

Enhancing Joint Training through Blended Learning–Training: Simulation, Mission Command, and a Learning Continuum

David T. Fautua, Ph.D.

Joint Staff J7,
Joint Training
Suffolk, VA

david.t.fautua.civ@mail.mil

Sae Schatz, Ph.D.

MESH Solutions, LLC™
(a DSCI® Company)
Orlando, FL

sschatz@mesh.dsci.com

Emilie A. Reitz

General Dynamics –
Information Technology
Suffolk, VA

emilie.a.reitz.ctr@mail.mil

**Patricia Bockelman, Ph.D.
& Danielle Julian**

MESH Solutions, LLC™
(a DSCI® Company)
Orlando, FL

pmorrow@mesh.dsci.com
djulian@mesh.dsci.com

ABSTRACT

Each year, the Joint Staff J7 (Joint Training) organizes numerous large-scale joint and coalition training events. These challenging, fast-paced exercises include a wide range of training objectives that must be accomplished on an intense schedule and (particularly of late) on a constricted budget. Military leaders, therefore, are continuously searching for ways to enrich the events' training outcomes without inflating their costs. Over the last three years, the Joint Staff J7, Deputy Director for Joint Training has developed, tested, and deployed a Blended Learning–Training System to enhance joint training and efficiently help identify and fill knowledge gaps across the joint training continuum. The system provides Combatant Commands and Joint Force Commands with options to maximize their training by blending online learning activities, metrics and assessments, and in-resident academics and table top exercises, that also includes distributed small-group simulation-based part-task trainers, and tailored feedback mechanisms that are all built into the Joint Event Life Cycle. This paper briefly reviews the development process and current status of the Blended Learning–Training System, and then it discusses two future joint training enhancements that the system now facilitates: (1) multi-lifecycle planning to integrate training events and (2) increased support for Mission Command within joint training.

ABOUT THE AUTHORS

David T. Fautua, Ph.D., is Chief, Individual Training & Learning, Joint Training, J7 Joint Staff. He formerly served as US Joint Forces Command Academic Chair, held an appointment as visiting associate professor at the Joint Forces Staff College, and was special assistant to two NATO Supreme Allied Commanders. Most recently, he served as the principal investigator for the NTSA-award winning Border Hunter research project.

Sae Schatz, Ph.D., is the Chief Scientist of MESH Solutions, LLC, a DSCI® Company. Her work focuses on education and training for the Defense community, particularly the skills associated with “cognitive readiness.” In addition to her research, she teaches in the University of Central Florida Modeling & Simulation graduate program.

Emilie A. Reitz is a research analyst with General Dynamics Information Technologies. In addition to working on the CoL, she also serves as one of the lead researchers for human factors in Bold Quest and acted as a research assistant for the Border Hunter initiative. Emilie holds a Master's Degree in international studies.

Patricia Bockelman, Ph.D., is a Human Systems Research Scientist at MESH Solutions, LLC, a DSCI® Company. Her background includes research in cognitive science, intelligent behavior, learning and training, and simulation environments. Her expertise includes applying interdisciplinary techniques to combine neurophysiological, psychological, and phenomenological metrics to evaluate human experience.

Danielle Julian is a Human Systems Research Scientist at MESH Solutions, LLC, a DSCI® Company. Her background includes research in Human Factors and learning and training. She holds a Bachelor's degree in Psychology and is currently pursuing a Master of Science in Modeling and Simulation at UCF.

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INTRODUCTION

Each year, the Joint Staff J7 (Joint Training) organizes numerous large-scale joint and coalition training events. These challenging, fast-paced exercises include a wide range of training objectives that must be accomplished on an intense schedule and (particularly of late) on a constricted budget. Military leaders, therefore, are continuously searching for ways to enrich the events' training outcomes and maximize their scarce resources. Over the last three years, the Joint Staff J7, Deputy Director for Joint Training has developed, tested, and deployed a Blended Learning–Training System (BLTS) to enhance joint training and efficiently help identify and fill knowledge gaps across the joint training continuum. The system provides Combatant Commands and Joint Force Commands with options to maximize their training by blending online learning activities, metrics and assessments, and in-resident academics and table top exercises, that also includes distributed small-group simulation-based part-task trainers, and tailored feedback mechanisms that are all built into the Joint Event Life Cycle (JELC). This paper briefly reviews the development process and current status of the BLTS, and then it discusses two future joint training enhancements that the system now facilitates.

CONTINUUM OF eLEARNING: BACKGROUND AND PREVIOUS RESEARCH

In 2011, Joint Staff J7, Joint Training division initiated the Continuum of eLearning (CoL) project in order to explore integration of blended learning into joint exercises. This exploration was motivated, in large part, by observed gaps associated with collective training events (for details on these gaps, see Fautua, Schatz, Reitz, & Kililea, 2012):

- (1) **“Untrained” staff:** Staff members missing a given collective training event (e.g., due to scheduling)
- (2) **Stovepipe training and education:** Various learning opportunities within an exercise lacking integration
- (3) **Service-specific mindsets:** Some personnel lacking the knowledge and attitudes needed for *joint* operations
- (4) **Insufficient data:** Targeted, objective assessment of personnel's cognitive capacities was unavailable
- (5) **Retention:** Staff members' knowledge possibly declining between annual (or longer) training events

The CoL project sought to mitigate these gaps by incorporating blended learning approaches into exercises. Specifically, this involved integration of targeted online courses, distributed scenario-based training, and blended learning processes into the JELC. Although the capacity for blended learning has existed for years, such large-scale institutionalization of it presented unique challenges, which have previously limited its use within the joint training community. Consequently, implementation of the resulting BLTS occurred iteratively, over the course of three years, and during this time CoL project team frequently emphasized the development of logistical and sustainment processes.

BLTS: Development and Testing

In order to create the BLTS, the CoL team needed to develop processes for the effective development and delivery of the new learning content as well as the integration of this new approach into the larger joint training enterprise. In other words, the CoL project needed to design processes from both a learning perspective and an administrative perspective. The following sections briefly describe the iterative approach that was used to establish the resulting BLTS, and the figure immediately below shows the development timeline for it, depicting how the system progressed from a concept into a full operational capability over the three-year timeline.

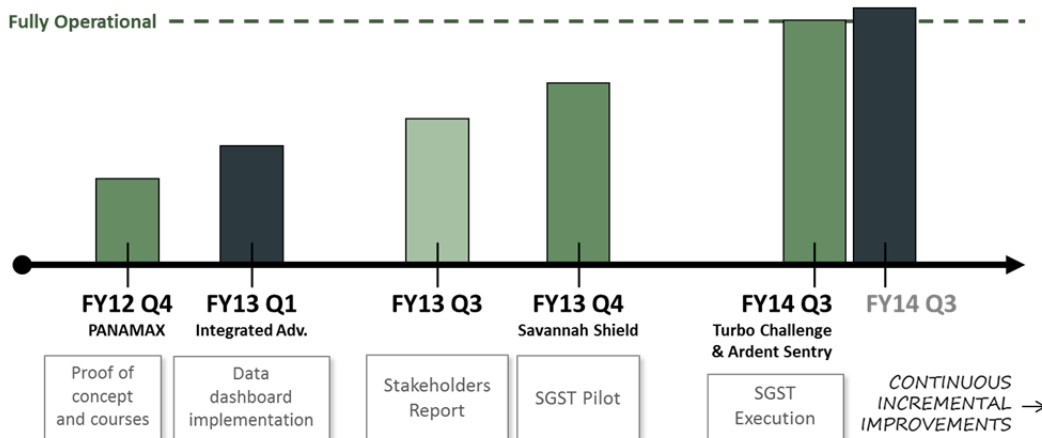


Figure 1. BLTS capability development timeline

FY12: Developed the overall vision for the BLTS, including processes for creating and executing blended-learning content within the JELC; created initial online courses and tested their impact during the PANAMAX 2012 exercise (FY12 Q4)

In Fiscal Year 2012, the CoL project developed the initial vision for the BLTS, including recommended processes for developing blended learning content and executing it within joint exercises. This included investigation of instructional best practices, development of a recommended instructional design methodology, and articulation of possible execution and integration processes, which define the logistics for integrating the blended learning–training content into existing exercise processes (Schatz, Reitz, & Killilea, 2012; Fautua et al., 2012). In this first project phase, joint training personnel also tested part of these processes by developing online courses and evaluating their impact during the PANAMAX 2012 exercise (see Schatz, Reitz, & Killilea, 2012; Fautua, Schatz, Taylor, Reitz, Bartlett, & Killilea, 2012).

The individual, online courses developed during the first year of this project included self-paced 100-level (basic) and 200-level (intermediate) Joint Force Command content. Personnel associated with Joint Knowledge Online, the Joint Staff J7 enterprise training system that delivers joint web-based training courses, supported the development process, and the courses are delivered via the Joint Knowledge Online learning management system. The online delivery instructional approach, however, was updated to incorporate additional andragogical best practices (e.g., emphasize higher-order learning, use of pre-test for performance, use of formative and summative assessments) in order to meet both the demands of the event tasks for which the students were training. To ensure adult military learners understand the “why” of course, each course begins with a multimedia vignette recreated from real-life operations to “set the stage” for course content. A pre-test is administered, and if the student scores with 100% accuracy, the student moves on to the next content module. This helps customize instruction for each person, reduce

redundant work, and maximizing participants’ time on instructional tasks. If students fail to pass all or part the pre-test, however, then they complete additional content modules, which include standard e-learning content, interactive multimedia, and self-reflection questions. Once the modules are completed, participants review a fictional scenario that applies the material presented in the course in a practical context, supporting knowledge transfer from a low-level “information possession” level to a higher “information application” level. Finally, participants complete a post-test which must be passed to advance to the subsequent course, and participants retake questions on the test as many times as needed to assure content mastery.

A beta test of the Year-1 BLTS was conducted during PANAMAX 2012, a U.S. Southern Command multinational training exercise. Approximately 200 personnel from the event participated in this study; half of the participants completed three online CoL courses prior to the event, while the other half represented the control group. (For a summary of the experimental design, see Schatz et al.’s 2012 I/ITSEC paper.) The research team documented the effectiveness of the BLTS courses, along with motivational effects, usability, relevance, and the ability to stimulate a “joint mindset” (Reitz, Schatz, Alston, & Fautua, 2013). According to the results, those who participated in the online courses had more positive reactions to the courses in comparison to previous experience with online coursework and demonstrated significantly higher learning outcomes (post-exercise) than the control group. At the end of the exercise, the experimental participants who completed the online pre-training reported feeling significantly more prepared for exercise in comparison to those who did not participate in the online courses (Reitz et al., 2013).

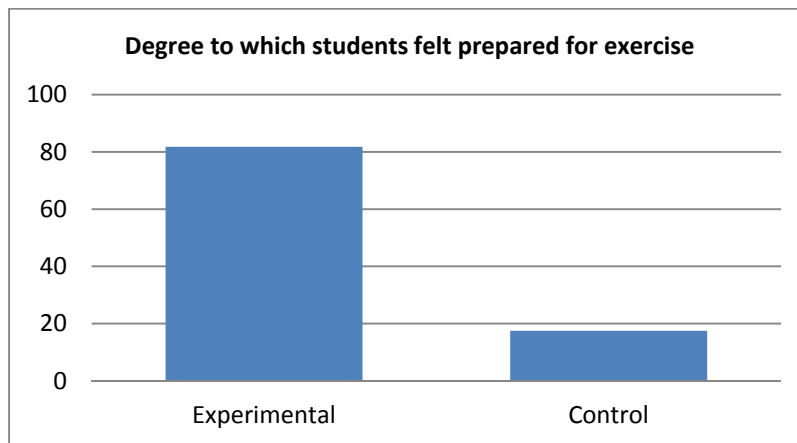


Figure 2. Exercise participants who completed tailored online pre-training prior to PANAMAX 2012 reportedly felt better prepared coming into the exercise (Schatz, Reitz, & Killilea, 2012)

FY13: Implemented early prototypes of the “data dashboard” (FY13 Q1), and conducted semi-structured interviews with joint training stakeholders in order to gauge buy-in and identify additional best practices operationalizing the BLTS (FY13 Q3); integrated a part-task distributed team training simulation into the BLTS

As a result of the 2012 PANAMAX beta test, the CoL team identified several recommendations and areas for improvement within the BLTS. Consequently, in Fiscal Year 2013, the team began making incremental improvements to the system. For example, the Observer/Trainers (O/Ts) needed a way to quickly receive meaningful output data from the online courses so that they could blend their instructional delivery to attend to the training audience’s identified knowledge gaps. One of the ways the BLTS accomplishes this is to use the metrics collected during the online coursework to support classroom academics: as training audience members complete the online courses the system aggregates their scores, and then periodically on the lead-up to an exercise the O/Ts and learning officers from the combatant command receive a “data dashboard” that describes the outcomes (knowledge gaps) and articulates recommendations for enhancing upcoming learning events (e.g., classroom academics, Boards-Bureaus, Centers-Cells working groups, table top exercises, or live exercise components). The latter point is

especially important when one considers that each Combatant Command's mission is becoming more differentiated, more distinct and where a one-size-fits-all training approach is becoming less relevant. Combat Commanders are less interested in generic training. They want specific, tailored training for their unique missions. Thus observer/trainers understand that despite their extensive expertise and broad perspectives, they can only tailor their material if they understand the learning gaps of each new training audience. The blended learning system helps them identify those high priority training needs earlier, and with greater clarity.

While Joint Staff J7 personnel implemented these recommended updates, the CoL team conducted additional research. Specifically, to identify other recommendations for BLTS enhancements as well as to gauge the level of buy-in for it, CoL researchers conducted semi-structured interviews with joint training stakeholders (Schatz, Killilea, & Reitz, 2013). Initial knowledge elicitation with Joint Training stakeholders began in April 2013. A two-person team conducted semi-structured interviews with 23 military personnel and government-civilians at the Joint Staff (South) headquarters in Suffolk, VA. All stakeholders expressed support for the blended learning-training approach. Interviewees acknowledged a need for sharing the benefits of blended learning-training across the JELC in order to create more interaction and relevance points. However, many stakeholders expressed the need to better socialize the new blended learning methods, both internally within the Joint Staff, J7 Joint Training Division, as well as with stakeholders from the training audience. The interviewees also offered commentary about how to best support integration of the online courses and distributed team training with the live exercises. Finally, a number of interviewees cautioned that the blended learning "team" needed to work closely with the standard Deployable Training Team (i.e., the training team who executes the live exercises), so that the online components receive sufficient attention and resourcing. These recommendations were carefully implemented internally, with valuable feedback and insights from Observer/Trainers. The BLTS also received continued support by senior leaders at the annual Worldwide Joint Training & Scheduling Conference in August 2013.

Finally, in 2013 the team incorporated the second major training intervention of the overall BLTS: a part-task distributed team-training element delivered via the Small Group Scenario Trainer (SGST). This distributed team-training element is intended to address the gap between individual information and the large-scale collective training exercise. Like the online individual BLTS courses, SGST scenarios begin with an opening multimedia vignette. This serves to gain participants' attention and prime their performance for the upcoming training scenario. Then, during the training scenario, participants interact with desktop computers similar to the ones on which they would perform their normal staff operations. Each participant has access to realistic planning interfaces and files, and simulated injects (e.g., messages or news stories) introduce new information into the scenario as it unfolds. We hypothesize that incorporating such part-task team training refreshes staff members' skills, fosters their teamwork competencies, and accelerates the team formation process prior to the large-scale exercise.

The impetus behind the team-training component is a corpus of research emphasizing the difference that training team-specific competencies can make. Studies involving U.S. military and other high stress jobs suggest that training teamwork aptitudes and task-work skills create better teams and enhance performance (e.g., Salas, Cooke & Rosen, 2008). An approach that accommodates globally distributed teams, simulation-based team training, allows members to productively engage in cognitive, behavior, and social teamwork processes while receiving feedback on performance (Reitz et al., 2013; Gorman, Cooke, & Winner, 2007). These features of simulation training made it an ideal fit for incorporation into the blended learning training packages.

Late-FY13–FY14: Conducted pilot testing of the SGST team-training component at SAVANNAH SHIELD (FY13 Q4) and TURBO CHALLENGE (FY14 Q4), and plan to complete final system testing during TURBO CHALLENGE (FY14 Q4)

Here again, the O/Ts were instrumental in improving BLTS processes. The Joint Staff O/Ts understood the blended process offered CCMD staffs not only an opportunity to learn basic concepts of joint operations (like planning, coordination and establishing workable battle rhythm) but also to practice those concepts as a team before the exercise. That way CCMD staffs can develop a shared mental framework by going through the process of forming, storming, and norming as a team. In other words, the staff starts the exercise ready to run vice having to crawl and walk, first. Delivering the training through a continuum of online courses, small-group simulation, academics, and

collective events gives the training audience more opportunities to practice and reflect on the content, which helps them sustain that knowledge longer.

At the end of FY13, the CoL team conducted a pilot test of the SGST team-training component during the SAVANNAH SHIELD event. Over 32 O/Ts conducted a full dress rehearsal of the SGST prior to the training event and provided an in-depth feedback to the CCMD leads of potential friction points in staff planning. The pilot test enabled refinement of the procedures and research assessment apparatus, which are presently being used in conjunction with the upcoming TURBO CHALLENGE 2014 (Transportation Command) and ARDENT SENTRY '14 (Northern Command) exercises. During these events, the CoL team plans to examine the effectiveness of the SGST virtual team-training capability, as well as specific elements of the blended learning–training package. Data will be collected in TURBO CHALLENGE to capture capability effectiveness and participant perceptions of the system. Subsequent analyses will consider how the blended approach, as applied in the JELC, would generalize to other joint systems, including multi-event cycles.

Background and Previous Research: Conclusion

The CoL project designed, tested, and refined the joint BLTS over three years. This iterative process enabled the systemic linkage of online learning, small-group scenarios, and collective training activities with improved metrics throughout. Using this alignment, the training audiences are now exposed repeatedly to information and practices appropriate to their actions during the exercise, thereby reinforcing objective skill execution and mitigating many joint training gaps.

PROPOSED JOINT TRAINING ADVANCEMENTS

The previous section discussed the development and execution of the joint BLTS, which enhances the effectiveness and efficiency of staff training. Now that this infrastructure is established, it can serve as an enabling capability for additional training advancements. The following section outlines two enhancements, in particular, that the BLTS could advantageously support: (1) multi-lifecycle planning and (2) increased support for Mission Command training.

(1) Multi-Lifecycle Planning: Integration Across Training Events

First, the successful implementation of the BLTS can now support more formal integration of separate joint training event lifecycles. In other words, in addition to blending between the learning opportunities associated with a single large-scale exercise (e.g., PANAMAX or TURBO CHALLENGE), the BLTS can facilitate integration *between* distinct exercises. This approach shifts the focus from an “exercise-centric” perspective to a “staff-centric” outlook that emphasizes longer-term, summative learning outcomes versus more immediate exercise outcomes, which is a paradigm shift in the way many joint training stakeholders have conceptualized exercises. (*Note, this recommendation builds upon initiatives originally developed by personnel from the U.S. Pacific Command.*)

Rationale: Multi-lifecycle planning supports both logistical and instructional (andragogical) aims.

Consider the logistical benefits of this multi-lifecycle planning approach. Historically, the joint training enterprise has focused on large-scale joint exercises, which are “generally characterized as some form of multi-echelon, computer-assisted exercise (either field training exercise (FTX) or command post exercise (CPX)) embodying relatively complex simulation and significant support requirementsD-7). ;” however, while such large-scale joint exercises “represent an important environment in which to conduct specific elements of joint training, there are many more alternatives available to the training planner that should be considered when matching training capability to training requirements and objectives” (*CJCS Guide 3501*, 2012, p. D-7). In recent years, Combatant Commands and Joint Task Forces have been turning more to these alternative training methods, such as “out-of-cycle” smaller-scale events or tabletop exercises (TTXs). In isolation, the smaller scale training opportunities may not fully achieve the targeted training goals; however, by systematically integrating several smaller training opportunities, and linking these to the larger events when they occur, deeper and more complex training objectives can be met. In other words,

this approach offers fiscal and engagement efficiencies which, in turn, support the achievement of objectives specified by commanders while reducing potential risks and realizing significant cost savings.

Next, consider the practical benefits for commanders of systematically integrating across training events. Multi-lifecycle planning will give commanders the longitudinal picture of their staff's performance. While events currently occur in stovepipes and are evaluated in isolation, a blended approach would shift the unit of evaluation to the staff. The status quo asks, "How successful was this exercise?" Under the new paradigm, the question becomes, "How successful is the staff?" Modeled after the successful data collection and communication strategies used in the BLTS (e.g., the data dashboard), the next stage of performance communication would link essential longitudinal staff competencies data. The data would be immediately applicable to decision-makers who script and shape the training objectives of each exercise, as well as learning officers and commanders who monitor the readiness of their staffs.

Last but not least, consider the instructional benefits of multi-lifecycle training event integration. Repeated (potentially small-scale) exposure to learning content enhances retention and mitigates the Ebbinghaus forgetting curve (Ebbinghaus, 1885/1913). In practice, this means that personnel proficiency could be maintained at a high level, with less variability in proficiency between training events, which would help maintain staff skills within the "band of excellence" and effectively enhance the average level of staff proficiency over time (see Figure 3). As is, staff proficiencies wax and wane, spiking in conjunction with isolated training events, but dropping due to a lack of ongoing training between these major exercises. In order to sustain a "band of excellence" for the staff, the training and learning interventions must be operationalized in a manner that blends the learning outcomes of one event into the next, and so that targeted staff skills are frequently and consistently exercised, evaluated, and remediated.

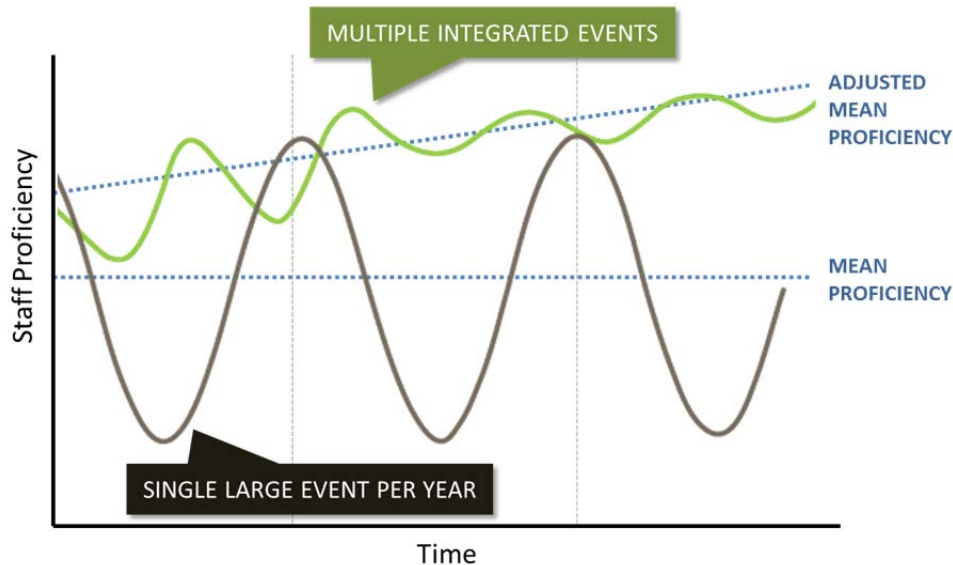


Figure 1. We predict that multi-lifecycle event planning method will enhance mean staff proficiency over time (Graphic adapted from U.S. Pacific Command)

Approach: Focus on training technical leads and their teams over time (versus isolated exercise outcomes)

The multi-lifecycle approach is designed to train and “operationalize” staff members via a continuous training program focused at the small-group level interventions versus a primary focus on episodic, cyclic joint exercises. Supporting this approach would involve: (1) Encouraging Combatant Commands and Joint Task Forces to view (and manage) their joint training resources more holistically; e.g. instead of leveraging three dozen joint trainers for one

large exercise, they might plan to spread that capability across several smaller training options. (2) Encouraging Combatant Commands and Joint Task Forces to design their comprehensive learning plans by first identifying the key learning areas and then working backwards to determine the specific sets of capabilities they might require to support those events. (3) Once these capabilities are identified, Combatant Commands and Joint Task Forces will need to build-up organic blended learning–training capabilities, tailored to each specific learning area and targeted to the appropriate learning objectives for their teams. They could then re-use the blended learning–training materials as often as required (e.g., for on-boarding training or staff remediation) without having to wait for an episodically-scheduled exercise program.

Why Blended Learning? The BLTS provides key processes, infrastructure, and learning content required to support the multi-lifecycle training event integration concept

The BLTS helps enable multi-lifecycle training event integration by (1) facilitating the necessary feedback loop that connects one event’s outcomes to the next event’s inputs; (2) bridging unexpected gaps (e.g., personnel missing an event) within the training continuum; (3) facilitating efficient remediation between events; and (4) enabling the development, sustainment, and delivery of a cohesive multi-event narrative. Additionally, multi-lifecycle plans must include infrastructure for capturing and communicating staff performance over individual and multiple event cycles. The BLTS could be tailored to accomplish precisely this, and in doing so, effectively address the proficiency drops.

(2) Mission Command: Empowering Staff Across Echelons

“Mission Command is the conduct of military operations through decentralized execution based upon mission-type orders. Successful Mission Command demands that subordinate leaders at all echelons exercise disciplined initiative and act aggressively and independently to accomplish the mission” (Joint Staff, 2011, Joint Operations).

Our second high-level recommendation is to use the BLTS to better support Mission Command training in joint events. Mission Command is a relatively decentralized form of leadership, where the staff are empowered to take independent action (within the commander’s intent and other relevant constraints, of course). To achieve this, staff members need to develop higher-order cognitive skills; they need to deeply understand their security environments, anticipate change and uncertainty, and operate on commander’s intent through trust, empowerment, and understanding. When implemented effectively, this enables greater efficiency, flexibility, and adaptability of a staff.

Rationale: The Chairman, has called for improved development and sustainment of Mission Command

General Martin E. Dempsey, Chairman of the Joint Chiefs of Staff, published a white paper in 2012 where he wrote, “Mission command must be institutionalized and operationalized into all aspects of the joint force—our doctrine, our education, our training, and our manpower and personnel processes.” Heightened operationalization of Mission Command in joint training would support the Chairman’s guidance by fostering the staff’s *cognitive dexterity*, helping to empower staff members to make independent decisions, assess situations, and anticipate their commander’s needs and approaches.

Two intelligent behaviors comprise what we refer to as cognitive dexterity: creative logic (the source of resourcefulness and ingenuity) and predictive logic (which uses rules and norms for predicting reasonable outcomes). Just as high levels of physical dexterity help an athlete navigate space, high levels of cognitive dexterity help decision-makers navigate complex situations. It provides someone with the skills to anticipate and respond to surprise and uncertainty, anticipate and recognize change and most importantly-operate on intent through trust, empowerment, and understanding. Each echelon of staff decision-makers use cognitive dexterity, but there are current training gaps that interfere with the ability of each level to do so with high degrees of effectiveness and efficiency. The proposed approach directly mitigates those gaps.

Approach: Foster staff cognitive skills and help them understand their commanders' mental models

To support Mission Command training, explicit cognitive learning conditions need to be designed into joint training events (e.g., *Cognitive Master Scenario Events Lists [MSELs]*). Supporting this approach would involve: (1) Development of a formal model, including the processes and metrics for the development of higher-order cognitive skills, i.e., an individual capacity for cognitive dexterity. (2) Processes and metrics for capturing expert elicitation of commander's intent, modes of thinking, and approaches to operational design. The resulting data could then be translated into the development of cognitive learning outcomes in support of inter-echelon training. (3) Design of the blended learning support would also require developing sustainable, measurable processes for instructional design and methodology to develop, test, and institutionalize repeatable Mission Command-type cognitive training processes.

Why Blended Learning?

This approach builds on prior research and training insights that position blended learning as a means for bridging between skills (i.e., from training, education, and experience) and stances (e.g., mindfulness, intuitive decision-making, sensemaking, and adaptivity). It supports the operationalization of Mission Command in joint training by enabling learning organizations and culture to assist the development of needed cognitive skills.

CONCLUSION

By integrating a blended learning–training approach into joint training, the CoL project created a system that could better emphasize higher-level thinking, provided formative and summative feedback, and enhance joint learning in individual, small-group, and collective training environments. This approach incorporates sound learning theory to promote greater functional readiness in complex joint exercise contexts. Further, now that the BLTS infrastructure is in place, it could support future joint training enhancements, including a shift towards multi-lifecycle training and incorporation of Mission Command learning objectives.

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