader development programs. The ultimate payoff will come from leveraging stronger leader competencies to enhance mission performance.

OPERATIONAL ASSESSMENT OF TOOLS FOR ACCELERATING LEADER
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OPERATIONAL ASSESSMENT OF TOOLS FOR ACCELERATING LEADER DEVELOPMENT (ALD): VOLUME I, CAPSTONE REPORT

Introduction

As the Army transforms to a modular structure, the need for high-quality leadership throughout the force is attracting more and more attention. The contemporary operational environment (COE) demands excellence among tactical leaders, yet compelling pressures make it more challenging than ever for leaders to pursue professional development. The challenges were recognized several years ago by the Army Training and Leader Development Panel (U.S. Department of the Army, 2001). The panel's recommendations included focusing on self-awareness and adaptability, exploiting network technology, dedicating resources to distributed learning, and introducing a multi-source feedback strategy. Notably, the distributed learning recommendation focused on providing "lieutenants access to Web-based, self-development modules to accelerate and enhance their ability to meet the requirements of [captain-level] assignments" (U.S. Department of the Army, 2001, p. OS-19). Since publication of the panel's report, the operational tempo (OPTEMPO) has increased and modularity has become a major initiative. These factors have further complicated the leader development challenges facing Army officers. Innovative training approaches are needed to enable young officers to build their leadership skills faster and assume higher levels of responsibility earlier in their careers.

Responding to the emerging imperatives, the U.S. Army Research Institute (ARI) initiated a program entitled "Accelerating Leader Development" (ALD). Begun in FY04 under an Army Technology Objective (ATO), the program aimed to develop approaches, methods and tools to enhance the self-development of company-grade officers. The work supported the U.S. Army Command and General Staff College, the Center for Army Leadership, and the School for Command Preparation. As the lead organization for the ALD program, ARI's Fort Leavenworth Research Unit (FLRU) defined the leadership skills that are critical in today's operational environment. Investigators proceeded to develop a family of self-development tools for building the critical skills. The culminating phase of the ATO entailed an operational demonstration and assessment of the ALD tools conducted among the target audience.

This document—Volume I—presents the methods and findings of the operational demonstration and assessment of the ALD toolkit, with emphasis on training methodology. It offers valuable information for decision authorities, program architects, training developers, and researchers working to advance the Army's leader development capabilities. Volume II contains the appendices. A companion report describes the technology aspects of the toolkit and the delivery environment (Woller, Garven, & Leibrecht, in preparation).

Background

The overarching goal of the ATO was to establish an innovative, integrated toolkit for building leadership competencies to meet the demands of the COE. As seen in Table 1, the program focused on competencies that contribute significantly to effective leadership—self-

awareness, metacognition, critical thinking skills, and interpersonal skills. These dimensions resulted from systematic literature review and research (e.g., Day, Zaccaro, & Halpin, 2004).

Table 1
Critical Leader Competencies

Competency	Description
Self-awareness	Understanding of one's own strengths, weaknesses, aptitudes, and attributes
Metacognition	Capacity to monitor and shape own self-development approaches and attitudes
Critical Thinking	Ability to apply structured problem-solving techniques to leadership challenges
Interpersonal Skills	Ability to handle person-to-person and cultural challenges as a unit leader

Scientists in ARI have been investigating and building leader development solutions for a decade or more. Much of the initial work focused on research frameworks and dimensions offering promise for advancing the state of the art (Zaccaro, Klimoski, & Gade, 1999; Boyce, Gade, Zaccaro, & Klimoski, 2000; Day & Halpin, 2001). Acknowledging the importance of self-awareness in leader development, ARI scientists established approaches and techniques for self-assessment (Bass & Avolio, 1990, 1995; Zaccaro, Klimoski, Boyce, et al., 1999; Cortina et al., 2004) and multi-source assessment (e.g., Halpin, 1997; Karrasch, Halpin, & Keene, 1997; Karrasch & Halpin, 1999). These efforts led to the development of various instruments for assessing one's own leadership experiences, attitudes, preferences, processes and outcomes.

Other investigators explored the role of tacit knowledge in leadership (Horvath, Hedlund, Snook, Forsythe, & Sternberg, 1998; Sternberg et al., 1999; Hedlund, Sternberg, & Psothka, 2000; Antonakis, Hedlund, Pretz, & Sternberg, 2002). Subsequent work extended into methods for training tacit knowledge (Cianciolo, Antonakis, & Sternberg, 2001; Matthew, Cianciolo, & Sternberg, 2005) and techniques for assessing it (Hedlund et al., 2003). Cianciolo, Antonakis, and Sternberg (2004) went on to expand the tacit knowledge concepts into a broader formulation of practical intelligence and leadership.

In parallel research, scientists analyzed the role of critical thinking in military leadership and created the foundation for training critical thinking skills among Army leaders (Cohen, Thompson, Adelman, Bresnick, & Riedel, 1999; Riedel, Morath, & McGonigle, 2001). This led to development of methods and tools for enriching critical thinking abilities (Lynch & Wolcott, 2001; Fischer, Spiker, & Riedel, 2008a, 2008b, 2009). These tools are seen as especially important in light of the Army's emergent emphasis on adaptive leaders who are mentally agile and skilled in solving poorly structured problems (e.g., U.S. Department of the Army, 2006).

Still other researchers explored the dimensions of interpersonal skills and their role in leadership (Carpenter & Wisecarver, 2004; Zbylut & Ward, 2004a). Their work set the stage for developing film-based vignettes that challenge leaders to expand their understanding of social dynamics in realistic scenarios (Hill, Douglas, Gordon, Pighin, & van Velsen, 2003; Hill, Gordon, & Kim, 2004; Zbylut & Ward, 2004b; Zbylut, Ward, & Mark, 2005; Nobel et al., 2006; Zbylut et al., 2007; Zbylut, Brunner, Vowels, & Kim, 2007). The vignettes utilize facilitated group discussion and multimedia mentoring to interactively enhance the learning experience.

Some of the ARI research has addressed the theoretical underpinnings of leadership development. Avolio and Yammarino (2003) examined leadership constructs derived from transformational leadership theory (e.g., Bass, 1996), as distinguished from transactional leadership theory. In a longitudinal field study they demonstrated that the impact of a transformational leadership intervention could be measured in terms of leaders' attitudes, application activities, personal development, and unit outcomes. Boyce, Wisecarver, and Zaccaro (2005) created a structural model of leader self-development and demonstrated that the multi-dimensional model provided a unifying framework for understanding the role of individual characteristics. In addition, Carpenter and Wisecarver (2004) constructed a model of dimensions defining interpersonal performance in the form of a behavioral taxonomy. They conducted empirical research that confirmed the suitability of the proposed model.

The work conducted under the ATO and predecessor efforts yielded tools in three high-priority areas—self-awareness/metacognition, critical thinking skills, and interpersonal skills. The prototype tools include (a) self-assessment instruments plus self-guided learning activities to foster metacognitive insights into one's own leader behaviors, (b) online instructional packages designed to build critical thinking skills, and (c) film-based vignettes that hone interpersonal skills via group discussion. The training program harnesses new approaches that include self-assessment tools, structured opportunities to link experiential and formal knowledge, immersive challenges for critical thinking, story telling, and computerized coaching and feedback. The ALD toolkit, described in the next section, aims to boost the Army's ability to develop leaders who can meet the challenges and rigors of the COE. By enhancing leader development processes and outcomes, the toolkit is designed to build high-performing leader teams. The payoff is expected to directly facilitate Army transformation efforts.

The ATO culminated in a field-oriented demonstration and assessment using U.S. Army Soldiers to represent the primary target audience. The overarching goal of this final phase was two-fold: (a) to demonstrate operational utilization of the ALD products and (b) to assess their acceptability and potential contributions in the hands of users. The operational demonstration constituted a capstone integrated technology demonstration that put the family of multi-dimensional products to an acid test. In designing the demonstration and assessment, ARI scientists defined multiple opportunities and mechanisms to obtain meaningful user feedback.

Problem Definition

A number of factors in today's national defense environment impact leadership development among company grade officers. The most significant factors are:

- The COE, especially as impacted by operational variables (political, military, economic, social, information, and infrastructure—PMESII) and unified action.
- The Army Force Generation (ARFORGEN) model with the attendant transition to the modular force, modular organization realignments, and unit lifecycle.
- The persistently elevated OPTEMPO highlighted by deployment requirements that stress units and Soldiers.

Military operations in the COE require increasingly precise coordination of dispersed forces within a rapidly changing deployment environment. Army leaders face greater ambiguity

and complexity across the full spectrum of military operations, and these conditions are expected to continue. This environment, coupled with a wide variety of missions, demands that leaders at all levels be adaptive, self-aware, and able to perform under complex conditions of uncertainty. The Army's leaders need to promote human capital and knowledge, develop teams, resist stress, and adapt quickly and effectively in volatile and unstructured environments. They must be able to think critically and creatively and to shift their perspective as the situation demands.

The cascading PMESII consequences of current tactical missions not only require Army leaders to deal with complex and uncertain conditions; they demand that company grade officers act independently at levels beyond those previously expected of their grade and time in service. Company grade officers must be trained to lead and act in an ever changing tactical environment and to do so at an increasing level of independence.

The expanding role of unified action is a major factor in the COE's complexity. This dimension of contemporary operations combines joint, interagency, intergovernmental, and multinational elements. Joint and unified military operations require leaders to coordinate dispersed forces within an information warfare environment that can change quickly. Leadership in this age of mushrooming knowledge, networks, and dynamic information environments requires new knowledge and skills—cognitive, interpersonal, and systems-specific.

Today's high-OPTEMPO context of military operations renders obsolete the old Army readiness paradigm of alert-train-deploy. Continuous, full-spectrum expeditionary operations are the new reality. To meet the new requirements, the Army has developed a force generation process—ARFORGEN (Figure 1)—to provide combatant commanders and civil authorities with rapidly deployable, employable, and sustainable force capabilities packages tailored to specific mission requirements (McNeil, 2005). Implementation of the three-phase ARFORGEN process cuts across the entire Army and profoundly impacts units and their leaders. In a sweeping transformation involving changes to doctrine and organization, the Army is transitioning from a division-based force to a modular force based on brigade combat teams (BCTs). The modular force structure aims to meet joint and coalition needs for responsive, flexible, rapid, worldwide deployment. In the process, the emphasis is shifting from deliberate to adaptive war planning.

To support this transformation, the Army leadership has revamped the processes for training tactical units. The new unit lifecycle training model (McNeil, 2005) is geared to leverage individual, team and collective training, including an externally evaluated certifying event. The goal is to produce cohesive and deployment-ready units with well trained Soldiers led by confident leaders. All phases of the lifecycle are intensive and place great demands on the company grade officers' time, limiting opportunities for professional development beyond what occurs in the execution of their routine duties. Yet preparing company grade leaders to be more effective and adaptive is important in meeting the challenges faced by the Army.

Another component of the Army's modular transition is organizational realignment—moving organizations and Soldiers to assignments at new installations to align with their new modular force role. The alignment actions add to the mix of requirements claiming the time and energies of company grade leaders. The multi-dimensional aspects of modular transformation,

combined with the pressures of the COE, form the backdrop for junior leader development challenges facing the Army today.

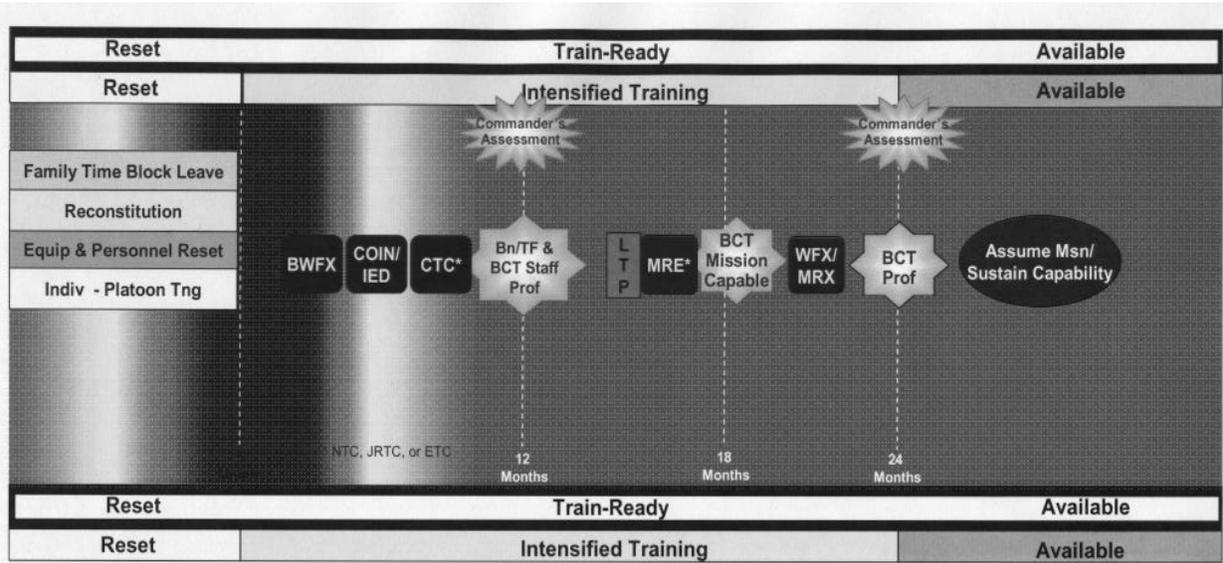


Figure 1. The ARFORGEN process (taken from U.S. Army Forces Command, 2008).

As an indicator of the pace of operations, OPTEMPO is an overarching contributor to the issues confronting today's Army leaders and the development of company grade leadership skills. The OPTEMPO is not expected to ease in the foreseeable future. Historically, there has always been a surplus of demands on the company grade officer's time. Extended deployment tours coupled with the imperative of training to combat readiness for the next deployment have greatly increased these demands and severely constrained the time available for professional development. In parallel the COE demands have increased, expanding the need for professional development of company grade officers.

As a learning process, leader development shapes knowledge and skills (cognitive, interpersonal, etc.) as well as attitudes and values. Traditionally, officer development has mainly focused on acquiring knowledge. The knowledge, skills, and wisdom required for effective leadership have come through years of experience in a broad range of settings. However, the COE demands expanded leadership competencies from relatively junior leaders. New methods and tools are required to meet the leader development needs of the Army's company grade officers if they are to be ready to perform in the COE.

Technical Objectives

The impetus for the ALD ATO originated with the interaction of two critical and conflicting factors—the COE's increasing demands and the decreasing time available for professional development of company grade officers. The combination of these two factors drove the research and development program that created innovative leadership development tools for company grade leaders. Demonstrating and assessing the effectiveness of the new tools was an essential step in crafting recommendations for refining and implementing them.

As the culminating phase of the ATO, the present research pursued two primary goals—demonstrate the operational utilization of the ALD toolkit, and assess its contributions and value to the Army’s leader development efforts. To align the results with the needs of tactical units, an operational demonstration/assessment was deemed imperative.

The following technical objectives structured the planning, preparation and execution of the demonstration and assessment of the ALD toolkit:

- ◆ Conduct an integrated technology demonstration of the ALD products
- ◆ Measure the acceptability, utilization, and effectiveness of individual ALD products
- ◆ Examine the impact of the ALD products on leader competencies
- ◆ Quantify the effects of ALD training on unit climate and cohesion
- ◆ Explore the ALD program’s impact on unit training and performance
- ◆ Determine the completeness and sufficiency of the ALD program
- ◆ Capture good ideas for improving the ALD products and program

The Leader Development Toolkit

The ALD toolkit resulted from a series of research and technology transfer projects initiated at the outset of the ATO. As a family of innovative leader development tools, the ALD toolkit set the stage for the operational demonstration and assessment conducted in the current project. This section describes the components of the toolkit that defined the ALD training program, including the training support tools and the utilization model.

Overview

The ALD toolkit brings a new approach to leader development training that exploits a variety of techniques embedded in an overall program of self-assessment and self-development capabilities (Figure 2). The program provides Web-accessed tools (with one exception) and a recommended model for harnessing them. The tools are intended for use by company grade officers in operational units, regardless of duty position. The fundamental intent is to increase leadership skills by helping officers to become self-aware, adaptive and agile decision makers. The toolkit contains two types of tools—diagnostic and training—that support self-paced assessment and learning.

Diagnostic Tools

The diagnostic tools were selected with two global functions in mind—self-assessment and feedback, and measurement of training efficacy. The self-assessment function was intended to (a) provide an objective basis for self-awareness and deliberate planning of self-development activities and (b) “give back” to the Soldiers who participated. One of the main complaints Soldiers express about “surveys” is that they rarely receive feedback, and the diagnostic tools addressed the issue. The second global function—training efficacy—aimed to quantify changes in leadership knowledge and skills that might result from using the ALD toolkit.

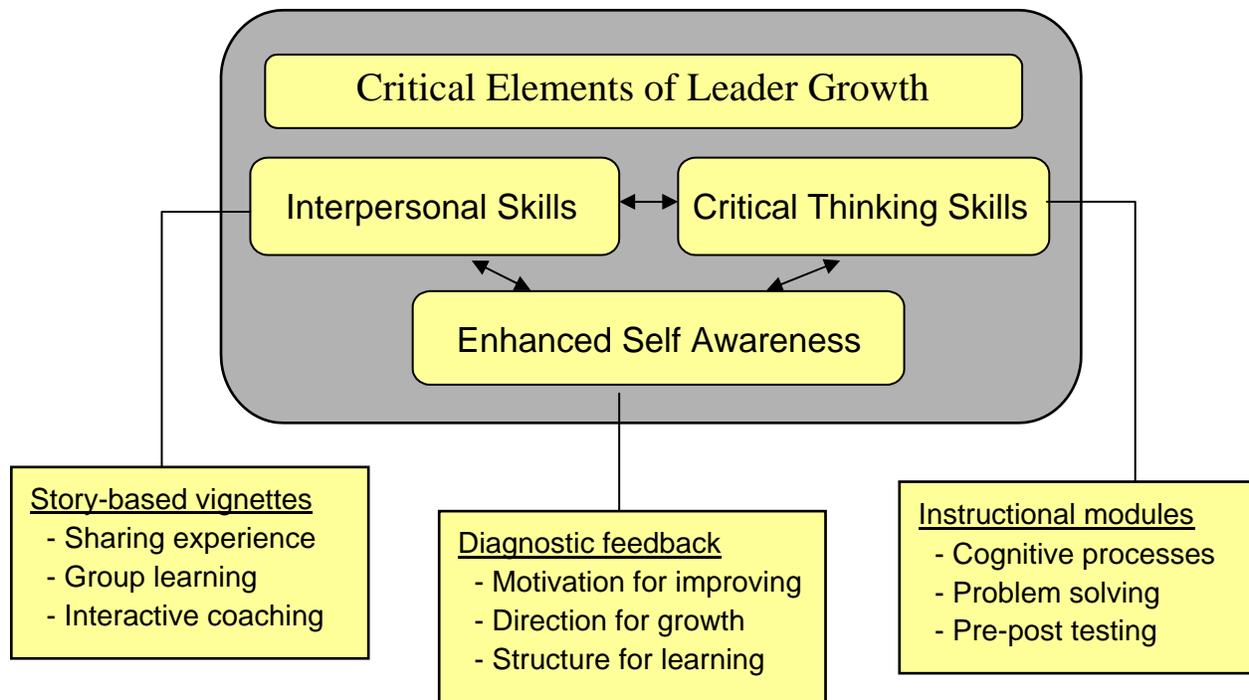


Figure 2. ALD program model of leader growth.

Table 2 lists the seven instruments included as online diagnostic tools. Four of them served as both pre- and post-training measures because of their expected sensitivity to ALD learning effects. Two of the instruments (Multifactor Leadership Questionnaire and Tacit Knowledge for Military Leaders instrument) were configured in alternate versions to avoid carryover effects from the pre- to post-training measurement. The other dual-role (pre and post) tools were single-version because they posed negligible risk of carryover effects. In some cases only a portion of the instrument’s measures or subscales were used in this research. All of the diagnostic tools were regarded as candidates to support analysis of individual differences.

Table 2
Diagnostic Tools of the ALD Toolkit

Tool	Role	Purpose
Demographic Survey	Pre only	Capture biographical and demographic data
Personality Assessment	Pre only	Measure stable traits to boost personal insights
Leadership Experiences Survey	Pre only	Record history of leadership assignments
Multifactor Leadership Questionnaire (MLQ)	Pre & Post	Assess transformational/transactional styles
Tacit Knowledge for Military Leadership (TKML)	Pre & Post	Document tacit leadership knowledge
Leadership Opinions Survey	Pre & Post	Measure self-development interest/motivation
Unit Cohesion Index (UCI)	Pre & Post	Measure cohesion within own unit

Demographic Survey

The demographic survey was developed by the research team especially for the ALD demonstration and assessment. It queries participants regarding individual variables and military background. The query dimensions include gender, age, ethnicity, native language, time on active duty, prior service, rank, branch of service, military training, and deployment experience. The tool requires less than 15 min to complete.

Personality Assessment

The International Personality Item Pool inventory (Goldberg, 1999) is used to measure personality traits. The short form version of this instrument is intended to inform participants of key personality facets that may contribute to their leadership style. The inventory categorizes personality along five factors—extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience. Within each factor are multiple subscales. Completing the inventory yields a narrative report to the participant describing his/her standing on each factor and subscale in qualitative terms such as low anger or average assertiveness. For this tool, participants were hyperlinked to another Web site (<http://www.personal.psu.edu/faculty/j/5/j5j/IPIP/>). Completing the inventory requires about 45 min.

Leadership Experiences Survey

The Leadership Experiences survey is taken from the Leadership Attitudes, Opinions, and Experiences Survey (Zaccaro, 2002). The instrument entails a retrospective look at specific leadership situations encountered during the past 5 years, such as working with people from other cultures. For each situation the participant selects responses on three scales: (a) number of opportunities to engage in the activity; (b) density (number of times the activity required primary focus); and (c) point in the job assignment during which the activity was engaged in the most. The survey presents 31 situations and takes about 30 min to complete.

Multifactor Leadership Questionnaire (MLQ)

The MLQ instrument (Bass & Avolio, 1995) assesses various aspects of transformational and transactional leadership. It prompts a participant to describe his/her leadership style by using a 5-point rating scale to indicate how frequently various statements fit—for example, “I seek differing perspectives when solving problems.” The rating scale ranges from “not at all” to “frequently.” The 5X-short version contains 45 items, responses to which are combined into seven subscales used to differentiate leadership style. The MLQ requires about 30 min.

Tacit Knowledge for Military Leadership (TKML) Survey

The TKML (Hedlund et al., 1999) assesses an officer’s knowledge gained through experience as opposed to formal training. Participants read typical situations encountered by military leaders, then rate multiple options for handling a situation using a 9-point scale ranging from “extremely bad” to “extremely good.” Each participant’s rating of an option is compared with experts’ ratings to generate a feedback summary. For the ALD toolkit, the company level version of the TKML contains 10 situations (with an average of 9 optional actions each), while

the platoon version presents 8 situations (averaging 10 optional actions each). A given participant completes only one version, based on rank and position specified in the Demographic Survey. Completing either version requires up to 1 hr.

Leadership Opinions Survey

The Leadership Opinions survey also comes from the Leadership Attitudes, Opinions, and Experiences Survey (Zaccaro, 2002). This instrument asks participants to indicate their opinions and attitudes about various aspects related to leadership style, such as “To what extent are you able to size up another person quickly?” The instrument presents 41 questions with 5-point Likert-type response scales, taking about 30 min to complete.

Unit Cohesion Index (UCI)

The UCI (Siebold & Kelly, 1988) was used to provide an overall look at the participants’ perceptions of unit cohesiveness based on social dynamic factors including trust and teamwork. Responses from the members of a unit can be pooled to produce a collective measure. The tool contains 24 statements such as “Members trust each other in this unit,” with participants rating their agreement/disagreement using a 5-point scale ranging from “strongly agree” to “strongly disagree.” The rating scale includes an “unable to judge” option. The responses are combined into 10 subscales characterizing various aspects of social cohesion. This tool usually takes less than 15 min to complete.

Training Tools

The work performed under the ATO produced three innovative tools for delivering self-development training to company grade officers. The training tools were designed by applying the results of research on competencies critical to effective leadership in the COE (see Table 1). The ALD training tools are listed in Table 3 along with the intended purpose of each. The following paragraphs describe the tools and their components.

Table 3
Training Tools of the ALD Toolkit

Tool	Mode	Purpose
Leader Adaptability Self-Training System (LASTS)	Individual	Sharpen metacognitive self-development skills
Critical Thinking Skills (CTS) Modules	Individual	Enhance cognitive abilities critical for leaders
Army Excellence in Leadership (AXL) Vignettes	Group	Build interpersonal skills via situated learning

Leader Adaptability Self-Training System (LASTS)

The LASTS tool (Cortina et al., 2004) is designed to promote proactive, deliberate leader development by improving an officer’s abilities to conceptualize and think about the goals and processes involved in self-development. The tool contains five modules:

- Self-appraisal, including self-appraisal biases, identifying desired characteristics, and defining a “possible self.”
- Self and social awareness, including awareness and leadership, self awareness, managing emotions, and social awareness.
- Self regulation and self development, including goal setting, identifying resources (mentors, learning partners, etc.), monitoring progress, and addressing discrepancies.
- Self development learning contracts, including a reflection exercise, a self-development goals exercise, and developing a learning contract.
- Application exercise, focusing on adaptive problem solving.

Available in two alternate versions (high vs. low structure), each module consists of slides (primarily text) that the participant views at his/her own pace. In addition to the primary training modules, the LASTS suite includes an introduction (overview) and a 38-item survey designed to determine whether a highly structured or a less structured (discovery learning) training approach would fit the participant better. Both of these components are optional. The complete set of modules requires 3-4 hr to complete.

Critical Thinking Skills (CTS)

The CTS training program (Fischer, et al, 2008) aims to improve cognitive skills by enhancing a leader’s ability to (a) critically evaluate novel situations, (b) develop creative, effective solutions, and (c) make sound decisions under time-constrained circumstances. The training was designed originally for individual learning in an academic setting but was modified to better fit a military audience. The program comprises eight interactive, multimedia modules, each requiring about 2 hr to complete.

The CTS modules are set in a framework of gathering, processing, and evaluating new information to meet diverse needs. The eight modules cover the following action-oriented principles:

- Frame the message
- Recognize the gist in material
- Develop an explanation
- Generalize from specific instances to broader classes
- Use mental imagery to evaluate plans
- Challenge one’s biases
- Examine other people’s perspectives
- Decide when to seek information based on its value and cost

Each module trains three to six sub-skills and includes practical exercises and test exercises which yield scores and provide feedback to the participant. In addition to the training lessons there are pre- and post-tests for self-evaluation.

As the operational demonstration got underway, the research team decided to add the CTS post-tests to the end-of-program (“post”) measures described earlier (see Table 2). The intent was to assess the retention of CTS learning following the end of ALD training. Each stand-alone post-test was expected to take less than 30 min.

Army Excellence in Leadership (AXL) Vignettes

The AXL component of the toolkit (Zbylut & Ward, 2004b; Zbylut et al., 2007) deals with the interpersonal aspects of leadership, with emphasis on realistic complexities of the COE. The tool contains two vignettes, titled *Power Hungry* and *Tripwire*, which are based on Soldiers' anecdotes from operations in Afghanistan and Iraq. Geared to catalyze the acquisition of tacit knowledge, the vignettes are filmed case studies combining storytelling elements with situated training techniques.

The AXL vignettes are designed to be used interactively in small group settings with a knowledgeable facilitator present. They are internet downloadable and adaptable for individual training, but they are best used in conjunction with small group discussions that focus on a specific teaching theme. Guidelines are available to help orchestrate the discussion. Group members have a computer interactive option to query the film's characters and receive scripted commentary. Because of their large size, the digitized video files are played from the hard drive of a local computer. Each vignette file takes 12-15 min to play from start to finish.

The family of AXL materials includes theme-based modules and an instructor's guide (Zbylut & Ward, 2004b). The interactive multimedia modules enable small groups to address various teaching themes related to military leadership. The instructor's guide gives instructions for leading vignette-based training sessions, including discussion questions and tips for guiding the discussion. Among the modules are the following:

- Command climate
- Command influence
- Communication
- Cultural awareness
- Guiding subordinates
- Mission clarity
- Model of command
- Respect for experience
- Leadership values

During the operational demonstration, the research team's vignette facilitator adapted the AXL methodology for the unit training environment, yielding the following steps:

- Introduction to the training session
- Viewing the AXL vignette film (entire group)
- Small groups (2-3 per computer) working on the cultural awareness module
- Small groups (2-3 per computer) working on the leadership values module
- Data collection (specialized diagnostics or user satisfaction)

Training Support Tools

The research team developed training support tools to guide participants' utilization of the toolkit and to facilitate proper use of the tools for optimal learning. These tools—Student Guide, Training Support Package, and Help Desk mechanism—are summarized below.

Student Guide

The Student Guide served to encourage participation in the ALD program and facilitate proper use of the tools. An important purpose was to ensure that the participants received maximum benefit from their ALD training. As seen in Appendix C (Volume II), the guide included an introduction, descriptions of all the tools, instructions for the participants/students, technical notes, and information for contacting the research team. The bulk of the guide described the tools, including the number and sequencing of training modules and the expected completion time. A multimedia version of the guide with voice track was available on the ALD homepage, and the participants received a paper copy in slide format during the unit's group orientation.

Training Support Package

The Training Support Package (TSP) provided a detailed guide for unit administrators and interested participants. It included an overview of the operational demonstration and the assessment process, benefits and costs of using the toolkit, the training model, tool descriptions, and administrative guidelines for the demonstration. Twelve appendices of the TSP contained details on various topics important to the demonstration, to include Web site description and guidelines for unit training schedules. An html file of the TSP with a hyperlinked index resided on the Web site, and a text file was available for exporting and printing. Appendix A (Annex G, page A-33) in Volume II presents the text version of the TSP.

The administrative guidelines called for appointing Unit Action Officers (additional duty) at battalion and company levels to facilitate the unit's utilization and assessment of the program. These positions were intended to be used only during the operational demonstration and would be optional for routine implementation.

Help Desk

A limited Help Desk was maintained to troubleshoot technical problems and answer questions from participants and unit command group members. A "Help" link on the ALD Web site led to an online form for submitting a problem report or help request. Participants could also submit problem reports and questions via email and telephone.

Specific Help Desk capabilities included correcting malfunctions in the Web site or its links; answering Web site questions/issues; assisting with training support issues; and providing guidance on the ALD program materials. As necessary, the Help Desk administrator relied on the Webmaster and tool-specific experts to resolve technical issues. A record of Help Desk queries and actions was maintained. Additional procedural details are available in Appendix B (page B-6) of Volume II.

Delivery Suite (Web Site)

Overview

The components of the ALD toolkit were hosted on a Web site server and managed by a learning management system (LMS). The singular exception to this arrangement was the AXL suite, which was distributed via compact disc and managed by a member of the research team who served as the vignette facilitator. In addition to enabling internet delivery of the ALD tools, the Web site supported the following functions: account set-up, user authentication, learning management, usage monitoring, problem reporting, assessment data collection, data storage and management (database), and administrative functions.

This section presents a high level description of the Web site. For more details, see Appendix A (Annex I, page A-56) in Volume II.

Security and Privacy

Controlling access to the Web site relied on a user authentication mechanism to prevent unauthorized access. Each participant chose a unique identifier and password to use for logins. For data security, an identification number was assigned to each participant and no personal identifying information (e.g., social security number, surname) was stored in the database. No record linking personal identifying information with data was maintained. Access to the contents of the database was strictly limited to selected members of the research team.

Web Site Architecture

The Web site was constructed for user interface presentation via commercially available Web browser packages. The hypertext pages were designed for easy legibility, clear separation of information elements, and minimum scrolling requirements. The top-level pages for entering the system and accessing the ALD tools included:

- Homepage with user login portal, “contact us” link, and Student Guide link
- Account set-up page (presented to new users only)
- Security and privacy notice page
- Welcome page with general information and links to the Student Guide and the TSP
- Main menu with three primary sections:
 - Pre Measures—links to demographic survey plus six self-assessment tools
 - Training—LASTS link plus individual links to eight CTS modules
 - Post Measures—links to four self-assessment tools plus eight CTS post-tests

The ALD homepage could be accessed directly at a unique address. All program components resided on the Web site server except the Personality Assessment (accessed on another Web site) and the AXL suite (delivered offline). When a participant selected a specific tool on the main menu, the link typically led to a secondary menu of modules (or components of CTS modules) available. Selecting a link from the secondary menu led to a family of tool-specific pages that conveyed the contents of the diagnostic or training module.

The research team selected a public domain LMS (Moodle) because it has no purchase or licensing costs and meets the Army's information technology standards (including compliance with the Sharable Content Object Reference Model). It has been used successfully on other DOD websites and was recommended by military training experts. The LMS also managed the capture of recordable participant responses (including diagnostic data and training-related measures) and transferred them to the database.

The LMS software included a database that stored and managed the data collected during online assessment and training. Login and module usage parameters (start/stop clock times) also were recorded and stored in the database. The researchers adapted report generation functions of the LMS software for monitoring, data analysis, and administrative purposes.

Exploiting the Web Site

Once a participant established an account on the ALD Web site, he/she could login and logout at will—24 hr a day, 7 days a week. There was no minimum or maximum limit on the duration of a session, nor on the time between sessions. Thus the participant controlled the timing of his/her activities in working with the ALD tools. The participant also determined his or her own pace during a session, normally by selecting “Next” or “Enter” or a new link when he/she was ready to advance. As a general rule, the participant could work through part of a module or more than one module in a single session. However, the LMS controlled the sequence of ALD tools.

To create optimal conditions for ALD training as well as data collection, the LMS enforced the following sequence of the diagnostic and training tools: Demographic Survey, UCI, Leadership Experiences, MLQ, Leadership Opinions, TKML, Personality Assessment, LASTS, and finally CTS modules. After finishing the LASTS tool, a participant could access the eight CTS modules in any sequence. Completing a given tool produced a check-mark next to a tool's link in the main menu. Participants could revisit tools completed earlier, if desired.

Due to the design features of the ALD tools, book-marking capabilities were generally absent. As a result, work on the diagnostic and LASTS tools was lost if the participant exited before reaching the end of a module. A warning about the potential loss of data appeared on the opening page of each module in this category. In addition, a few tools imposed a completion time limit. This constraint was removed midway through the operational demonstration.

When a tool yielded feedback for the participant, it was normally delivered online. An exception to this practice was the Personality Assessment, where the narrative report was sent to an email address designated by the participant.

Utilization Model

Training Model

To guide the utilization of the ALD tools in a consistent fashion likely to produce optimal program benefits, the research team crafted a training model. The training model addressed two

dimensions—sequence and time. The start of the sequence rested on the argument that self-awareness and strategic thinking about self-development are basic enablers (Day, Harrison, & Halpin, 2009). This premise suggested that the self-assessment tools and the LASTS modules should come first to give the individual an appreciation of his/her strengths and leader development approach. With an objective foundation identified, a mixture of individual training on cognitive capabilities (CTS) and group training on interpersonal skills (AXL) emerged as a blended learning application. Staging the two types of training to build progressively across the individual and group domains could leverage socially situated learning and consolidation of knowledge and skills. Finalizing the sequence logically entailed post-training diagnostics to probe for evidence of learning effects. This train of logic led to the recommended sequence depicted in Figure 3.

Timeline	Start	→	→	→	→	→	Finish
Activity	Diagnostics	Training					Diagnostics
Tools	Pre-Measures	LASTS	CTS 1-4	AXL #1	CTS 5-8	AXL #2	Post-Measures
Time	4-6 hr	3-4 hr	8-10 hr	2-3 hr	8-10 hr	2-3 hr	3-4 hr

Figure 3. Training sequence as recommended for the operational demonstration.

The time dimension of the training model was intended to shape realistic expectations for the level of effort needed to fully harness the ALD toolkit. The research team drew on the formative evaluation results from the development efforts for the various tools, and on feedback gathered during the pilot test. This led to the time parameters shown in Figure 3, reinforced by including time estimates for each tool in the Web site’s main menu. Implementing the time and sequence features of the training model could be expected to optimize the benefits from working with the components of the ALD toolkit.

The model represented in Figure 3 provided working guidelines for units and participants interested in putting the ALD toolkit to good use. Although the LMS enforced a fixed sequence for the diagnostic and LASTS tools, the system allowed participants to use the subsequent tools in any sequence desired. Also, participants could return to a module for review or further study, and they were encouraged to do so.

Optimally, ALD training would occur primarily during the reset phase of the unit lifecycle. However, the training modules are suitable for use during other phases of the lifecycle including individual and team training, certifying events at Combat Training Centers, and sustainment training. As the recruitment of units for the operational demonstration worked out, there was little opportunity to align unit participation with a particular phase of the lifecycle.

Utilization Environment

The ALD tools were intended for use by company grade leaders during duty hours as part of the unit's training program. The ALD architects envisioned that users would have ready access to computers within the unit or in a nearby learning center. In reality, the participating units had few computers and most of them were not readily accessible to participants.

The operational demonstration plan envisioned individual work with the toolkit to be included on the unit training schedule, and the TSP contained materials to facilitate such scheduling. However, only the AXL events were placed on the training schedule. Consequently, participants used the other tools as their schedules permitted. Consistent with the COE, the hectic pace of unit activities (individual and collective training events, equipment management and maintenance, administrative functions, external taskers, and so on) severely limited the time participants had available to spend on ALD training.

Demonstration and Assessment Methods

This section describes the documentation, research staffing, participants, investigational paradigms, procedures, and data collection processes employed in planning and executing the ALD demonstration and assessment. The questions of interest, sampling approach, assessment design, evaluation approach, and measurement strategy/approaches are described in the Detailed Test Plan (see Appendix A in Volume II). The description here focuses on the actual methods executed, regardless of those called for in the Detailed Test Plan and other planning documents. Notable departures from the planned methods occurred on a number of counts to accommodate the requirements and constraints of the operational environment.

Overview

The overarching approach called for conducting an operational demonstration under realistic field conditions and gathering feedback from members of the target audience. To ensure an independent assessment, none of the ALD tool developers participated directly in planning and executing the demonstration and data collection. The research team created a Web site to enable online delivery of the ALD tools and pilot tested the site before opening it to outside access. The team targeted operational units in both the Active Component (AC) and Reserve Component (RC), but only AC units participated. The investigators also worked with user juries to expand the feedback base. The operational users and user juries yielded data on the suitability of the tools, utilization patterns, basic learning, module-specific performance, user acceptability, and improvement options. Data analysis served to characterize the utilization of the ALD tools and to derive lessons learned that could help improve the interactive self-development program.

The following steps were executed to accomplish the operational demonstration and assessment objectives:

- Thorough demonstration and assessment planning
- Development of an integrated Web site (see Woller et al., in preparation)
- Pilot testing of the Web site, with subsequent refinement
- Planning, preparing, executing, and documenting user juries

- Planning, preparing, executing, and documenting the operational demonstration
- Compiling, integrating, and analyzing the cumulative data

Planning Documents

Through a systematic planning process the research team designed the investigational approach, developed the implementation procedures, identified measurement objectives and methods, and determined resource requirements. This largely analytical process produced three planning documents to guide the operational demonstration and assessment:

- ◆ Detailed Test Plan
- ◆ Implementation Support Plan
- ◆ Data Collection, Management and Analysis Plan

The Detailed Test Plan (see Appendix A in Volume II of this report) established the framework and architecture for the operational demonstration and set the stage for creating the subsequent planning documents. Development of the Detailed Test Plan began by identifying the purpose, goals and objectives of the demonstration and assessment. The objectives were translated into key questions of interest. Based on the goals and questions of interest, the research team developed an integrated assessment approach, including a sampling approach and measurement strategy. The investigators derived the measurement requirements and mapped them to a correlated family of measurement approaches, identifying the potential sources of data. In addition to the research plan, the Detailed Test Plan included a management plan addressing timeline aspects, management structure, recruiting of units, demonstration strategy, resource requirements, decision milestones, and finally threats to the validity of the assessment along with approaches for avoiding the threats or mitigating their impact.

The Implementation Support Plan (see Appendix B in Volume II) spelled out in detail the blueprint for meeting the objectives of the operational demonstration. The document outlined the stages and steps that formed the heart of the blueprint. After defining the target audience, it then detailed the key operational procedures: overall management, Web site management, help desk operations, unit participation, monitoring procedures, and information management. Next came a timeline for the stages and steps of the operational demonstration. The document carefully defined the personnel requirements and their associated duties and qualifications. A risk mitigation plan outlined measures to control or offset the factors that could threaten the success of the demonstration. Finally, the document included an outline plan for the pilot test.

The Data Collection, Management and Analysis Plan set the terms for capturing and processing both quantitative and qualitative metrics. The goal was to obtain data capable of answering the research questions of interest. Using the key questions from the Detailed Test Plan (page A-11 of Volume II), the research team inventoried the data requirements and translated them into a master list of measures and other metrics. They then mapped the master list of data requirements into a list of candidate data collection instruments. The investigators outlined operational processes for collecting data and organized them along an ideal timeline for a participating unit. They spelled out the procedures for managing the data and organizing them in a cumulative database. Finally, they outlined the approaches for analyzing the data. As the operational demonstration and assessment unfolded, the research team adjusted the measurement

procedures to fit the actual utilization conditions. This involved choosing the relevant and measurable data elements, then developing the supporting data collection instruments.

Pilot Test

To test the functionality of the ALD Web site and ensure readiness for the operational demonstration, the research team conducted a pilot test of all primary and supporting materials. The objectives were to verify that the ALD products, the Web site and its supporting software, research team personnel, training support materials and procedures, and data collection and management mechanisms were ready for full execution. The test exercised key procedures specified in the Implementation Support Plan. During this event independent researchers tested the structure and functions of the Web site as well as the process for gathering utilization data and user feedback. Table 4 summarizes the principal steps of the pilot test methodology.

Table 4
Primary Steps of the Pilot Test

Phase	Step
Preparation	<ul style="list-style-type: none"> • Schedule participants to represent the target audience • Develop pilot test-specific materials and instruments • Confirm that Web site, hardcopy materials, and participants are ready
Execution	<ul style="list-style-type: none"> • Conduct kick-off briefing as the pilot test launch event • Sequentially test components and document problems/observations • Hold as-needed hotwashes to surface problems of immediate concern
Documentation	<ul style="list-style-type: none"> • Gather data collection instruments from all participants • Compile problems, findings, lessons learned, and recommendations • Inventory and prioritize follow-on actions required

The pilot test entailed a limited trial with all players (especially sources of data) represented—demonstration/assessment manager, operations manager, Web site experts, users (target audience), data collectors, and help desk personnel. The role players were contract personnel located at four sites—Forts Leavenworth, Knox, Benning, and Hood. A ten-day schedule covered Web site loading (stress test), employment of pre-training diagnostics, utilization of individual training tools, conduct of collective exercises (AXL), and deployment of post-training diagnostics. The schedule also included the use of the primary user feedback tool (user satisfaction survey) and pilot test-specific data collection instruments (worksheet and participant journal). The test concluded with an after action review to summarize the major lessons learned as well as follow-on actions.

The entire process for collecting and managing data (including database operations) was exercised, and data analysis procedures were tested selectively. Investigators checked the quality of the data capture processes, especially the automated mechanisms. During testing of the ALD tools, usage and performance data populated into the database by means of automated Web site processes were inspected for tagging, accuracy, and completeness of data elements. Data entered manually were spot checked randomly. Flaws and problems were fixed and retested.

The investigators used the results of the pilot test to revise the Web site—including the user interface, selected diagnostic tools, the learning management process, and the data capture mechanisms. They also revised the training support materials, the data collection instruments, and the data management procedures. In addition, they refined the procedures for managing user access, monitoring Web site use, and resolving problems.

User Juries

To provide narrowly focused feedback opportunities, the research team planned and conducted a series of user juries. A user jury is a group of target audience representatives that previews or reviews a new product or system in a compressed timeframe and provides limited feedback (Throne, 2006). In the ALD assessment, the user jury technique served to expose a captive audience to a selected component of the toolkit in a well controlled setting. While the technique did not represent a fully operational test, it enabled the research team to investigate specific dimensions of ALD tools such as technical quality, user acceptability, doctrinal suitability, and potential value.

The investigators harnessed the user jury sessions to assess two of the three ALD training tools—LASTS and CTS modules. (Captive audience implementations of the AXL vignettes were built into the unit assessment process.) Across 14 user juries at five different installations (Table 5), the research team assessed most of the LASTS modules and all of the CTS modules. With the exception of two of the CTS modules, a given module was assessed only once.

Table 5
User Jury Sessions Conducted during the Demonstration

User Juries	Tool Examined	Data Collection
Location 1 (4 groups)	LASTS Modules (4 of 5)	Demography, Think-Aloud, Surveys, Hotwash
Location 2 (2 groups)	CTS Modules #1 and #2	Demography, Pre- & Post-Tests, Surveys
Location 3 (2 groups)	CTS Modules #3 and #4	Demography, Pre- & Post-Tests, Surveys, Hotwash
Location 4 (2 groups)	CTS Modules #5 and #6	Demography, Pre- & Post-Tests, Surveys
Location 5 (4 groups)	CTS Modules #7 and #8	Demography, Pre- & Post-Tests, Surveys

The research team adopted a familiarize-inspect-reflect process for conducting the user jury sessions. Each group of troops addressed only one module, so that no jury members worked with more than one ALD product. Each session lasted 3-5 hr and included an introduction to the ALD program, an overview of the module of interest (familiarization), observation of the module in group mode (inspection), and subsequent assessment and discussion (reflection). During the inspection phase, the group of participants (from 6 to 15 Captains, Lieutenants or NCOs on active duty) walked through the module of interest by viewing the user interface on a large projection screen. As the research facilitator led the group through the multimedia screens, the participants verbalized their reactions and opinions. After the walk-through, the jury members provided reflection-based feedback by completing a questionnaire and participating in a group discussion or hotwash. As part of the survey process, the participants furnished demographic information that included rank, branch, current assignment, and years in the Army.

The user satisfaction survey (see Appendix D in Volume II for versions tailored to LASTS, CTS, and unit participants) contained self-report, rating scale, and write-in items to elicit reactions and opinions from the participants. The opinion rating items used a 6-point or 7-point agree-disagree response scale. The questionnaires addressed the following dimensions of the ALD tools:

- Overall impressions (potential role, warranted investment of time, relative priority)
- Technical quality (accuracy, clarity, conciseness, quality of feedback, etc.)
- Acceptability (ease of use, sensibility, realism, level of challenge, etc.)
- Learning contributions (e.g., awareness, knowledge, insights, understanding, skills)
- Potential value (relevance, importance, applicability, usefulness, benefits, etc.)
- Cost-benefit aspects (e.g., global return on investment of time)
- Potential leader development issues the ALD tools might address
- Ideas and suggestions for improving the modules or the overall program

The facilitator recorded hand-written notes of the think-aloud verbalizations and group discussions, later compiling them into a thematic summary. Occasionally another researcher served as a note-taker. The participants completed the questionnaires in paper-and-pencil form. In the case of the CTS modules, the pre- and post-tests from the toolkit were administered to the participants in hardcopy form.

A total of 140 Soldiers participated in the user juries. This included 48 Captains, 23 First Lieutenants, 52 Second Lieutenants, 5 Sergeants First Class, 5 Staff Sergeants, and 7 Sergeants. The participants represented various branches including Armor/Cavalry, Infantry, Field Artillery, Military Intelligence, Air Defense Artillery, Aviation, Ordnance, Military Police, Engineer, Quartermaster, Transportation, Signal, Chemical, Adjutant General, Medical Service, and Judge Advocate Corps. The time on active duty ranged from 3 months to 20 years ($Mdn = 6.4$ years).

Operational Demonstration

The Implementation Support Plan guided the field testing (see Appendix B in Volume II). The plan spelled out the methods and procedures for executing the operational demonstration. At a strategic level the plan called for enlisting tactical units to participate in the demonstration, giving them guidelines for utilizing the various tools on the Web site, measuring indicators of utilization and impact, and gathering feedback from the users. The plan organized the demonstration and assessment activities into the stages and steps outlined in Table 6.

The primary research personnel who supported the operational demonstration and assessment included:

- Demonstration/assessment manager (primary interface with participating units)
- Operations manager to coordinate day-to-day activities
- Web site cell (designer/manager, developer/programmer, database specialist)
- AXL facilitator (the demonstration/assessment manager) to lead vignette sessions
- Help desk administrator to resolve operational and technical problems
- Data collector to conduct interview and survey sessions on-site

Two battalions participated in the operational demonstration and assessment. Both were Active Component combat units based at home stations. Within these units the target audience for using the ALD toolkit included “leader teams” within the company formation (platoon leaders, company commanders and executive officers [XOs], and non-commissioned officers [NCOs] in the grade of Staff Sergeant and above). The eligible population totaled approximately 80 personnel in each battalion. For the two units the demonstration period was 7 months and 4 months, respectively, to accommodate the heavy OPTEMPO. Scheduling was coordinated with the battalion training officer (S3).

Table 6
Primary Steps of the Operational Demonstration

Stage	Step
Preparation	<ul style="list-style-type: none"> • Recruit brigade combat teams or battalions to participate • Update training support materials (Student Guide, TSP) • Develop unit orientation/start-up package (briefing slides) • Establish help desk capabilities (email and telephone) • Operationalize ALD Web site (with improvements based on pilot test)
Unit Start-up	<ul style="list-style-type: none"> • In-brief commander and/or other members of command group • Orient participating leaders and initialize utilization process • Verify unit access to ALD Web site and help desk • Resolve concerns and issues from users and leaders
Toolkit Usage	<ul style="list-style-type: none"> • Maintain Web site operations to enable participants’ use of tools • Monitor participants’ online usage and encourage unit leaders • Provide self-assessment feedback to individual participants • Resolve technical and operational problems • Conduct AXL training sessions (with ARI facilitator on-site) • Collect, process, and manage online and paper-based data
Wrap-up	<ul style="list-style-type: none"> • Assess status of data collection and determine logical stop point • Gather end-of-demonstration feedback from users and unit leaders • Provide overall summary to users and unit leaders

Between the two battalions that supported the demonstration and assessment, about 160 leaders were eligible to participate in ALD training and data collection. Of those, 142 leaders participated in one or more ALD training activities. Of the total group, 76 took part in only the offline AXL events, meaning they left no trace on the Web site. Thus, 66 leaders spent time on the ALD Web site, with 53 of them contributing demographic data. All were in active duty status, and all but one were males. The group included 2 Lieutenant Colonels, 2 Majors, 8 Captains, 6 First Lieutenants, 16 Second Lieutenants, 4 Master Sergeants, 9 Sergeants First Class, 2 Staff Sergeants, and 4 Sergeants. Their time on active duty ranged from 10 months to 23 years (*Mdn* = 8.5 years). Altogether the leaders represented eight branches—Infantry, Armor, Field Artillery, Military Intelligence, Aviation, Signal, Military Police, and Adjutant General.

In the unit start-up stage, the demonstration/assessment manager initially conducted a desk-side in-brief for the commander and other members of the command group to introduce the ALD program and the goals of the operational demonstration. The package for the in-brief drew on the materials in the TSP and Student Guide and highlighted the training time needed by

participants to work with the online ALD products. The demonstration/assessment manager then conducted a group orientation for the target audience explaining the purpose of training, account set-up, and the recommended sequence for using the tools. The orientation used the Student Guide (in slide form) to give participants an appreciation of the ALD toolkit, as well as narrative describing the purpose of the demonstration and the projected timeline. A primary objective of the in-brief and orientation was to generate support for the operational demonstration.

As a general rule each participating unit had a single point of contact to serve as the primary interface between the unit and the research team. This individual encouraged the unit's eligible leaders to use the ALD toolkit, and helped resolve issues that could affect participation. The demonstration/assessment manager maintained routine contact with the unit points of contact, keeping them informed of the participation status within their units.

Each unit participant initially created an account on the ALD Web site, choosing a user name and password. The user interface invited participants to review the Student Guide (and the TSP, if more information was desired) before starting any modules. Subsequently they could work on modules at their own pace, following the sequence enforced by the LMS. As a general rule, the LMS required users to complete the pre-training diagnostic modules first, then the LASTS modules, then the CTS modules (in any order), and finally the post-training diagnostic modules. The users could revisit the Student Guide or the TSP as desired. The online suite's structure and the LMS process are described in Appendix A (Annex I, page A-56) in Volume II, and technical details can be found in Woller et al. (in preparation).

As the demonstration and assessment proceeded, user feedback occasionally led to minor improvements in selected features of the online suite. These improvements generally revolved around wording or highlighting changes in the lead-in instructions, the main menu links, the Student Guide, the TSP, or selected diagnostic tools. In addition, the help desk features were refined and expanded. Toward the end of the primary data collection, the LMS controls were modified to allow random access to the online modules (in anticipation of an additional demonstration phase). The in-process, evolutionary improvements to the online suite are documented in a companion report (Woller et al., in preparation).

The help desk process relied primarily on users submitting technical and operational problems via email. A Web site link connected users to a pre-defined email form. The demonstration/assessment manager normally processed an incoming email to determine if she could resolve the problem directly or needed special assistance. Users also could submit a regular email or leave a telephone message. Once a resolution or definitive reply had been sent to the originator, the administrator could transfer key information to a lessons learned folder.

Participant adherence to the ALD training model obviously impacted the validity of the data. The demonstration/assessment manager sent email reminders to the participants at several points—primarily with each pre-measure feedback packet and preceding each AXL session. In the final analysis, it proved very difficult to influence participants' behaviors and the amount and quality of the resulting data reflected substantial variability in the level of compliance.

Unlike the individual learning sessions with the online tools, the AXL vignette sessions were conducted offline in group fashion, as designed. The on-site facilitator (demonstration/assessment manager) led a group of participants numbering 8-12 through viewing of the 12-15 min vignette on a laptop-driven projection screen. The participants then divided into groups of 2-3 seated around a computer. Working together, each group completed two computer-based training modules—one on cultural awareness and one on leadership values. Each session lasted 2-3 hr, with 6 weeks and 16 weeks, respectively, between the first and second sessions for the two different battalions. At the end of the first session, the facilitator administered two tests measuring participant characteristics—Need for Cognitive Closure, and Learning Strategies. The first of these was developed as part of the AXL project (Zbylut & Ward, 2004a). The Learning Strategies instrument was adapted from Duncan and McKeachie (2005). The second vignette session ended with a feedback questionnaire addressing the entire ALD toolkit.

The Data Collection, Management and Analysis Plan guided the capture of data in the operational assessment. As Table 7 shows, the research team used a variety of data collection instruments that ranged from manual forms to automated mechanisms. Five kinds of data collection instruments were used—event chronologies, product-embedded tests, forced-choice diagnostics, attitude surveys (questionnaires), and structured interviews. The product-embedded tests and the diagnostic tools were utilized as is (without modifying the developer’s final version). The user satisfaction surveys (see Appendix D in Volume II) and the demographic survey were developed by the investigators through iterative review and revision cycles.

Table 7
Data Collection Instruments Used during the Operational Demonstration

Instrument	Description	Timeframe
Participant Roster	Listing of participants (eligible vs. registered)	Unit start-up
Web Site Logger	Automated documentation of login events	Continuous
Product-Embedded Tests	Assessment components built into ALD tools	LMS-triggered
Demographic Survey	Biographical profile completed via Web site	User registration
Toolkit Diagnostics	Pre- and post-training assessment via Web site	Pre- and post-training
User Satisfaction Surveys	Gathering of participant feedback on-site	End of training
Interview Protocol	Conducting interviews on-site (face-to-face)	Intermittent
Help Desk Log	Recording of problems and their resolutions	Event-triggered

In the absence of control (baseline) units, the research team used a pre-test and post-test paradigm to probe for effects of utilizing the ALD training tools. Among the diagnostic tools described earlier in *The Leader Development Toolkit* section, four instruments were selected for pre versus post comparison because of their expected sensitivity to self-development learning:

- Multifactor Leadership Questionnaire
- Tacit Knowledge for Military Leaders
- Leadership Opinions
- Unit Cohesion Index

Among the toolkit's diagnostic tools, two were deemed unsuitable for pre-post testing due to the inherent stability of the measures involved. As a factual account of one's leadership history in the Army, the Leadership Experiences survey could not be expected to reveal short-term learning effects. As an instrument designed to measure stable personality dimensions, the Personality Inventory would not be a candidate to reflect the acquisition of new leadership knowledge, skills, and understanding. Thus, these two diagnostic instruments served mainly as tools to enhance a leader's self-awareness and generate baseline measures.

As an adjunct to the set of post-training diagnostic tools, the research team added the post-tests from the CTS modules. They did this for two reasons. First, there was interest in examining the potential value of the tests as independent diagnostic tools. Second, the team hypothesized that positive effects of ALD training subsequent to completing the CTS modules might be detectable by repeating the CTS post-tests. In effect, this represented an extension of the pre-post comparison paradigm, with the CTS post-tests to be used during training and again at the end.

As a unit's participation window ended, the demonstration/assessment manager interviewed leaders to gather insights about the overall ALD program and the issues faced in utilizing the toolkit. She also provided them global feedback on the outcomes of the assessment, encouraging them to share the information with their participating leaders.

Data Handling and Analysis

The cumulative data included qualitative and quantitative measures originating from the user juries and the operational users. Because the user jury data were not comparable in terms of procedures and measures, they were not compiled into a common database. In processing the operational users' data, the research team aggregated them into a multi-dimensional database. The data collected via online processes were transferred automatically into the database. The paper-and-pencil and hardcopy data were entered manually and spot checked for accuracy.

Parallel procedures were used for analyzing and integrating the data from the user juries and the unit participants. Given the mixed nature of the data, both quantitative and qualitative techniques were used for analysis. The quantitative analytical techniques were limited to descriptive statistics. The members of the research team liberally applied their own observations and judgment, especially to interpret the data and inject investigators' insights.

Findings and Discussion

The presentation of findings considers data from unit participants and user juries together to shed light on six different aspects of the ALD methodology and the training outcomes:

- The program of instruction
- The learning environment
- Online usage of ALD tools
- Suitability of the tools
- Learning effectiveness of the tools

- Impact and value of using the tools

Before beginning the presentation of findings, some interpretive cautions are in order. In the complex operational environment of the ALD demonstration, diverse factors could influence the quality and completeness of the data (Table 8). Unwanted factors could compromise the assessment’s validity (Cook & Campbell, 1979). Most or all of the unwanted factors in Table 8 occurred during the operational demonstration, and they could confound the analysis and interpretation of the resulting data. The reader should be aware of these factors in considering the findings of the assessment.

Table 8
Unwanted Factors and Their Potential Impact

Unwanted Factor	Potential Impact
<i>Unit-Related Factors</i>	
Shortfall in enrollment of units	Low confidence in findings, inability to generalize findings
Sampling of active duty units only	Inability to draw conclusions about Reserve Component units
Absence of control/baseline units	Difficulties discerning true effects of ALD training
Low participation w/in enrolled units	Small sample sizes that reduce confidence in findings
Interrupted access to ALD products	Demotivation, participant drop-outs, loss of data
Unpredictable external events	Conflicting priorities, demotivation, participant attrition
<i>Participant-Related Factors</i>	
Shortage of time due to OPTEMPO	Inability of motivated participants to use ALD tools fully
Positive effects of pre-test tools	Difficulties attributing positive effects to ALD training
Low-fidelity product utilization	Skewed performance data and unreliable user feedback
Incomplete participation by Soldiers	Incomplete data sets, disproportionate loss of later measures
Attrition of participants	Loss of data due to participants departing or traveling
Missed data collection opportunities	Data gaps such as missing user feedback and incident logs

The limiting factors listed in Table 8 are fairly typical of field investigations conducted within operational units. The pressures of today’s COE make it very difficult for tactical units and their individual Soldiers to dedicate substantial time to self-development activities. These pressures, which partly motivated the ALD program in the first place, hampered enrollment of baseline units and led to low participation rates and drop-outs among well-intentioned Soldiers. The data collection consequences—especially the relatively small sample sizes, incomplete data, and absence of post-training measures—collectively lower the confidence that is warranted in the data. Significantly, the participation by only AC units means that the assessment findings cannot be generalized to RC units without extreme caution.

Program of Instruction

The ALD “program of instruction” was defined chiefly by the mix of tools, the target audience, the training methods, and the training model. This section discusses these factors, acknowledging that the program was largely a collection of independent tools connected loosely by the training model.

Mix of Tools

The Detailed Test Plan called for examining the completeness and sufficiency of the ALD toolkit (see Appendix A, page A-11, in Volume II). This was to be accomplished at the end of the operational demonstration by interviewing leaders of participating units and conducting focus groups with ALD-experienced participants. However, the research team was not able to collect relevant data because of time constraints within the units and shortage of participants with robust experience using the ALD tools.

As explained earlier, the toolkit included (a) a suite of diagnostic instruments to boost self-awareness, (b) the LASTS modules for teaching metacognitive skills, (c) CTS modules for enhancing cognitive skills, and (d) AXL vignettes for building interpersonal skills. The unit participants recognized a role for each of these components (see Tables 9, 11 and 12), but they were not asked to identify other components that might be needed. It is reasonable to conclude that the ALD toolkit contains useful components but is not necessarily a complete family of tools for the full spectrum of self-development needs.

The end-of-program user satisfaction survey asked the unit participants to write in which of the four groups of ALD tools was most useful. Among the modest sub-sample responding, the responses were distributed fairly evenly (Table 9). Responses from participants who worked with only one tool were excluded from the table, but it is likely that some responses were based on working with only two or three of the tools. Further, a participant may have used a particular tool to a limited extent. The response patterns were remarkably similar for the two separate battalions. These results indicate no notable preference for one ALD component over another. It is tempting to infer that the four components were judged to be equally important, but equating usefulness with relative or absolute importance is questionable. Further, the results must be tempered by the facts that the sample was not robust and some participants spent too little time to fully appreciate all of the tools (see Tables 13 and 14). The participants took part in the AXL vignettes as a captive audience (guaranteeing complete exposure), but not in their work with the other tools.

Table 9
Frequency of Unit Participants' Responses Regarding Most Useful ALD Tool

Battalion	Pre-Measures	LASTS	CTS	AXL	None
1 (<i>n</i> = 9)	2	2	2	2	1
2 (<i>n</i> = 22)	6	6	6	4	0
All (<i>N</i> = 31)	8	8	8	6	1
% of All	26%	26%	26%	19%	3%

Unit participants were also asked to write in which of the four groups of ALD tools was least useful (Table 10). The most frequent response was the diagnostic pre-measures (50% of respondents), and next came the AXL vignettes (19%). Only one respondent selected the LASTS

modules as the least useful. Coming from the self-selected sample, these results are inconsistent with other data from unit participants (see especially Table 31 below), and their implications for the ALD toolkit are open to debate. Although we didn't investigate it, different tools may have been judged useful depending on a participant's status (e.g., a "young" officer vs. a more seasoned NCO).

Table 10
Frequency of Unit Participants' Responses Regarding Least Useful ALD Tool

Battalion	Pre-Measures	LASTS	CTS	AXL	None	All
1 (<i>n</i> = 7)	1	0	0	3	2	1
2 (<i>n</i> = 19)	12	1	3	2	1	0
All (<i>N</i> = 26)	13	1	3	5	3	1
% of All	50%	4%	12%	19%	12%	4%

In short, the ALD toolkit appears to contain a sensible mix of training capabilities but it could be incomplete. Additional research would be required to determine what additional tools might be needed, if any.

Target Audience

By design, the ALD developers selected company grade officers as the primary target audience for the family of tools, with platoon and company NCOs as a secondary audience. In this project's operational demonstration, NCOs were included in the pool of eligible leaders at the request of the battalion commanders. The assessment-focused research team targeted tactical units to participate in the demonstration, because they expected the greatest need for the self-development tools there.

Many unit participants and user jury members indicated that the target audience should not be company grade officers in operational units. Rather, they stated the best use for the ALD toolkit lies in leader preparation arenas such as the U.S. Military Academy (USMA) or NCO education courses such as the Advanced NCO Course (ANCOC). The reasons for targeting these arenas included:

- Military schooling “is when leadership skills and traits are being taught and established.”
- Junior officers assigned to units have already received training on the ALD topics and their limited time should be spent on practical leadership experience.
- Notably, some USMA graduates stated that they had already received the AXL training.

When the unit participants were asked to check the blocks of formal education programs where “any of this training” would fit best, the results seen in Table 11 emerged. The patterns were reasonably similar for the two battalions. Overall, the most frequent selection was the Basic Officer Leader Course (BOLC, 67%), followed by the USMA or Reserve Officer Training Corps

(USMA/ROTC, 51%) and the Basic Noncommissioned Officer Course (BNCOC, 38%). In general, the response frequencies declined for the more advanced courses and they were lower for NCO courses than for comparable commissioned officer programs. Taken as a whole, these results indicate that the unit participants recognized a role for the ALD toolkit in institutional programs, especially for junior leaders and officer cadets.

Table 11
Frequency of Unit Participants' Responses Regarding Best-Fit Potential of ALD Toolkit

Battalion	BNCOC	ANCOC	USMA/ ROTC	BOLC	CCC	CGSC
1 (<i>n</i> = 15)	5	5	8	10	1	0
2 (<i>n</i> = 30)	12	10	15	20	10	6
All (<i>N</i> = 45)	17	15	23	30	11	6
% of All*	38%	33%	51%	67%	24%	13%

Note: BNCOC = Basic NCO Course; ANCOC = Advanced NCO Course; USMA = U.S. Military Academy; ROTC = Reserve Officer Training Corps; BOLC = Basic Officer Leader Course; CCC = Captains Career Course; CGSC = Command and General Staff College

* Because respondents could select more than one item, percentages total more than 100%.

In the case of the LASTS user juries, the user satisfaction survey asked the Soldiers to circle the military education programs where the LASTS modules could play a valuable role. Table 12 summarizes the results, which reveal quite similar patterns across the four different user jury groups. In all, the most frequent selection was USMA/ROTC (84%), followed by BOLC (38%) and self-development (32%). Two respondents selected the Sergeants Major Academy and one selected CGSC. In addition, three Soldiers wrote in Officer Candidate School. The pattern of results in Table 12 is similar to the pattern seen in Table 11, including the decline for more advanced courses/programs and the less frequent selection of NCO courses. The user juries saw a clear role for LASTS training in institutional programs.

Table 12
Frequency of User Jury Responses Regarding Potential Role of LASTS

Jury	BNCOC	ANCOC	USMA/ ROTC	BOLC	CCC	SELF- DVLPT
1 (<i>n</i> = 15)	3	3	14	6	2	4
2 (<i>n</i> = 6)	0	0	4	1	0	3
3 (<i>n</i> = 9)	2	0	8	2	0	2
4 (<i>n</i> = 7)	4	2	5	5	2	3
All (<i>N</i> = 37)	9	5	31	14	4	12
% of All*	24%	14%	84%	38%	11%	32%

* Because respondents could select more than one item, percentages total more than 100%.

Many unit participants and user jury members stated that the ALD toolkit would be very suitable for use in an institutional environment. With an eye to enabling greater payoff from the tools, the Soldiers mentioned several considerations regarding institutional use:

- Institutions would be the best way to reach the population most likely to benefit from ALD training—cadets, officer candidates, or platoon/company level NCOs.
- Whereas time constraints are severe in tactical units, time for working with ALD tools would be available in an institutional setting.
- The strong requirements for equipment-specific and mission essential training in tactical units would not be a factor in a school house environment.
- In the institution the ability of students to discuss and/or interact with instructors or small groups of students would increase the effectiveness of the ALD tools.

In summary, the demonstration participants' feedback pointed to a different target audience than what was envisioned originally. Many Soldiers felt that the early stages of leader development (cadet status for officers, primary leader schooling for NCOs) are most suitable for ALD training. This shifts the focus from operational units to military education institutions.

Training Methods

The ALD toolkit relies heavily on distributed learning methods implemented at the individual level. These bedrock features of the ALD training methods—computer delivery and individuals working alone—drew considerable feedback from the demonstration participants, although quantitative data were not obtained.

Not surprising, unit participants and user juries both expressed the belief that leadership training is essential. However, some asserted that computer based training is not well suited to building leadership skills. In one user jury, members stated that computer delivered training has limited benefit because it is just “check the block.” Since the Army is digitized and company grade Soldiers grew up with computers, such opinions do not likely result from low computer literacy or anti-computer biases. Rather, the distributed learning skeptics mentioned their past experience with computer based training and their conviction about favorable methods for leader development. Their preferred methods included mentoring, counseling, discussion with peers and supervisors, and practical experience.

The concerns about the suitability of Web-delivered training for developing leadership skills could work against acceptance of the ALD toolkit. Even with today's emphasis on distributed learning in the Army, Soldiers and leaders may resist computer-based training. If the targeted users and the chain of command are not convinced of the value and effectiveness of the training, it will not be given a chance to demonstrate a positive effect. One skeptical battalion commander summed up the issue by asking, “How can you teach interpersonal skills online?”

When many Soldiers stressed mentoring, counseling, discussion, and practical experience as high-value approaches for effective leadership development, they usually indicated or implied that interpersonal interaction and learning by doing were important considerations. The following participant comments illustrate the beliefs that surfaced:

- “A computer tool cannot take the place of human interaction.”

- “Face to face feedback is more important than online feedback.”
- The benefits of person-to-person discussion are important; “... it’s difficult to ask a computer why it believes your answer is wrong.”
- You can’t teach leadership in a class because “leaders are made.”
- “Adding on all of this ‘cost effective’ and ‘high tech’ leadership training is simply taking time away for getting actual leadership experience.”

Related to the emphasis on interpersonal interaction was the frequently expressed belief that working with others—in dyads or groups—is essential for effective leadership training. Members of one user jury felt that LASTS training would benefit from small group discussion. A member of another user jury suggested that the Army needs to change its notion that self-development is a solo endeavor, and instead place critical emphasis on social learning. The target audience beliefs about group versus individual methods for training leadership skills suggest that special effort may be required to create conditions for successful fielding and implementation of self-development tools. At the same time, it may be worth reexamining design principles that ignore interpersonal interaction as an element of self-development tools.

Given the demonstration participants’ stated beliefs that mentoring and counseling are important, a related dimension of the ALD training methodology merits discussion. To counter the absence of live instructors or mentors, the developers took deliberate steps to build feedback into some of the tools. For example, the TKML instrument generates feedback based on expert ratings of the courses of action outlined for the various scenarios. And the AXL modules include the interactive capability to query the actors and receive scripted commentary about their thought process. While the participants were not asked to comment directly on these features, the proxy mentoring may have contributed to the positive opinions conveyed in the user satisfaction survey data (for example, see Tables 15 and 21).

Training Model

As explained in the *Utilization Model* section, the ALD training model recommended an optimal sequence for the various tools. This sequence began with self-awareness diagnostics, then proceeded to LASTS training, then called for CTS and AXL training (intermixed), and concluded with diagnostic post-measures. During the pre-training diagnostics and LASTS modules, the LMS enforced the recommended sequence. Past the LASTS training, the LMS allowed users to self-select the order of the remaining modules. The research team was unable to gather user feedback on the training model because there were too few participants who became fully familiar with the complete toolkit. Thus, the suitability of the utilization model remains an open question.

Soldiers from the participating battalions occasionally expressed a desire for latitude to choose their own sequence of working with the ALD tools. This appeared to reflect a sense that the participants could make intelligent decisions about how to invest their leader development time. There was also an implication that the LMS-enforced sequence was too confining and prevented participants from browsing the various tools before deciding where to start. Near the end of the participation period for the two active duty battalions the research team decided to

open the ALD suite to self-sequencing, but the expected follow-on units failed to materialize. In effect, user flexibility in sequencing the ALD work was accepted as a valuable feature.

Occasionally Soldiers stated that the ALD toolkit should acknowledge other leader development programs. Such programs include the self-appraisal features of the current Officer Evaluation Report, leadership coursework incorporated in USMA and ROTC curricula, the Center for Army Leadership's Multi-Source Assessment and Feedback program, and a handful of tools available through the Army Knowledge Online (AKO) Web site. Members of one user jury suggested that the LASTS tool should be hosted through AKO so other leader development tools would be readily available. Soldiers in another user jury stated that the LASTS modules should incorporate Army leadership references such as AR 600-100, *Army Leadership* (U.S. Department of the Army, 2007), FM 6-22, *Army Leadership* (U.S. Department of the Army, 2006) and DA Pamphlet 350-58, *Leader Development for America's Army* (U.S. Department of the Army, 1994). The ALD program does not exist in a vacuum, and pointing to other programs and references would reinforce the bigger picture.

Learning Environment

Distributed Learning Aspects

The ALD Web site was hosted on a government server with the Moodle LMS installed. No special software on the user's computer was required, aside from the requisite version of the software for displaying multimedia files. The user authentication process that required Soldiers to set up an account drew no criticism from participants, but a few questioned why the Web site did not rely on AKO's single sign-on capability.

The 24x7 internet access to the ALD Web site was maintained without incident. If any participants encountered bottlenecks in their internet access, it did not come to the attention of the research team. Few technical issues and problems were reported by the users, although one participant stated that his first two attempts to login failed, leading him to stop trying.

Relying on commercially available Web browsers as the software framework for the user interface provided a familiar look and feel to the target audience. The users made no negative comments about the appearance or functionality of the interface. Presumably they found the explanatory tags appended to each main menu link—such as “Learn about your own leadership style”—to be useful. The requirement to enable the display of pop-ups such as graphic objects apparently did not pose a problem for any of the participants. The success of the user interface most likely stemmed, in part, from the pilot testing and the research team's efforts spent making minor improvements during the early stages of the operational demonstration.

More detailed findings on technical aspects of the ALD Web site's delivery environment can be found in the companion report by Woller et al. (in preparation).

Equipment Availability

On-site visits by research team members revealed that computers were generally not available below the company headquarters. This was true of both battalions participating in the operational demonstration. However, only one unit participant commented that the limited access to unit computers was a problem for using the online ALD tools. The absence of participant comments might result from Soldiers taking the issue for granted. Another possible explanation is the tendency of Soldiers to overcome problems to accomplish assigned tasks.

Regardless, the participating units had few computers and they were most likely dedicated to administrative functions such as personnel and supply management. If the ALD program is to be effective, there must be sufficient access to unit computers along with internet access. It is not known how many participants used their own computers to access the ALD Web site. However, occasional comments indicated that this was an unwelcome option because it extended long duty days and infringed on “Family time.”

Operational Constraints

A strong recurring theme in comments from both unit participants and user juries was the compelling impact of the COE on the professional development of junior leaders, both officers and NCOs, in tactical units. Four aspects of the COE became clear:

- Lieutenants and NCOs are being promoted quickly and given increased responsibilities when they may have insufficient experience.
- Although some units commit time to leadership development training, more effort and opportunities are needed.
- The high OPTEMPO in units, regardless of the lifecycle phase, adversely impacts leadership development. Junior officers and NCOs have more demands on their time than can be met, even with long days.
- Requirements placed in the unit training schedule define priorities. As one participant stated, “The plate is full and anything that is not a requirement falls off of the plate.”

The unit participants and user juries asserted that, to be effective, time must be dedicated to using the ALD tools. Expecting Soldiers to “make time” for the bulk of self-development training will not work. Participants noted (a) the duties and training that are scheduled during unit reset, and (b) the “difficulty fitting the training into workdays which are already 12 hours long.” In conjunction with the long hours and fast pace, three other aspects surfaced:

- Using the ALD toolkit at home conflicts with being “a Family man/Soldier,” making it hard to find time for ALD work outside of duty hours.
- A few participants thought that ALD would interfere with more valuable training. For example, “My Soldiers have not been able to train because of my time here.”
- Some felt that ALD “training was both valuable and relevant” but the time required was a “distraction from scheduled training.”

One leader summed up the consensus of unit participants: “Scheduling this [ALD] training and blocking time on the training schedule is the only effective way of executing this event in an MTOE [Modified Table of Organization and Equipment] unit.”

Online Usage of ALD Tools

A total of 66 participants logged into the ALD Web site, eventually accumulating an average of 14.0 logins (range, 1-50). After creating an account, participants had the choice of viewing the *Student Guide* or directly entering the pre-measures section of the Web site, an area where the LMS recorded start/stop times for most of the instruments. A total of 62 participants entered one or more time-recording areas of the ALD Web site at least once.

Diagnostic Pre-Measures

The diagnostic pre-measures were the first tools accessed by the participants. Table 13 lists the instruments in the order in which a participant encountered the links in the main menu. As the table shows, different numbers of participants used the diagnostic instruments to varying degrees. Nearly all participants who viewed an instrument spent some time responding to the questions, but many chose to exit before reaching the end of the tools. The frequency counts in the table suggest an order effect, such that usage of the tools declined across the sequence of instruments from first to last, except for the Personality Assessment.

Table 13
Unit Participants' Usage of Pre-Measures, by Instrument

Pre-Measure Instrument	# Viewed	# Compl'd	Viewing Time (min)	
			Median	Range
Demographic Survey	61	53	N/C*	N/C*
Unit Cohesion Index	59	56	1.3	1.2-16.3
Leadership Experiences Survey	57	36	11.9	1.3-49.2
Multifactor Leadership Questionnaire	48	48	N/C*	N/C*
Leadership Opinions Survey	49	48	9.6	3.2-69.6
Tacit Knowledge for Military Leaders – Platoon Level	24	23	20.0	4.2-60.0
Tacit Knowledge for Military Leaders – Company Level	24	22	24.9	0.02-60.2
Personality Assessment	44	33	N/C*	N/C*

* N/C = not captured.

The time spent on the various instruments varied considerably, depending largely on the number and complexity of the items comprising the measures. As Table 13 shows, the UCI took the least time (median, 1.3 min) while the company-level version of the TKML instrument took the longest time (median, 24.9 min). The times for the Leadership Opinions and Leadership Experiences surveys fell in between (medians of 9.6 and 11.9 min, respectively). Occasional participants spent more than an hour on the lengthier diagnostic instruments.

Training Modules

After completing the diagnostic pre-measure instruments, participants proceeded to the

training section of the Web site. The available training tools included the LASTS modules and the CTS modules (the AXL vignettes were not available online).

- At least one LASTS module was viewed by 41 participants, with a range of 1-7 viewings per participant and a mean of 1.63. No time on task data were recorded.
- The CTS suite contained 8 modules, each with 3 components—pre-test, training lessons, and post-test. Participants could access any component of the CTS modules for any length of time at their discretion. Discussion of CTS usage data follows.

Thirty participants accessed the CTS menu option and viewed some component of the CTS modules at least once, with the LMS recording start and stop times. Because they could choose their own sequence of modules and components, participants often had gaps in their CTS usage data. For example, a participant may have taken the pre-test for Module 3 but not the post-test, or vice versa. Also, participants who took pre- and/or post-tests did not always access the training portions of the modules. Those who did access an actual lesson did not necessarily undergo training, since the time they spent on the lesson was sometimes too scant (occasionally less than a minute) for reading or studying the material.

As seen in Table 14, participant usage—especially time on task—varied widely for any given CTS component. The patterns across modules show an order effect, with the number of participants declining for modules coming later in the CTS sequence especially when comparing modules 1-4 with modules 5-8. This is true for all three components—pre-test, training, and post-test. Modules 5-8 drew participants rarely. The order effect is also evident in the time on task data, especially for training and post-test components.

Table 14

Time (Min) Spent by Unit Participants Working on CTS Modules, by Component

Module	Pre-Test			Training			Post-Test		
	<i>n</i>	Mean	Range	<i>n</i>	Mean	Range	<i>n</i>	Mean	Range
1	16	9.3	1.1-22.3	8	26.5	0.3-87.6	22	21.3	3.1-39.3
2	13	15.2	3.7-30.3	7	5.1	0.1-9.3	20	21.4	1.9-36.7
3	13	20.0	3.1-51.0	8	8.2	0.2-29.0	18	8.8	0.9-21.4
4	11	16.3	6.1-27.5	9	14.4	0.1-54.2	18	16.4	2.6-29.6
5	1	N/A ^a	(6.2)	1	N/A ^a	(0.3)	5	8.9	1.0-14.8
6	1	N/A ^a	(20.1)	1	N/A ^a	(1.4)	5	5.0	1.1-9.7
7	1	N/A ^a	(3.8)	0	N/A	N/A	5	5.4	1.2-10.8
8	0	N/A	N/A	0	N/A	N/A	5	5.2	.8 - 10

^a The sample size (*n* = 1) did not support computing a mean.

The training component of each CTS module consisted of interactive lessons on the designated skill and sub-skills (see *The Leader Development Toolkit* section). Only 11 of the 30 participants who accessed the CTS tool spent time viewing the training portion of any module,

and the times were generally insufficient to expect substantive learning to occur. As the ranges in Table 14 show, the viewing time for the training modules frequently fell below 1.5 min, which is negligible. The mean training times for Modules 2 and 3 were under 9 min, while the highest mean viewing time was 26.5 min. This is notable considering that each module was designed to engage the learner for approximately 2 hr. This indicates that for the seven modules viewed, most of the participants did not spend enough time for learning to occur. At the same time, some participants did spend substantial time (as much as 87 min) on selected modules.

Post-tests were the most frequently viewed CTS component. The time spent viewing each post-test varied widely from under 1 min to over 39 min. It is not clear why the post-tests appeared to draw more attention from the participants than the pre-tests or training lessons, but some Soldiers may have considered the post-test an opportunity to demonstrate their pre-existing knowledge, a means of getting credit without taking the lessons, or a personal challenge. It is also possible that some expected a post-test would give a quick overview of the instructional contents, presuming that the pre-test would serve an attention-getting or motivational purpose.

Because AXL training was conducted offline, no usage data were collected by the ALD Web site's LMS. The first AXL vignette occurred 1-2 months after the start of ALD training, while the second vignette took place near the end of the ALD training window. Appearing on the unit training schedule, the vignette sessions drew participants in groups of 8-12 Soldiers each. By the end of the ALD operational demonstration, more than 90 Soldiers had participated in one or two vignette sessions.

Diagnostic Post-Measures

At the end of ALD training, participants were asked to complete the diagnostic post-measures. Intended to enable pre-post measurement of ALD learning effects, these instruments included the UCI, MLQ (alternate version), Leadership Opinions survey, and TKML (alternate version). Also available were the post-tests from all eight CTS modules to evaluate retention of critical thinking knowledge and skills. Only three participants spent time on the post-measures, yielding insufficient data to characterize the usage patterns.

Suitability of the Tools

Diagnostic Tools

The user satisfaction survey (see Appendix D, page D-6, in Volume II) included items addressing the measurement aspects of the online diagnostic instruments. For example, one of the questions asked the participants to indicate the extent to which the MLQ covered all aspects of leadership. The research team administered the survey to the unit participants present at the end of the second AXL vignette session—up to 5 months after they were scheduled to complete the pre-training diagnostics.

A summary of the survey-based agree/disagree rating data appears in Table 15. The results indicate weakly or moderately favorable opinions across the board, with more than 40% of the respondents agreeing (slightly, somewhat, or strongly) with the positive statements

regarding the various tools. Among the more favorable opinions (66-74% of respondents agreeing) were the TKML, Leadership Opinions, Personality Inventory, and UCI instruments. With only one exception, the proportion of the respondents registering negative opinions was less than 20%. Overall, these results indicate that the diagnostic tools measure relevant and instructive dimensions of leadership in the eyes of Soldiers, but there is room for improvement. It is possible that the ratings were influenced by more than the stated measurement aspects (e.g., time required for completion).

Table 15
Unit Participants' Ratings of Measurement Aspects of Pre-Training Diagnostics (N = 34)

Test / Measurement Aspect	Mean Rating*	% Agreeing	% Disagreeing
The MLQ questions accurately reflected my leadership style	4.6	53%	12%
The MLQ questions covered all aspects of leadership	4.4	41%	24%
The MLQ questions accurately described me as a leader	4.5	50%	18%
The MLQ reading list added to my leadership understanding	4.7	59%	9%
The TKML's feedback comparing my answers to SMEs was useful	4.6	68%	15%
The TKML reading list gave me some useful information	5.0	71%	3%
The Leadership Opinions questions accurately reflected me as a leader	5.1	74%	6%
The Leader Experiences tool captured all my leadership experiences	4.6	53%	18%
The personality inventory feedback gave me personal insights	4.8	68%	9%
The UCI questions were pertinent to the topic	4.9	68%	3%
The UCI allowed me to correctly express the attitudes of my unit	5.0	66%	6%

* The rating scale ranged from 1 (strongly disagree) to 7 (strongly agree), with 4 being neutral.

Of the six online diagnostic instruments used to generate pre-training self-awareness, three merited special interest because of their aggregate scoring options and expected sensitivity to self-development training effects. In addition, two instruments were added as hardcopy (offline) diagnostic tools and were administered to AXL participants as baseline measures. The resulting instruments will be examined in detail in the following paragraphs:

- Self-awareness and pre-post measures
 - Multifactor Leadership Questionnaire (MLQ)
 - Tacit Knowledge for Military Leaders (TKML)
 - Unit Cohesion Index (UCI)
- Baseline measures
 - Need for Cognitive Closure Survey
 - Learning Strategies Survey

The MLQ instrument measured leadership style by asking the respondents to judge how often a given statement (e.g., "I spend time coaching") fit them as leaders. The higher the frequency rating, the more a respondent perceived that a given statement applied to him. The 45 items of the instrument were used to compute rating-based scores for 13 subscales, as seen in

Table 16. For the sample of unit participants, the table gives summary descriptive statistics for each subscale. The relationships among the mean, median, and minimum/maximum values for each subscale indicate basically normal distributions. Average scores varied moderately across the subscales, ranging from a low of 1.8 to a high of 4.6. For the majority of the subscales, mean scores below 2.5 indicated that the leadership characteristics fit the participants “sometimes.” There are insufficient post-test data against which to compare the results in Table 16.

Table 16
Unit Participants’ Pre-Training Scores for MLQ Scales and Subscales (N = 48)

Subscale	Mean Rating*	Median Rating	Range	Std Dev
Transactional Leadership**	2.4	2.4	1.38-3.12	.47
Transformational Leadership**	1.9	1.9	1.0-3.2	.56
Inspirational Leadership	2.1	2.0	1.0-3.75	.64
Idealized Influence	2.0	2.0	1.0-3.5	.55
Contingency Reward	2.0	2.0	1.0-3.0	.55
Intellectual Stimulation	2.0	2.0	1.0-3.5	.44
Individual Consideration	1.9	1.9	1.0-3.0	.46
Management by Exception (Active)	2.8	2.8	1.5-4.25	.67
Management by Exception (Passive)	3.8	3.8	2.5-5.0	.39
Passive Avoidance	4.2	4.2	3.25-5.0	.52
Laissez-faire**	4.6	4.8	3.75-5.0	.40
Attributed Charisma (N = 42)	1.8	1.8	1.0-3.0	.51
Extra Effort (N = 37)	2.0	2.0	1.0-3.0	.55

* The underlying rating scale ranged from 0 (not at all) to 4 (frequently), with 2 being sometimes.

** Denotes key scales.

The platoon-level TKML test involved eight scenario-based challenges with a total of 81 individual ratings of different courses of action. The company-level test involved ten scenario-based challenges with a total of 90 different courses of action rated. The difference between the experts’ average rating and the participant’s rating was computed for each item, and the absolute value of the difference was summed across all items to produce a total score indicating the degree of variance from expert judgment. The lower the total score, the better the agreement with expert judgment. Table 17 summarizes the resulting data for the pre-training TKML test. The pattern of values for mean, median, and minimum/maximum scores indicates reasonably normal distributions for both TKML versions. The average performance on the tests (parallel versions) was quite similar for the platoon-level and company-level samples.

Table 17

Unit Participants' Pre-Training Scores for TKML (Overall), by Echelon

Echelon	Mean	Median	Range	Std Dev
TKML Platoon Level (N = 23)	139.0	138.6	97.3-198.9	24.6
TKML Company Level (N = 22)	145.5	138.3	110.3-208.7	26.9

Note: The scores indicate degree of variance from expert judgment, aggregated across items.

The Need for Cognitive Closure instrument measured four aspects of cognitive style, as seen in Table 18. This diagnostic tool asked the respondents to rate how much they agreed or disagreed with a given statement—for example, “I dislike unpredictable situations.” The 35 items of the instrument were used to compute rating-based scores for the four subscales. For the sample of unit participants, Table 18 gives summary descriptive statistics for each subscale. The strong agreement between mean and median values suggests reasonably normal distributions. The average scores vary moderately between the subscales, ranging from a low of 3.14 to a high of 4.41. There are no baseline or post-training data against which to compare these values.

Table 18

Unit Participants' Pre-Training Scores on Need for Cognitive Closure, by Subscale (N = 67)

Subscale	Mean	Median	Std Dev
Need for Cognitive Closure – <i>Predictability</i>	3.99	4.00	.82
Need for Cognitive Closure – <i>Ambiguity</i>	4.03	4.00	.58
Need for Cognitive Closure – <i>Closed-Mindedness</i>	3.14	3.12	.60
Need for Cognitive Closure – <i>Order</i>	4.41	4.60	.72

Note: The rating scale ranged from 1 (strongly disagree) to 6 (strongly agree), with no neutral point or “don’t know” option.

The Learning Strategies instrument measured three cognitive process aspects of learning in computer-based training environments, as seen in Table 19. This diagnostic tool asked the respondents to rate how much they agreed or disagreed with a given statement such as “I think about possible alternatives.” The 15 items of the instrument fed the calculation of rating-based scores for the three subscales. For the sample of unit participants, Table 19 gives summary descriptive statistics for each subscale. Here again, the strong agreement between mean and median values suggests reasonably normal distributions for the various subscales. There is little variability among the means for the three subscales, the difference between the lowest and highest means representing about one-third of the typical standard deviation.

Table 19

Unit Participants’ Pre-Training Scores for Learning Strategies Subscales (N = 69)

Subscale	Mean	Median	Std Dev
<i>Effort regulation</i> in computer learning environments	3.74	3.75	.50
<i>Critical thinking</i> in computer learning environments	3.97	4.00	.64
<i>Elaboration</i> in computer learning environments	3.93	4.00	.93

Note: The underlying rating scale ranged from 1 (strongly disagree) to 6 (strongly agree), with neither neutral point nor “don’t know” option.

As Table 20 shows, the UCI survey yielded measures on ten dimensions ranging from trust and caring among Soldiers and leaders to teamwork to pride in unit membership. The table includes the mean rating for each dimension, along with the percent of the sample agreeing or disagreeing that the characteristic was true for their unit. “Unable to judge” responses have been removed from the analysis. The highest mean rating was 3.2, indicating weak agreement with positive statements about unit cohesion, at best. The highest proportion of the sample agreeing (including strongly agreeing) with any characteristic was 39%, with about 50% of the sample choosing “neither agree nor disagree.” The highest proportion of the sample disagreeing (including strongly disagreeing) with any characteristic was 52%, with about one-third of the sample choosing “neither.” The pattern of mean ratings suggests that the respondents discriminated among the various dimensions of unit cohesion, but generally held a neutral view of cohesion in their units.

Table 20

Unit Participants’ Pre-Training Ratings for Unit Cohesion Index Dimensions (N = 56)

Cohesion Dimension	Mean Rating*	% Agreeing	% Dis-agreeing
Members and leaders support Army values (Army Values)	3.2	39%	9%
Members trust and care about each other (Member Bonding)	3.0	26%	13%
Members work together as a team to get the job done (Teamwork)	3.1	38%	11%
Leaders trust and care about each other (Leader Bonding)	3.1	31%	13%
Leaders care about and help Soldiers (Leader Caring)	3.1	39%	16%
Leaders have skills and abilities to lead in combat (Leader Skills)	2.9	28%	28%
Members know what is expected and what causes trouble (Rule Clarity)	3.1	38%	14%
Members feel a sense of pride and importance in the unit (Unit Pride)	2.9	25%	27%
Members feel their Family and social needs are met (Member Needs)	2.4	11%	52%
Members are progressing toward their goals (Member Goals)	3.2	39%	12%

* The rating scale ranged from 1 (strongly disagree) to 5 (strongly agree), with 3 being neither.

Training Tools

The first ALD training tool encountered by the unit participants was the LASTS suite containing five primary modules. As part of the user satisfaction survey administered near the end of unit participation, 32 leaders rated various aspects of the LASTS modules, as seen in Table 21. The summary of results in the table indicates moderately favorable opinions of the acceptability of the modules. The mean ratings were all less than 5.0 (equating to “slightly agree”), with 44-65% agreeing (slightly, somewhat, or strongly) with the survey’s statements. Between 28% and 50% of the respondents were “fence sitters,” choosing “neutral” as their response for a given item. Altogether, these results indicate that the LASTS tool as a whole is acceptable to Soldiers, with substantial room for improvement. The unit participant data shed no light on the individual modules within the LASTS suite because the survey addressed the tool only globally.

Four separate user juries examined portions of the LASTS suite in a group setting with shared comments and discussion. After viewing a LASTS-wide overview and then a selected module, each group individually completed a user satisfaction survey tailored to the specific module. Thus these Soldiers provided ratings for the specific module that they reviewed primarily as observers rather than “participants.” The extent to which they were able to imagine working with the module in individual fashion is unknown.

Table 21

Unit Participants’ Ratings of Training Aspects of ALD Toolkit, by Training Tool

Training Aspect	Mean Rating*	% Agreeing	% Disagreeing
<i>LASTS Modules (N = 32)</i>			
The modules appeared easy to use	4.7	47%	3%
The modules related directly to me and my career	4.6	44%	9%
The exercises focused on realistic situations and challenges	4.9	65%	3%
The training exercises were challenging	4.5	50%	16%
The feedback from the exercises was a valuable teaching tool	4.8	63%	9%
The modules took too much time	4.8	52%	13%
<i>CTS Modules (N = 33)</i>			
The training exercises were challenging	4.7	52%	9%
The feedback from the exercises was a valuable teaching tool	4.9	63%	6%
<i>AXL Vignettes (N = 40)</i>			
The films focused on real world situations & leadership problems	5.0	68%	18%
The films highlighted critical leadership issues	5.5	80%	8%
Feedback from actors revealed leaders’ thought processes	5.1	70%	10%
Group discussion/feedback provided different points of view	5.7	78%	3%

* The rating scale ranged from 1 (strongly disagree) to 7 (strongly agree), with 4 being neutral.

The mean user jury ratings of the selected aspects of the four different LASTS modules appear in Table 22. Because the rating scale had no neutral point, a “middle of the road” average would be 3.5 (rather than 4.0 for the data in Table 21). Unlike the results from the unit participants, the user jury means tend to reflect slightly to moderately negative opinions about the LASTS modules. Four dimensions drew moderately unfavorable ratings—career relatedness, exercise realism, exercise challenge, and feedback value—with grand means from 1.8 to 2.6 (averaged across modules). Notably, the Self and Social Awareness module received an overall rating (averaged across aspects) that was moderately unfavorable (grand mean, 1.9). This may reflect that group’s comments criticizing the presentation of information in the module, especially the lack of interactivity and low-quality materials. It should be remembered that the user jury members were unable to judge the acceptability of the modules in light of any post-training application experience.

For the CTS modules, the unit participants’ ratings of two training aspects are included in Table 21. The results in the table indicate moderately favorable opinions of the CTS training exercises in terms of level of challenge and value of the feedback (mean ratings of 4.7 and 4.9, respectively). These are scant data but suggestive of a positive regard on the part of Soldiers who had developed a working familiarity with the CTS capabilities (recall from the usage data in Table 14 that more participants worked with the pre- and post-test components of the CTS modules than the actual training lessons). Here again the rating framework was global, shedding no light on the individual CTS modules.

Table 22
User Jury Mean Ratings for Training Aspects of LASTS, by Module

Training Aspect	Module*				Grand Mean
	ESA <i>n</i> =15	SSA <i>n</i> =6	SR <i>n</i> =9	AE <i>n</i> =7	
The module appears easy to use	3.6	3.2	4.7	4.9	4.1
The module relates directly to me and my career	2.5	1.2	3.2	3.6	2.6
The module covers important aspects of leader development	3.4	3.7	3.8	3.6	3.6
The module makes sense based on my experience	3.4	1.8	4.1	3.4	3.2
The exercises focus on realistic situations and challenges	2.7	1.3	2.9	2.0	2.2
The training exercises are challenging	2.2	1.3	1.6	2.2	1.8
The feedback from the exercises is a valuable teaching tool	3.1	1.0	2.4	2.6	2.3
Grand Mean	3.0	1.9	3.2	3.2	

* ESA = Effective Self-Appraisal; SSA = Self and Social Awareness; SR = Self Regulation; AE = Application Exercise.

Note: The rating scale ranged from 1 (strongly disagree) to 6 (strongly agree), with no neutral point.

The user juries generated considerably more data on the training aspects of the CTS modules (Table 23). The table’s summary of the relevant rating results covers all eight modules,

each examined by a separate group of Soldiers. While the opinions of training aspects— informativeness, responsiveness, exercise challenge, and feedback value—showed a weakly favorable pattern on the whole, the ratings varied across the different modules. Module #8 (Decide when to seek information) garnered relatively strong positive regard (grand mean, 5.4), while four modules (#3, #5, #6, #7) drew weakly favorable opinions overall (grand means of 4.4 to 4.8). The remaining three modules (#1, #2, #4) received overall ratings that were slightly unfavorable (grand means of 3.4 to 3.7). These findings may indicate that the perceived quality differed between the various CTS modules. However, each user jury rated only two of the eight CTS modules and the user juries varied along several dimensions (installation, facilitator, background, etc.), so the differences between user juries may have contributed to the patterns seen in Table 23.

The unit participants’ ratings of four different training aspects of the AXL vignettes are included in Table 21. These results come from the user satisfaction survey, which did not ask the participants to distinguish between the *Power Hungry* and *Tripwire* vignettes. The mean ratings indicated moderately favorable opinions regarding the training dimensions built into the films as well as the group-centered procedures. The means were 5.0 or greater with 68-80% of the respondents agreeing (slightly, somewhat, strongly) with any given questionnaire statement. The viewpoint diversity dimension associated with group discussion drew especially favorable responses ($M = 5.7$), consistent with participants’ positive comments about the benefits of group interaction. The consistently positive ratings for the AXL vignettes provide persuasive evidence of favorable reception among the target audience.

Table 23
User Jury Mean Ratings for Training Aspects of CTS Modules

Training Aspect	CTS Module*							
	1 <i>n</i> =12	2 <i>n</i> =6	3 <i>n</i> =10	4 <i>n</i> =8	5 <i>n</i> =12	6 <i>n</i> =11	7 <i>n</i> =26	8 <i>n</i> =17
The training module was informative	3.5	4.0	4.7	3.8	4.8	5.4	5.3	5.6
The training tool was responsive to my educational needs	3.0	3.0	4.1	3.1	4.3	4.4	4.2	5.1
The training exercises were challenging	3.4	3.7	5.0	3.1	4.1	4.5	4.0	5.5
The feedback from exercises was a valuable teaching tool	3.8	4.2	3.7	4.0	4.9	4.7	5.1	5.2
Grand Mean	3.4	3.7	4.4	3.5	4.5	4.8	4.6	5.4

* The rating scale ranged from 1 (strongly disagree) to 7 (strongly agree), with 4 being neutral.

Many of the user jury members who worked with the tools in some detail stated that LASTS and CTS (no user juries reviewed AXL) required major revisions to be effective. Recurring themes were voiced as essential for user acceptability:

- The materials must be clearly designed for Army officers or NCOs and not perceived as adaptations of materials designed for an academic or a civilian audience.
- Scenarios or anecdotes must be relevant to Army operations, current, and realistic. Some viewed these elements as trivial or overly simplistic.

- The instructional materials must reflect understanding of the operational Army. The participants sometimes criticized the instructional presentation as patronizing and amateurish. Specific criticisms included:
 - Use of academic language and tone (defeats credibility and acceptability).
 - Use of unfamiliar terminology (degrades Soldier friendliness).
 - Presence of unnecessary or redundant information (detracts seriously).
- All instructional materials must be clear and concise (to the point, easy to read, easy to follow). Otherwise, the learner will tune out quickly.
- The instruction should make the learner's job as easy as possible. On this count the following rules emerged:
 - Don't expect the learner to read run-on text.
 - Break run-on text into chunks of information such as concise bullets.
 - Include graphic methods such as charts to present knowledge.
 - Simplify wherever possible to enhance conceptual clarity.
 - Put the bottom line up front.
 - Use more than one page where information is crowded.

Learning Effectiveness of the Tools

LASTS Modules

Among the user satisfaction survey queries were items addressing the training outcomes of the ALD training tools. For the LASTS tool, Table 24 summarizes the unit participants' ratings of two outcome aspects. The survey given to the unit participants did not distinguish between the LASTS modules, so the ratings apply at the global level. The results in the table indicate moderately favorable opinions about the information gained from the exercises (mean rating, 4.8) and the resulting attention focused on self-appraisal (mean rating, 4.8). Although they represent only two outcome aspects, the results suggest that Soldiers formed a positive regard for the LASTS capabilities, based on their online work with the tool's modules.

Table 24

Unit Participants' Ratings of Training Outcomes of LASTS Modules (N = 33)

Training Outcome	Mean Rating*	% Agreeing	% Disagreeing
The exercises provided useful information and techniques	4.8	66%	3%
The training taught me to think about self-appraisal	4.8	59%	6%

* The rating scale ranged from 1 (strongly disagree) to 7 (strongly agree), with 4 being neutral.

For the user juries, Table 25 presents the mean ratings for six outcome aspects of four LASTS modules. In contrast with the results from the unit participants, the user jury ratings tend to reflect slightly to moderately negative opinions about the LASTS modules. (Because the user jury rating scale had no neutral point, a "neutral" average would be 3.5). Five outcome aspects—utility of exercise information/techniques, personal insights, etc.—drew mildly unfavorable ratings, with grand means from 2.6 to 2.8. Notably, the Self and Social Awareness module received an overall rating (grand mean, 2.2) that was noticeably lower than the grand means for the other three modules. This is consistent with the user jury results for training aspects of the same module (see Table 22). It should be remembered that the user jury members had no post-training application experience with which to judge the utility of the ALD tools.

CTS Modules

With an eye on gauging the impact of CTS training on critical thinking abilities, the online pre- and post-test for each module were intended to measure performance before and after completing the lessons. Presumably the learning effects of the lessons would increase the score on the post-test compared to the pre-test. Each test contained a unique combination of questions that varied in number, with a pre-defined scoring template. The recorded performance of unit participants on the CTS pre- and post-tests is summarized in Table 26. By virtue of self-selection, the subset of unit participants completing any given test varied across modules, with variable overlap between the pre- and post-test sub-samples. Because of the erratic pattern with which participants completed pre-tests, training lessons, and post-tests (discussed in the next paragraph), the data are suggestive at best.

Table 25

User Jury Mean Ratings for Training Outcomes of LASTS Modules

Training Outcome	Module*				Grand Mean
	ESA <i>n</i> =15	SSA <i>n</i> =6	SR <i>n</i> =9	AE <i>n</i> =7	
The module provides useful information	3.5	3.7	3.1	4.3	3.6
The module gave me insights on my self-development approach	2.8	2.3	2.9	3.4	2.8
The module added to my understanding of self-development	2.8	2.0	2.3	3.1	2.6
The exercises provide useful information and techniques	3.1	2.0	2.2	3.3	2.6
The training taught me how to improve my self-development	2.5	1.7	3.0	3.4	2.6
The module taught me to think about my self-development	3.1	1.8	2.5	2.9	2.6
Grand Mean	3.0	2.2	2.7	3.4	

* ESA = Effective Self-Appraisal; SSA = Self and Social Awareness; SR = Self Regulation; AE = Application Exercise.

Note: The rating scale ranged from 1 (strongly disagree) to 6 (strongly agree), with no neutral point.

Table 26

Unit Participants' Scores (Percent Correct) for CTS Pre- and Post-Tests, by Module

Module	Pre-Test			Post-Test			Difference
	<i>n</i>	Mean	Range	<i>n</i>	Mean	Range	Delta
1	16	52.5	6-94	22	56.1	35-72	+3.6
2	13	47.2	24-71	20	56.4	25-94	+9.3
3	13	49.4	20-91	18	47.5	5-70	-1.9
4	11	N/A ^a	N/A	18	56.8	32-91	N/A
5	1	N/A ^b	(65)	5	43.0	30-55	N/A
6	1	N/A ^b	(32)	5	35.0	25-60	N/A
7	1	N/A ^b	(58)	5	46.2	27-62	N/A
8	0	N/A	N/A	5	34.0	25-50	N/A

^a Data were missing.

^b The sub-sample size (*n* = 1) did not support computing a mean.

Frequently participants who did take pre- and/or post-tests did not access the training lessons, and those who did access them normally spent too little time to learn the material. Several examples of individual use of the CTS modules illustrate the issues with the performance data from the pre- and post-tests.

- One participant took both the pre- and post tests for the first 3 modules, with no training accessed. His scores went down 12 points for Module 1, up 7 points for

Module 2, and up by 33 points for module 3. In the case of Module 4 he took only the post-test without accessing the other components.

- Another participant took all eight post-tests, without accessing any pre-tests or training components. His times for the first two modules were 25.2 and 36.7 min (scores of 50 and 58, respectively). Times then decreased to under 20 min for Modules 3 and 4 (scores of 45 and 60, respectively), and then to 10.5 min for module 5 (score = 55). He accessed the three remaining modules for less than 10 min each, posting scores of 40, 50 and 40, respectively.
- A participant spent less than 3 min on the pre-test for Module 1 and then spent 17 min taking the post-test (no training time available) to have his score decrease from 94 to 64. Similarly, this participant took both tests for Module 3 (13.0 min on the pre-test and 33.0 min on the post-test) with his score declining from 91 to 55.
- Another participant took the Module 1 pre-test in 8.2 min and spent 188.9 min (3.1 hr) on the lessons, after which his post-test score (70) exceeded his pre-test score by 9 points. On Module 2, with only 24.8 min of training, his scores went from 55 points on the pre-test to 94 points on the post-test. He also accessed Module 3 for 99.9 min but took only the pre-test.
- One participant took no pre-tests and accessed no lessons. He accessed the post-tests for Modules 2-8, spending less than 2 min on each except for 4.3 min on post-test #4.

Providing an alternative look at the CTS performance tests were the user juries, whose members completed the pre- and post-tests in hardcopy form. Table 27 summarizes the user jury results by module, including the pre-to-post “deltas.” Not surprisingly, the average performance shows wide variability across modules, with pre-test means ranging from 25% correct to 81%, and post-test means ranging from 46% to 68%. The deltas indicate performance improvement for some CTS modules and performance decline for others.

Table 27

User Jury Scores (Percent Correct) for CTS Pre- and Post-Tests, by Module

Module	Pre-Test			Post-Test			Difference
	<i>n</i>	Mean	Range	<i>n</i>	Mean	Range	Delta
1	12	72.2	50-100	12	58.9	47-72	-13.3
2	6	69.0	36-86	6	56.0	22-69	-13.0
5	12	50	27-73	12	57.8	37-68	+7.8
6	11	40.5	27-59	11	52.5	30-70	+12.0
7	27	80.9	36-91	26	68.5	39-93	-12.4
8	18	25.4	8-50	17	46.2	25-65	+20.8

Note: Data for modules 3 and 4 are omitted because they were compiled improperly.

Interpreting the results in Table 27 is difficult because of confounding factors. Most notably, the user jury Soldiers did not engage in self-paced training at individual workstations, but viewed the facilitator-controlled display on a large projection screen along with the rest of the group. Further, they participated freely in open discussions during the training session, which

may have distracted them by competing for their attention and exposing them to others' reactions. Finally, taking the tests in hardcopy form may have distorted the performance dynamics intended by the CTS developers. As a result, the performance outcomes seen in Table 27 cannot be taken as representative of proficiency levels or potential improvements attributable to online CTS training.

The user satisfaction survey asked the unit participants to rate a few training outcome aspects of the CTS tool, with no distinction between specific modules, using the familiar agree/disagree scale. The rating results (Table 28) indicate moderately favorable opinions on the how-to contributions of the training. The means ranged from 4.7 to 4.9, with half to two-thirds of the sample agreeing (slightly, somewhat, strongly) with the questionnaire statements about training outcomes. These results for the CTS outcomes provide additional evidence of favorable reception of this tool among the target audience.

Table 28
Unit Participants' Ratings of Training Outcomes of CTS Modules (N = 33)

Training Outcome	Mean Rating*	% Agreeing	% Disagreeing
The training taught me how to listen, analyze, and evaluate messages	4.9	67%	12%
The training taught me to think about the big picture	4.8	63%	9%
The training helped me perform a self-appraisal of my leadership skills	4.7	53%	13%

* The rating scale ranged from 1 (strongly disagree) to 7 (strongly agree), with 4 being neutral.

Parallel data on training outcomes of the CTS modules came from user juries via the CTS-specific user satisfaction survey. As Table 29 shows, the mean ratings in the majority of cases were moderately favorable, reaching as high as 5.8. However, the ratings varied considerably across the different modules. Five modules (#3, #5, #6, #7, #8) drew moderately favorable opinions overall (grand means of 4.6 to 5.3). The remaining three modules (#1, #2, #4) received overall ratings that were mildly unfavorable (grand means of 3.3 to 3.7). These findings are very similar to and support the validity of the patterns found in Table 23 (CTS training aspects), where modules #1, #2 and #4 also received the lowest ratings of the CTS set. These results suggest that the perceived utility differed between the various CTS modules. However, the user juries varied along several dimensions (installation, facilitator, background, etc.) and the differences between groups may have contributed to the patterns seen in Table 29.

AXL Vignettes

The interactive courseware for the two AXL vignettes challenged the unit participants to rank order the top seven issues from a list of 21 actions that Soldiers in the film vignette should have done differently. The assigned ranks were then used to compute scores indicating how much emphasis a participant placed on four different categories of issues. If obtained before and after AXL training, the category scores could reveal shifts in participant thinking due to the vignette-based learning. Table 30 summarizes the end-of-session emphasis scores for the two film-based vignettes, comparing the cultural awareness module with the leadership values

module. The means varied substantially between the four categories—by a factor of 4 in the case of the cultural awareness module for the *Tripwire* vignette. The patterns were similar for the two vignettes, except for the category yielding the lowest mean scores (self-regulation issues for *Power Hungry*, and cultural issues for *Tripwire*). However, the results in Table 30 shed no light on training effectiveness because there was no pre-versus-post comparison.

Table 29
User Jury Mean Ratings of Training Outcomes of CTS Modules

Training Outcome	CTS Module*							
	1 <i>n</i> =12	2 <i>n</i> =6	3 <i>n</i> =10	4 <i>n</i> =8	5 <i>n</i> =12	6 <i>n</i> =11	7 <i>n</i> =26	8 <i>n</i> =17
The training taught me to listen, analyze, and evaluate msgs	3.4	3.8	4.3	3.0	4.5	4.7	4.3	5.1
The training taught me to think about the big picture	4.2	4.2	4.9	3.9	5.0	5.1	4.8	5.4
Questions made me think critically about scenario issues	3.9	4.0	5.5	3.8	5.7	5.4	5.4	5.8
The training helped me self-appraise my leadership skills	3.2	2.7	3.5	2.4	3.5	4.5	4.5	4.9
Grand Mean	3.7	3.7	4.6	3.3	4.7	4.9	4.8	5.3

* The rating scale ranged from 1 (strongly disagree) to 7 (strongly agree), with 4 being neutral.

Table 30
Unit Participants' Scores on AXL Relative Emphasis Scales, by Vignette and Module

Category	Cultural Awareness Module			Leadership Values Module		
	Mean	Std Dev	Range	Mean	Std Dev	Range
<i>Power Hungry Vignette</i>	<i>N</i> = 82			<i>N</i> = 76		
Tactical Issues Emphasis	7.40	5.83	0-18	6.49	6.17	0-18
Leader-Subordinate Emphasis	6.37	5.23	0-22	6.14	6.96	0-25
Cultural Issues Emphasis	5.82	5.00	0-17	3.63	4.60	0-15
Self Regulation Emphasis	2.95	3.89	0-15	2.16	3.49	0-15
<i>Tripwire Vignette</i>	<i>N</i> = 44			<i>N</i> = 15		
Tactical Issues Emphasis	10.32	8.63	0-27	9.40	8.58	0-28
Leader-Subordinate Emphasis	6.32	6.15	0-18	5.53	5.25	0-18
Cultural Issues Emphasis	2.55	3.76	0-15	2.53	3.14	0-8
Self Regulation Emphasis	4.02	4.73	0-14	6.47	6.97	0-18

Note: The scores were derived from relative importance rankings of 21 issues.

Impact and Value of Using the Tools

The user satisfaction survey included items addressing selected impact aspects of the ALD training—particularly usefulness and benefits of using the various tools. Table 31 summarizes the agree/disagree ratings provided by the unit participants at the end of their unit's operational demonstration period. Three of the diagnostic tools (MLQ, TKML, and personality inventory) drew moderately favorable opinions (means above 4.5) on their usefulness. The

personality inventory received the most positive ratings of usefulness ($M = 5.0$), perhaps reflecting its broad applicability and detailed feedback. The results suggest that the participants perceived practical value in the three selected diagnostic instruments. The survey did not include comparable items for the other diagnostic tools.

Table 31
Unit Participants' Ratings of Selected Impact Aspects of ALD Training

Impact Aspect	<i>N</i>	Mean Rating*	% Agreeing	% Disagreeing
<i>Tool-Specific Dimensions</i>				
The MLQ was a useful tool	34	4.6	59%	9%
The TKML feedback from SMEs was useful	34	4.6	68%	15%
The personality inventory was a useful tool	34	5.0	74%	9%
The LASTS exercises provided useful information & techniques	32	4.8	66%	3%
The LASTS modules provided definite benefits	32	4.9	59%	6%
The information gained from CTS exercises was useful	33	5.2	73%	3%
The CTS training was easily implemented into the real world	33	4.6	58%	15%
The feedback from the AXL actors provided leadership insights	40	5.1	70%	10%
<i>Overall Program Dimensions</i>				
I am a better leader after completing the ALD training	39	4.5	46%	15%
The ALD training changed my leadership style	39	3.5	26%	36%
The benefits outweighed the time required for ALD training	38	4.2	47%	26%
The ALD training was easily implemented into the real world	39	4.7	59%	13%
I recommend ALD training for all individuals in leadership positions	39	4.7	54%	10%
The ALD training interfered with my everyday training mission	37	5.0	65%	16%

* The rating scale ranged from 1 (strongly disagree) to 7 (strongly agree), with 4 being neutral.

As seen in Table 31, the three training tools (LASTS, CTS, and AXL modules) received moderately favorable ratings of their usefulness, benefits, and applicability. The mean ratings ranged from 4.6 to 5.2, with 58-73% of the sample agreeing (slightly, somewhat, strongly) with the survey's positive statements. The CTS and AXL tools drew the strongest positive ratings, but it would be unwarranted to infer meaningful differences between the three ALD training products. Altogether, the results indicate that the participants saw potential value in using the toolkit's training capabilities.

The unit participants also rated several dimensions of the overall ALD program. As Table 31 shows, they agreed to a mildly positive degree ($M = 4.5$ to 4.7) that the ALD training (a) made them better leaders, (b) could be easily implemented in the real world, and (c) could be recommended for leaders in general. At the same time, the respondents were ambivalent ($M = 4.2$) about the ALD benefits outweighing the required training time. Not surprisingly, the sample mildly disagreed ($M = 3.5$) that ALD training changed their leadership style. And they felt moderately strongly ($M = 5.0$) that the ALD training interfered with their routine training mission, perhaps reflecting the pressures of the COE.

Additional data on the impact and value of the ALD toolkit came from the user juries. The user jury results for the LASTS modules (Table 32) consistently convey ambivalent (grand means of 3.2 or 3.3) or moderately negative (grand means of 2.0 or 2.1) opinions about practical aspects of the LASTS modules examined. Across all four user juries, the members disagreed moderately (mean ratings from 1.2 to 2.3) that all five modules are worth completing. Consistent with results presented above, the Self and Social Awareness module drew less favorable opinions (grand mean, 2.1) than the other three modules ($M = 3.3$ in each case). On the whole these results suggest that the LASTS modules lack the practical value that Army leaders expect for self-development purposes. However, the user jury results differ from the slightly more positive opinions of the unit participants (e.g., Table 24), so interpretive caution should be exercised.

Table 32
User Jury Mean Ratings of Practical Aspects of LASTS Modules

Practical Aspect	Module*				Grand Mean
	ESA <i>n</i> =15	SSA <i>n</i> =6	SR <i>n</i> =9	AE <i>n</i> =7	
I'd work thru all five modules because I think they're valuable	2.3	1.2	2.2	2.3	2.0
I can see some definite benefits of the LASTS modules	3.5	2.2	3.9	3.7	3.3
I can see how I could apply what's taught to my career	3.5	2.5	3.4	3.5	3.2
I think LASTS training could make me a better leader	3.4	2.5	3.6	3.7	3.3
I think LASTS training would be good for leaders I know	3.7	2.2	3.3	3.5	3.2
Grand Mean	3.3	2.1	3.3	3.3	

* ESA = Effective Self-Appraisal; SSA = Self and Social Awareness; SR = Self Regulation; AE = Application Exercise.

Note: The rating scale ranged from 1 (strongly disagree) to 6 (strongly agree), with no neutral point.

Table 33 summarizes the user jury ratings of practical aspects of the CTS modules. Not surprisingly, the ratings varied considerably across the different modules. Five modules (#3, #5, #6, #7, #8) drew moderately favorable opinions overall (grand means of 4.5 to 5.2). The remaining three modules (#1, #2, #4) received mildly negative ratings overall (grand means of 3.3 to 3.4). These findings are very similar to the patterns in Table 23 (CTS training aspects) and Table 29 (CTS training outcomes), indicating consistent opinions across a variety of dimensions. It should be remembered that the user juries differed in several respects (facilitator, background, etc.) and the patterns seen in Table 33 may reflect the basic differences between groups.

Some of the items in the user satisfaction survey given to the LASTS user jury members addressed general context issues that may speak to the potential value of the ALD toolkit. The pertinent items appear in Table 34 along with a summary of agree/disagree ratings. The sample of Soldiers agreed moderately ($M = 5.1$ on the 6-point scale) that leader development planning is good for an Army officer's career. Regarding their satisfaction with today's leader development realities, the Soldiers registered ambivalent opinions (mean ratings of 3.4 to 3.6). Perhaps more important, CTS user jury members (not represented in Table 34) agreed with moderate strength

($M = 6.1$ on a 7-point scale, $N = 99$) that creating a leadership plan and goals is necessary to be an effective leader, as did unit participants ($M = 5.9$, $N = 33$). These results point to the need for leader development planning, but the survey did not ask the participants what planning tools might be useful.

Table 33
User Jury Mean Ratings of Practical Aspects of CTS Modules

Practical Aspect	CTS Module*							
	1 <i>n</i> =12	2 <i>n</i> =6	3 <i>n</i> =10	4 <i>n</i> =8	5 <i>n</i> =12	6 <i>n</i> =11	7 <i>n</i> =26	8 <i>n</i> =17
The training package is a valuable leader development tool	3.2	3.3	4.4	3.6	5.3	4.9	4.9	6.2
The information gained from the exercises was useful	3.2	3.5	4.5	3.6	4.7	4.6	4.9	5.4
Training will be easily implemented into real-world application	4.1	3.8	4.3	4.1	5.2	5.1	5.0	5.1
Benefits outweigh the time required to complete the training	3.3	3.0	5.0	2.2	5.4	5.0	4.9	4.5
I recommend this training for all leaders	3.2	3.3	4.1	2.8	5.0	5.0	4.7	4.9
Grand Mean	3.4	3.4	4.5	3.3	5.1	4.9	4.9	5.2

* The rating scale ranged from 1 (strongly disagree) to 7 (strongly agree), with 4 being neutral.

Table 34
User Jury (LASTS) Mean Ratings for Army Leader Development Aspects

Statement	<i>N</i>	Mean Rating*	% Agreeing
Leader development planning is good for an Army officer's career	37	5.1	97%
I am satisfied with the Army's leader development tools and practices	32	3.6	56%
I am satisfied with my unit's leader development priorities and resources	29	3.5	48%
Leader development competes with my everyday training mission	37	3.4	51%

* The rating scale ranged from 1 (strongly disagree) to 6 (strongly agree), with no neutral point.

Lessons Learned

Throughout the course of the demonstration and assessment, the research team gathered numerous lessons about the ALD program. Presented in this section are major lessons that hold value for future program architects, training developers, and investigators. They highlight substantive considerations regarding leader self-development and delivery of online training. In many cases, the lessons point to a need for further exploration. The following sub-sections organize the discussion:

- The Big Picture
- Program of Instruction
- Learning Conditions
- Fielding and Implementation

The Big Picture

Army Policy versus Unit Schedules

The Army's published policy for leadership development (U.S. Department of the Army, 2007) specifies self-development as one of three domains involved in developing competent leaders. It assigns all leaders the responsibility for developing those junior to them through counseling, coaching, and mentoring. However, in tactical units the policy comes into conflict with the persistently high OPTEMPO and the overcrowded docket of deployment-driven requirements that extend through all phases of the unit lifecycle. The conflict is resolved by relegating the self-development requirements to a status outside the unit training schedule, which forces unit leaders to create time for their own and others' self-development, mentoring and coaching activities by unofficial means. In reality, this leaves little to no time available for self-development in units.

Interdependence among Programs

As a large organization, the Army has numerous programs directed at developing and sustaining competent leaders. Most of them claim an official status, while some represent grass-roots initiatives (e.g., communities of practice such as CompanyCommand.mil). When new leader development technologies or tools become available, they join the existing constellation of programs. Whether specified or implied, a new program's relationships with existing programs can substantially influence how the target audience perceives the new capabilities. In early program stages, a system-of-systems framework could facilitate design and development of new leader development tools. The same framework could enhance efforts to evaluate and implement the tools. The program proponent and developers should invest effort in making it clear to the target audience how the new tools fit into the total Army picture. This can help orient the intended users, expand their own knowledge of programs, and establish a measure of credibility for the new program.

Distributed Learning Trend

The Army's growing reliance on distributed learning extends to the leader self-development arena. Anywhere-anytime training is touted as a solution to the shortage of time available for self-development tasks. But the skepticism expressed by many demonstration participants raises questions about leveraging the attractive features of online delivery methods. To achieve its distributed learning goals in the leader development arena, the Army faces several challenges. First, online programs that give credit for completion without study and effort are not taken seriously. Soldiers must be able to see how their investment in legitimate learning brings tangible value in terms of career advancement. Second, the training audience may not accept the appropriateness of using online tools without being convinced. Army leaders favor face-to-face methods for developing their leadership skills, largely because they highly value interpersonal interaction. Third, tactical units do not necessarily possess the computer resources and infrastructure (network capabilities) needed to empower the intended users. Fourth, online tools suffer a distinct disadvantage if they do not compare favorably with the wide assortment of Web sites and games available to Soldiers beyond the boundaries of their jobs.

Current Reality of Leadership Development

Discussions with Soldiers indicate that leadership development, other than that which occurs as a product of training exercises or routine duties, is not occurring formally to any major degree in operational units. Leader development programs do exist in units (Schirmer, Crowley, et al, 2008), but they rarely win the competition for time among the abundance of pressing requirements. By necessity even scheduled training must sometimes be cancelled or modified to meet unexpected, urgent priorities. Unit leaders focus on accomplishing the mission, be it reset or deployment—to the exclusion of intangible, long-range benefits of leadership development. Another aspect of the current reality is that the leadership demands on junior officers have increased, while more rapid promotion rates have decreased their opportunities to prepare thoroughly for the increased leadership responsibilities. On one hand the COE demands leadership development; on the other hand the OPTEMPO precludes it.

Research versus Operational Requirements

Research organizations such as ARI have a responsibility to develop concepts, strategies, methods, technologies, and tools that further the Army's leader development goals (U.S. Department of the Army, 2007). This includes evaluating concepts, technologies, prototype tools and the like with Soldiers involved. However, the OPTEMPO and deployment pressures make it very difficult for tactical units to support evaluation activities. This sets up a "catch 22" circumstance where the inability to test and validate new leader development capabilities may deprive Soldiers of much-needed tools. Successfully recruiting units or Soldiers does not ensure they will be able to participate fully in research efforts. Future research teams should weigh the troop support requirements early on and lay out vigorous steps to secure an adequate plan for participation of Soldiers. This may necessitate enlisting a high-level sponsor and convincing the appropriate chain of command to assign a high priority to the research effort. Emphasis on utilizing mechanisms such as General Officer Steering Committees, Councils of Colonels, and integrated teams of stakeholder representatives may be worth considering.

Program of Instruction

Suitability of Online Delivery

The present findings raise issues regarding the suitability of distributed learning methods for leader self-development programs. Soldiers' frequent skepticism about online leadership training methods indicates that there are disadvantages to be weighed. Program architects and designers should consider potential disadvantages as they create the program blueprint and make key decisions about training methods. Beyond the technical and feasibility issues regarding online training, three subtle aspects deserve attention. First, the distributed learning option, because of its visibility and resource advantages, may lead decision makers and program executives to downplay the potential role of alternative training methods. Second, the suitability of computer-enabled methods for training particular leadership skills is better verified during front-end analysis (FEA) than during evaluation of prototype tools. Third, the culture among tactical units is predisposed toward face-to-face methods for developing leadership skills, and

new distributed learning programs face the challenge of persuading Soldiers to accept methods that may lack traditional interpersonal dimensions.

Importance of Interpersonal Interaction

Some demonstration participants questioned ALD's online tools on the yet-to-be-tested belief that leadership development requires interaction with leaders/mentors and discussion of leadership lessons with peers. This was a major reason for their judgment that the best use for the ALD toolkit lies in institutional training, where ideas could be discussed and lessons exchanged. It may be feasible in the future to create online leader development tools for collective training applications within units. Similarly, incorporating interpersonal interaction into individual Web-delivered leader development tools should receive careful consideration. This could be accomplished by remote interaction with mentors (synchronous or asynchronous), student discussion groups (already part of AXL training), computerized interactive discourse (as in the AXL modules), participating in communities of practice or communities of interest (such as AKO forums or Battle Command Knowledge System communities of practice), feedback originating from experts (as in the TKML instrument), and perhaps other techniques. For online self-development training to be accepted and used, concerns about the sterile environment of Web-delivered training must be addressed. Both the users and the chain of command must be convinced of the effectiveness of online training or they will ignore the tools.

Quality of Training Tools

For some of the participants in the ALD demonstration, aversion to Web-delivered training stemmed in part from past experiences with "check the block" or ineffective training. With the high OPTEMPO demands, there is no tolerance for less than excellent Web-delivered training. Company grade officers will spend neither valuable duty time nor limited Family time on training unless it is essential and excellent. There are some clear lessons on what Soldiers expect in Web-delivered training. Further research may be warranted in this area, but training developers should consider applying these lessons in the design of training for junior Army leaders. The training must:

- Be designed specifically for the Army audience, and not perceived as an adaptation of training intended for some other audience.
- Apply an understanding of the operational Army in all aspects—language, terminology, scenarios, instructional content, context, etc.
- Organize and present information so it is clear, concise, to the point, easy to read, easy to follow, and free of "fluff."
- Build or enhance skills that are required to improve immediate performance or meet deployment needs.
- Respect the limited time Soldiers have available by reducing the training time to the absolute minimum.
- Incorporate an automated mechanism that enables students to readily track their progress.
- Include a robust, automated book-marking mechanism so students can break in the middle of a module and later return effortlessly.

- Provide constructive interaction with mentors or proxies (e.g., artificially intelligent tutors) to facilitate learning and give students access to expert viewpoints.
- Deliver relevant, useful, timely feedback that enhances the learning process and helps the student understand his/her standing or progress.
- Present a style and tone that is comparable to sophisticated Web sites and games with which the target audience is likely to be familiar.

Independence of Tools

Originating as independent components, the ALD tools were not designed to share common themes, principles, scenarios, etc. Nor were they designed with interdependencies in mind, such as relying on the learning in one module to feed another module or integrating the cumulative knowledge and skills into a common learning forum. In the ALD operational demonstration, no unit Soldiers commented on the lack of common threads across the various tools, although they were not asked directly to consider the issue. In retrospect, the program may have benefited from designing a family of related tools and applying principles such as recurrent themes, mutual reinforcement, successive integration, nesting, scenario commonality, and capstone assessment to their development. In future research, it would be worth examining the utility and value of creating a family of inter-related leader development tools.

Learning Conditions

Basic Learning Environment

The demonstration participants' comments about the advantages of institutional settings for ALD training are instructive. They considered several factors important to define a favorable environment for leader development learning. Their comments, along with the insights of the research investigators, highlight several enabling factors:

- Relatively high priority on developing individual leadership skills.
- Availability of sufficient time for learning new knowledge and skills.
- Presence of experts available to spend time as mentors and/or coaches.
- Availability of time to reflect on one's own leader development strategy.
- Frequent opportunities to meet in groups to share experiences, ideas, and the like.
- Low level of operational demands competing for time and energies.

In the context of these considerations, the institutional environment appears to be ideal for leader development training, including self-development efforts. However, the factors listed above can serve as guidelines for units trying to improve their own leader development programs, where efforts could benefit from increasing the emphasis on at least some of the enablers. The factors may also help program architects, designers, and developers to define realistic conditions for a successful leader development program.

Ready Access to Learning Tools

Effective use of Web-delivered training requires that Soldiers have adequate access to computers with internet connections. Although computers are pervasive in many environments, this is not the case in operational units. The duties of most junior officers and NCOs do not

require them to use computers with internet access, limiting the number of computers assigned to units. Further, computers in units are dedicated to specific functions, such as command and staff operations. While unit or installation learning centers offer computer access, the extra time needed for Soldiers to reach them becomes an impediment. Expecting Soldiers to use their own computers for training may be unreasonable from two perspectives. It involves using personal property for government business, and it infringes on a Soldier's limited Family time. The latter is especially onerous considering that Soldiers at home station are either returning from or preparing for a deployment away from their families. For these reasons, a training program FEA should survey/analyze the expected unit infrastructure to determine the computer availability and network assets likely to exist at the time of fielding. If needed, computers could be provided to units (and left) as an incentive to participate in Web-delivered training.

Soldier Control of Learning Conditions

The degree to which a learner controls his/her progression through an online course should be considered during program design. Important control dimensions include pacing, distribution of effort, break points, and sequencing. For Army leaders, self-control of pacing and distribution is a must. They need wide flexibility in when and how long they work on a module, how much time passes between sessions, and how many sessions they spend on a module. As discussed earlier, they must be able to break at almost any point in a module and return later to the exact break point (via book-marking). A lockstep or prescribed sequence of lessons or modules is sometimes imperative, as when training involves sequential dependencies. However, Army leaders who routinely exercise considerable responsibility may not favor rigid sequencing, and some unit participants expressed dislike for the rigidly enforced sequence of the ALD Web site. There are, of course, inherent risks associated with giving students unfettered latitude in sequencing or progressing through a training program. The program architects should identify and weigh the risks as they develop the training strategy. Consistent with other training design factors, maximum emphasis should be placed on student control of learning conditions for Web-delivered self-development training of Army leaders, regardless of their grade.

Interaction as a Part of the Environment

As discussed earlier, Soldiers tend to believe that leadership development must involve the individual's interaction with leaders, mentors, or instructors to be most effective. In the case of the ALD toolkit, many demonstration participants felt that the general lack of interpersonal interaction was a serious shortcoming. The ideal from the students' perspective is face-to-face interaction with a mentor/instructor. Online tools can leverage distributed learning techniques to achieve interactivity. The training development question becomes: how can students obtain advice from a trusted source, in a context that is relevant to their situation, when they need it? Earlier discussion mentioned several online interactive techniques—remote interaction with mentors, student discussion groups (in person or online), communities of practice, computerized interactive discourse, and feedback originating from experts (synchronous or asynchronous). More elaborate techniques include intelligent tutors (computerized agents) and electronic performance support systems. Training developers can determine what level of interactivity is warranted, using cost-benefit analysis with Soldiers in the loop. Training researchers should explore ways to improve the interactive dimensions of the learning environment. They should

also explore ways to ensure the interaction is perceived as credible. Further research appears to be essential if Soldiers are to be convinced that online training is a valuable way to build leadership skills and knowledge.

Time Considerations

Given the extremely limited time Soldiers in operational units have available for self-development training, how much time is likely to be acceptable for completing a particular module? The answer lies in a cost-benefit paradigm: Soldiers tend to weigh the time required against the perceived value or payoff from the training. The greater the expected payoff, the greater the time they are willing to invest. Training development teams must keep in mind that Soldiers will decide the value and acceptable time for the training—not program architects or senior Army leadership. The FEA should use objective means to determine what leadership skills the leaders themselves recognize as critical to their unit’s mission effectiveness. The FEA should also gauge multiple aspects of time: how much total time is acceptable for a module or subject, how much time can be spent in a single session, and how many calendar days is the module likely to span? The critical FEA issue is how much time units and Soldiers can allocate for the training, not how much time the training developer thinks should be allocated to fit the topic. In addition, the ALD operational demonstration reinforced the importance of giving students an estimate of the time required to complete each module, so they can plan their time strategy realistically.

Fielding and Implementation

Setting Conditions for Success

Fielding and implementing new programs, including Web-delivered training, require buy-in by the targeted units and their leaders. No time and effort will be invested by the units without buy-in and endorsement on the part of commanders. The proponent and/or fielding agency for a new program must collaborate with commanders to determine what implementation conditions are feasible for the targeted units. This aspect should become an integral part of the fielding plan. Another key goal is to embed the new capabilities in unit training programs, and this too should be part of the fielding plan. At the same time, the proponent or fielding agency should remain cognizant of the constraints with which commanders must live. A committee of stakeholders, perhaps in the form of a steering committee, may be able to facilitate program fielding and implementation. Although this may require significant effort, it can increase the chances for success. A stakeholder/steering committee can bring a better appreciation for the situation in the field and the challenges that must be addressed. The committee can also solicit the senior leadership emphasis needed to obtain the resources and priority of effort required to realize the benefits of the new program.

Dedicating Time for Leadership Development

As the saying goes, “There’s no such thing as a free lunch.” Trumpeting a new program as it’s fielded will fall on deaf ears unless commanders decide to commit unit resources to implementing the program. In the case of leader development programs, time is the chief

resource to be committed. The high OPTEMPO plus Family needs make time an ultra-precious resource in operational units. Expecting leaders in tactical units to spend their own time on self-development activities is unrealistic in the current COE and invites program dismissal. Many Soldiers already receive deployment-driven tasks to accomplish during off-duty hours, eroding their personal and Family time. Placing ALD or other leadership development events on the unit training calendar is imperative if the target audience is to realize any benefits. The Army's senior leaders must emphasize leader development as essential preparation for deployment, acknowledging that leadership skills affect mission success and Soldier survivability. Unit leaders can translate the senior leaders' emphasis into allocating and protecting sufficient time for leadership development.

Informing and Motivating the Target Audience

Soldiers will invest their time and effort in training that they are convinced will benefit their duty performance and mission success. Therefore, the target audience and their leaders must be armed with program information that engenders awareness and motivation. More than knowing the objectives of the training, they must know how the new training will benefit them—especially by improving performance in the near term. Because it is unsafe to assume that the target audience will recognize their need for the training, the ALD program materials contain motivational information. For example, the TSP includes a “benefits” section and the Web site's main menu includes motivational “tags” for each ALD tool's link. The demonstration results do not reveal whether the toolkit goes far enough on this count. Considering the time constraints facing unit leaders, future development and implementation teams should pay special attention to convincing the target audience of a new program's value. The supporting materials (in-briefing package, student guide, posters, etc.) should describe succinctly how Soldiers will become better leaders and how unit readiness will benefit. In addition to the stakeholders/steering committee option mentioned above, working through the AKO community may be useful for informing and motivating the target audience.

Conclusions and Recommendations

The ALD toolkit offers innovative, computer-based technologies for enhancing the Army's leadership development efforts. As the culminating phase of the four-year ATO program, the current research aimed to conduct an integrated technology demonstration and assess various aspects of the ALD program.

The toolkit exploits a variety of distributed learning techniques. The Web-accessed tools aim to improve leadership skills by helping officers to become self-aware, adaptive decision makers. The toolkit contains the following components:

- Diagnostic instruments to enhance self-awareness of strengths and weaknesses.
- Self-training modules to build metacognitive skills for self-development.
- Critical thinking modules to train structured problem-solving techniques.
- Film-based case study vignettes for group training of interpersonal skills.

The results of the research extend the knowledge base regarding leader development approaches and methods. The findings are of primary value to decision makers, program architects, training developers, training researchers, and program evaluators. The lessons learned provide a foundation for shaping and developing future leader development tools. Additional findings and insights on training technology aspects and the ALD Web site can be found in Woller et al. (in preparation).

Conclusions

The ALD tools provide a reasonable mix of diagnostic and training capabilities, but the assessment did not gauge completeness of the toolkit. The tools appear to be more suitable for use in pre-commissioning programs and Army schools, rather than tactical units. The suitability of the training model remains an open question. Additional research is needed to determine program completeness, optimal utilization model, and tailoring required for institutional settings.

On the whole, the demonstration participants expressed moderately positive regard for most aspects of the ALD toolkit, including the acceptability of the various modules and the learning effectiveness and value of using them. At the same time, there is substantial room for improvement. A handful of general recommendations emerged, based on Soldiers' expectations of online training packages:

- Make the tools more Soldier friendly, more concise, and less time consuming.
- Incorporate doctrinal references or other well known sources of key information.
- Store student-entered responses for later retrieval or presentation (LASTS).
- Automate interactive capabilities to orchestrate forward-feed, cumulative progression.
- Enable breaking anytime with assured saving and later retrieval of information.
- Update the AXL videos to reflect the current MDMP process used in the COE.
- Enhance the CTS modules by incorporating more realistic conditions and exercises.

At least in tactical units, Soldiers may view distributed learning methods as marginally suitable for leader self-development purposes. The potential disadvantages of online tools must be considered carefully. An important dimension is interpersonal interaction with leaders, mentors, and peers. The interactive features of the ALD toolkit were useful but did not go far enough. Research would be needed to explore techniques for improving the interpersonal dimensions of online tools.

The COE has a powerful impact on the professional development of junior leaders, both officers and NCOs, in tactical units. Four aspects of the COE stand out: (a) rapid promotion of junior leaders, (b) OPTEMPO-driven scarcity of time for leadership development, (c) need for more leader development opportunities, and (d) imperative to include self-development tasks in the unit training schedule.

Several factors define a favorable environment for leader development learning. These factors include (a) high priority on individual leadership training, (b) adequate time for learning and reflection, (c) availability of mentors/coaches, and (d) opportunities for group interaction.

The current information technology infrastructure in tactical units does not support wide-scale distributed learning. General purpose computers are relatively scarce, especially below battalion echelon. Learning centers with computers typically impose a tax in the form of travel time and inconvenience. Expecting Soldiers to use their own computers for self-development is questionable because it involves using personal property for government business and it infringes on a Soldier's personal and Family time.

The limitations of the current effort point to follow-on research in several areas. A trial implementation with RC units would yield valuable feedback and lessons for crucial elements of today's modular force. Extending the database to institutions and additional AC units would generate broader conclusions and bring greater focus to future efforts to develop leader self-development programs. Insights on an effective self-development training strategy would help guide program architecture and design. And further research on innovative online methods for leader self-development, including best practices for interpersonal interaction, would offer useful knowledge and guidelines.

Recommendations

This report has presented the findings of an operational demonstration and assessment of the ALD program for self-development of Army leaders. By harnessing the findings, program architects and training developers can refocus Army efforts to enhance the process for producing competent, self-aware and adaptive leaders. The authors offer the following recommendations to boost the Army's efforts:

- Consider improving the ALD toolkit by incorporating recommended modifications, perhaps as a near-term programmatic step.
- Target timely expansion of the database on ALD training effectiveness and impact, to include trial implementations with institutions, RC units, and additional AC units.
- Pursue follow-on research on innovative distributed learning methodology for delivering Soldier friendly, high-payoff leader development training.
- Outline contingency plans for follow-up evaluation in case the ALD program becomes available at-large.

The progressive research culminating in the operational demonstration and assessment of the ALD toolkit sets the stage for enhancing the effectiveness and efficiency of Army leadership development programs. By helping units and institutions build highly competent leaders and leader teams across the force, the research is playing a key role in Army transformation. As transformation and deployment requirements continue to expand the need for excellence in Army leaders, the products and findings of the cumulative research can help build leader competencies that are critical enablers of full spectrum dominance.

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ACRONYMS AND ABBREVIATIONS

AC	Active Component
AE	Application Exercise
AKO	Army Knowledge Online
ALD	Accelerating Leader Development
ANCOG	Advanced Non-Commissioned Officer Course
ARFORGEN	Army Force Generation
ARI	U.S. Army Research Institute for the Behavioral and Social Sciences
ATO	Army Technology Objective
AXL	Army Excellence in Leadership
BCT	Brigade Combat Team
BNCOC	Basic Non-Commissioned Officer Course
BOLC	Basic Officer Leader Course
CCC	Captains Career Course
CGSC	Command and General Staff College
COE	contemporary operational environment
CTS	Critical Thinking Skills
ESA	Effective Self-Appraisal
FEA	front-end analysis
FLRU	Fort Leavenworth Research Unit
html	hypertext markup language
LASTS	Leader Adaptability Self-Training System
LMS	learning management system
<i>M</i>	mean
<i>Mdn</i>	median
MLQ	Multifactor Leadership Questionnaire
MTOE	Modified Table of Organization and Equipment
<i>n</i>	sub-sample size
<i>N</i>	sample size
NCO	non-commissioned officer
OPTEMPO	operational tempo
PMESII	political, military, economic, social, information, and infrastructure
RC	Reserve Component
ROTC	Reserve Officer Training Corps
SR	Self Regulation
SSA	Self and Social Awareness
Std Dev	standard deviation
TKML	Tacit Knowledge for Military Leaders
TSP	Training Support Package
UCI	Unit Cohesion Index
USMA	United States Military Academy
XO	executive officer