

Institutionalizing Blended Learning into Joint Training: A Case Study and Ten Recommendations

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ABSTRACT

In 2011, the Joint Staff J7 (Joint Training) directorate initiated the Continuum of eLearning project in order to integrate blended learning into joint exercises. This three-year research and development effort included construction of both the blended learning instructional materials (e.g., best practices for online instructional delivery [andragogy] within Joint Knowledge Online) and the processes required to implement blended learning within the existing joint training enterprise. Although the capacity for blended learning has existed for decades, such large-scale institutionalization of it presented unique challenges, which have previously limited its use within the joint training community.

Joint Training personnel built the blended learning system iteratively, concurrently, and incrementally over the three-year project. We also systematically measured the effectiveness of implemented components. This paper presents an overview of this process as a case study for others, and it summarizes the results of the empirical testing. The paper builds upon two previous IITSEC presentations, each of which detailed separate portions of the ongoing project (i.e., effectiveness of blended online courses in 2012 and integration of a part-task team-training simulation in 2013). This paper adds to those earlier articles by presenting holistic project outcomes, along with previously unpublished data from the empirical trials. For instance, some notable results included 21% higher learning outcomes (knowledge) when complementary e-learning courses preceded an exercise, and when an additional team-training simulation was added to the pre-exercise preparation, 62.9% of participants indicated that they felt more confident performing their assigned tasks as a result. Finally, this paper includes ten recommendations for other organizations seeking to formally implement a blended learning system, including don't assume that trainers know how to "blend" from an instructional perspective and to truly implement a robust blended learning *system* the organizational culture and its shared narrative about training must evolve.

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INTRODUCTION

Teachers and trainers have relied upon blended learning for at least two decades, and scholars have authored (*and continue to write!*) thousands of papers about it. Yet, despite the wealth of individual experience and reams of published theory available, institutionalizing high-quality blended learning processes in large, dispersed organizations still poses significant challenges. The Joint Staff J7, Deputy Director for Joint Training initiated the Continuum of eLearning (CoL) project in order to overcome barriers to institutionalization of integrating blended learning into the joint training enterprise. This enterprise affects thousands of personnel each year, and diverse service and program office stakeholders support it. Hence the CoL project involved identifying ways to systematize instructional best practices, build a common vision for blended learning among the various stakeholders, formalize organizational processes for it, and empirically demonstrate the system's feasibility and value. As of 2014, Joint Staff J7 (Joint Training) has implemented the resulting *Blended Learning–Training System (BLTS)*, comprising the unified blended learning concept, corresponding set of processes, and growing repository of blended learning materials. We have demonstrated its viability at eight combatant command training events and collected data on its effectiveness at PANAMAX 2012, Savannah Shield 2013, and Turbo Challenge 2014. This paper summarizes the three-year research project, data collection outcomes, and resulting BLTS; it also includes generalizable lessons learned about institutionalizing blended learning in complex organizations.

BLENDED LEARNING – Combining online and face-to-face instruction; often used interchangeably with the term *hybrid learning*; see Bonk and Graham (2006) for detailed definitions and history.

JOINT TRAINING EXERCISES

Each year the Joint Staff J7 (Joint Training) directorate supports dozens of large-scale training events on behalf of the combatant commands and their service component commands. 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 (see Figure 1). Military leaders, therefore, are continuously searching for ways to enrich the events' training outcomes and maximize scarce resources.



Classroom-based academics in support of PANAMAX (2012)

Photo: MC2(SW) Robert A. Wood Sr.



Personnel simulate a medical evacuation during Ultimate Caduceus (2014)

Photo: Staff Sgt. Stephenie Wade



Operational staff use computer simulation in Vibrant Response (2013)

Photo: Sgt. Ken Scar

Figure 1. Joint training exercises generally involve a combination of classroom-based learning and hands-on scenario-based training, including both computer-based simulation and hands-on field training (examples shown)

In 2011, Joint Staff J7 initiated the CoL project in order to explore integration of blended learning into collective training exercises. This exploration was motivated by observed gaps associated with training events (for more detail on these gaps, see Fautua, Schatz, Reitz, & Killilea, 2012). In brief, the gaps included:

- (1) **“Untrained” staff:** Up to 40% of staff members might miss a given training event (e.g., due to scheduling)
- (2) **Stovepiped training and education:** The various learning opportunities within an exercise lacked integration
- (3) **Service-specific mindsets:** Some personnel lacked the knowledge and attitudes needed for *joint* operations
- (4) **Insufficient data:** A lack of targeted, objective assessment of personnel’s incoming subject-matter knowledge
- (5) **Retention:** Staff members’ knowledge potentially decayed between the annual (or longer) training events

To address these gaps, Joint Training personnel developed the BLTS. This system complements the *Joint Training System* (see U.S. Joint Staff doctrinal publications *CJCS Guide 3501* and *CJCSM 3500.03D*), which, similar to the well-known ADDIE model of instructional design (Branson et al., 1975), defines deliberate processes for designing, planning, executing, evaluating, and assessing joint training. The BLTS includes a corresponding set of processes for developing, executing, and continuously improving blended learning within the joint training context. The BLTS documentation also articulates the concept of and rationale for employing joint blended learning, and the system includes a growing repository of blended learning instructional materials, such as tailored courseware, training scenarios, and supporting multimedia vignettes (see Figure 2). In the future, we anticipate that the BLTS concept, processes, and content repository will merge into the Joint Training System, as ongoing use of blended learning causes this once-novel concept to become status quo.

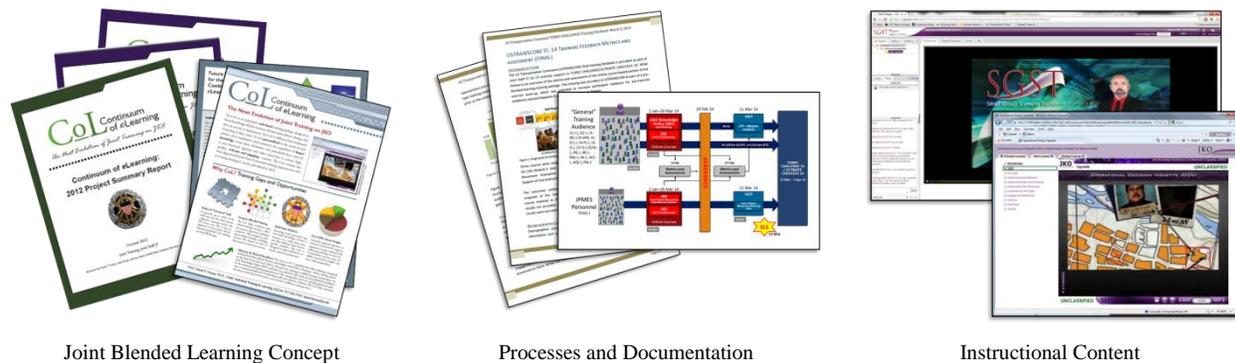


Figure 2. The BLTS comprises (1) the blended learning concept, (2) a set of processes, and (3) a repository of instructional materials for supporting blended learning within the joint training enterprise (web-based examples shown)

Individual training bundles produced by the BLTS are called Blended Learning–Training Packages (BLTPs). Joint Training personnel design these training materials so that they integrate with a particular exercise or support an emergent commandant command training request. In other words, BLTPs align with the objectives and schedule of the live training events that they support, and each BLTP includes a combination of the following components:

- **Online Courses:** Tailored, individually paced e-learning courses from Joint Knowledge Online (JKO)
- **Part-Task Team Training:** Online distributed simulation-based training designed for small groups
- **Blended Live Training:** Interventions and multimedia to augment live events
- **Feedback Processes:** Formalized feedback loop (e.g., metrics reports) to provide outcome data to stakeholders
- **Instructional Design Processes:** Administrative and instructional design guidelines for BLTP development
- **Schedule Processes:** Adjustments to the associated exercise’s *Joint Event Life Cycle* (JELC) timeline (a process defined in the Joint Training System) to accommodate the front-end integration of blended learning

BLTS DEVELOPMENT: CASE STUDY

The BLTS was developed and integrated with the Joint Training System over three years (2011–2014). Initially, the blended learning concept faced many hurdles, and the bureaucratic structure of the joint training enterprise (e.g., the compartmentalization of duties and resources) created barriers to its implementation. To address these concerns, the project team used a human–systems integration (HSI) methodology to establish the system; this involved iterative,

incremental, and concurrent research and development with an emphasis on human-centric issues (e.g., see Pew, Mavor, et al., 2007). In our opinion, this deliberate approach significantly contributed to the successful integration of the BLTS into the joint training enterprise. The following subsections describe the three-year HSI process as a generalizable case study for other complex organizations seeking to implement blended learning.

Phase 1 (Fiscal Year 2012)

Like all investigational efforts, this project began with several months of **team sensemaking**, which involved participating in frequent discussions, reading articles, developing graphics and presentations, and creating a shared narrative. By “shared narrative,” we mean an evocative and easily understood “elevator pitch” that explained the need, expected value, and planned approach for building the system. (See Table 1.)

Another important aspect related to team sensemaking involved **gap analysis**. Although our team had firsthand experience with joint training and had already observed some gaps, anecdotally, we took steps to formally document these issues and verify our subjective understanding of them. This involved compiling extant data (e.g., about the number of personnel who miss an exercise due to scheduling issues) and discussing observed gaps with fellow Joint Staff J7 staff and decision-makers. These meetings helped refine our understanding (and shared narrative) of the gaps, and they were a mechanism by which to involve other stakeholders in the BLTS development initiative. Such early stakeholder involvement proved critical to the future success of the institutionalization effort.

As a secondary part of the gap analysis, we interviewed seven military distance learning subject-matter experts (SMEs) from both within and outside of the Joint Staff J7; they helped our team identify possible barriers to the implementation of the BLTS (see Fautua et al., 2012a, 2012b, for a summary of the responses). For instance, they warned us about trainees’ somewhat negative perception of online learning and previous issues they had all experienced with poor quality embedded assessments. These SMEs’ past experiences and recommendations helped our team create strategies to mitigate pitfalls that we might have otherwise been unprepared for.

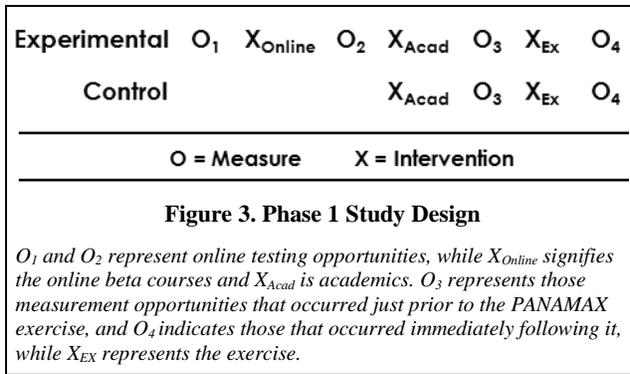
Concurrently, other members of our team developed the initial **high-level requirements** for the BLTS. Although it seems counterintuitive to design the initial system while simultaneously engaging in sensemaking and analysis, this approach created efficiencies. (Such concurrent development is considered a best practice of HSI for this reason; see Pew, Mavor, et al., 2007.) Initially, the high-level requirements only described the design of the online courses along with a plan for aligning their content with joint doctrine and the training events they were designed to support. The initial requirements were based upon the team’s subject-matter knowledge of e-learning and instructional design, informed by doctrine and published best practices for blended learning. We also drew upon the instructional design experience from course designers in JKO (i.e., the e-learning team within Joint Staff J7).

The next task involved **initial prototype development**. That is, the JKO instructional development team built a preliminary, experimental BLTP based upon the initial requirements and recommendations. At this early phase in the project, the BLTP consisted of three online courses and a delivery schedule tied to PANAMAX 2012, the exercise where we tested BLTS Version 1.0. Gaining approval to test the prototype presented some institutional challenges. Initially, PANAMAX stakeholders were concerned about how the BLTP would impact the exercise. Leaders from the training audience, for instance, worried about how much time their personnel would spend completing the “extra” training and observer/trainers (i.e., “instructors”) from the Joint Staff J7 wondered whether they would have additional tasking in support of the BLTS. **Strategic messaging** and involvement of stakeholders were paramount for overcoming these concerns. This meant frequently explaining the “why, how, and what” of the concept, engaging stakeholders in both formal and informal professional settings, and actively listening to their concerns and recommendations about the BLTS. To support our strategic messaging, we developed a one-page summary sheet about the project, gave presentations at the scheduled PANAMAX planning meetings, and held desk-side discussions with an array of interested parties.

Table 1. Summary of Tasks for FY 2012

| | Q1 | Q2 | Q3 | Q4 |
|--------------------------|----|----|----|----|
| Team sensemaking | X | X | | |
| Gap analysis | X | X | | |
| Requirements development | X | | | |
| BLTS (V1.0) development | X | X | | |
| Strategic messaging | | X | X | X |
| Empirical testing | | | X | X |
| Requirements revision | | | | X |

These task summary tables, provided in each subsection, roughly depict the timing and duration of major stages in the research and development process.



In large part due to the strategic messaging efforts, we gained permission to **empirically test** the BLTP at PANAMAX. Data collection took place 20 May–17 August 2012 in Mayport and Doral, FL and in Suffolk, VA. U.S. personnel from Tier I and Tier II staffs participated in the longitudinal data collection ($N = 196$). The experimental group ($n = 106$) completed the BLTP. At times O_1 and O_2 (see Figure 3), data were collected on their immediate learning outcomes in the online courses (i.e., pre and post-tests), and they completed surveys about the courses' usability, motivational effects, operational relevance, and ability to engender a "joint mindset."

The experimental participants, along with the control group participants ($n = 90$), completed knowledge tests, joint mindset questionnaires, and reactions surveys during the PANAMAX exercise at times O_3 and O_4 in the study diagram, after the classroom academics and full-scale exercise, respectively. (See Fautua et al., 2012b for a technical report of the experimentation; a subset of the most notable results are described below.)

Learning. All participants completed identical knowledge tests at the end of the PANAMAX exercise. Outcomes from a univariate between-subjects analysis of covariance (ANCOVA), controlling for rank and service, showed a statistically significant difference between the scores from the control group ($n = 47$, $M = 48.83\%$) and experimental group ($n = 57$, $M = 59.09\%$), $F(2, 48) = 8.58$, $p = .001$. Personnel in the experimental condition scored, on average, 21% better on the knowledge test versus participants in the control group (see Figure 4). (Note, because data collection took place over a three-month period and in an ecological setting, attrition occurred; the reduced n -values reflect this.)

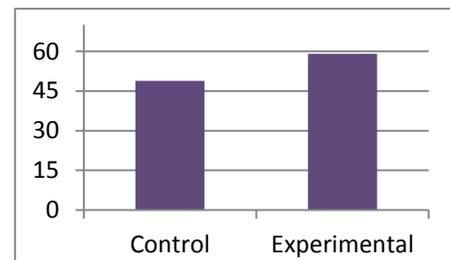


Figure 4. PANAMAX Learning Outcomes

Table 2. Meaningful trends in free-text reactions

| Participant Remarks | Control | Exp. |
|---|---------|------|
| Online pre-training would have been (or was) beneficial | 68% | 92% |
| Participant felt prepared for academics and/or exercise | 18% | 82% |
| Participant felt rushed to complete training requirements prior to exercise | 68% | 71% |

Reactions. Participants completed several reaction surveys through the longitudinal study. For instance, after passing the online courses, experimental participants responded to several five-point Likert-style items, and they generally agreed (i.e., 4 out of 5) that the online courses better prepared them for operating in a joint and multinational environment (repeated measures aggregated across courses: 11% *disagree*, 34% *neutral*, and 43% *agree*). Some of the most notable responses, however, came from the

survey given at the end of the full exercise, which included a section for detailed free-text responses. Select items were worded so that both experimental and control participants could respond to them. To analyze the responses, two researchers reviewed the data, categorized the most common remarks, and tallied the percentage of participants who provided similar feedback. A comparison between the experimental and control group responses revealed three notable differences. In particular, 82% of experimental participants indicated that they felt prepared for the event, in comparison to only 18% of the control group (see Table 2 for more details).

To summarize the key points from data collection at PANAMAX, the training audience reported lukewarm subjective reactions about the online courses designed to coincide with the exercise; however, they showed higher levels of knowledge at the *end of the live training* exercise (as compared to the control group). Finally, when asked to reflect at the *end of the live training* exercise, the experimental participants were substantially more likely to report, retrospectively, that they were well prepared coming into the event.

The practical experience gained by the designing and executing the PANAMAX prototype, along with the formal data collected, gave the project team new insights. We revised and expanded the BLTS **requirements**, and offered research-informed recommendations for practical next steps for its integration into the joint training context.

Phase 2 (Fiscal Year 2013)

Immediately after PANAMAX, Joint Training personnel began making **improvements** to the learning management system (LMS), in response to recommendations uncovered during the empirical trial. Joint Staff J7 personnel also began working on **BLTS (V2.0) development**, which included the addition of a “*data dashboard*” for reviewing interim output data and a *part-task team-training simulation* for distributed pre-event teamwork training. (See Table 3.)

Table 3. Summary of Tasks for FY 2013

| | Q1 | Q2 | Q3 | Q4 |
|---------------------------|----|----|----|----|
| LMS improvements | X | X | X | |
| BLTS (V2.0) development | X | X | X | |
| Stakeholder interviews | | | X | |
| Empirical testing (pilot) | | | | X |
| Requirements revision | | | | X |
| Strategic messaging | X | X | X | X |

Data Dashboard. The data dashboard is a report summarizing training audience data from the online courses. During the PANAMAX exercise, the trainers and training audience commanders only received outcome data from the BLTS post-exercise. However, they needed to review that data *before* the event, in order to tailor their instructional approach to fit participants’ demographics and identified knowledge gaps. A rudimentary version of the data dashboard was piloted during SOUTHCOM’s Integrated Advance 2012 exercise, just a few months after PANAMAX 2012. While not a formal study, comments in the event’s after-action report suggest it was positively received. The U.S. Army South Chief of Training noted that incorporation of this interim feedback loop was a potential game-changer for the design of major exercises because (once mature) it would allow trainers to target and optimize the experience for each unique training audience, where previously mechanisms for this sort of tailoring did not readily exist (C. Unrath, personal communication, March 21, 2013).

Team-Training Simulation. The second major addition to the BLTS included a distributed part-task team-training simulation. From an instructional design perspective, trainees (in groups of about 10–40) are intended to complete scenarios in the part-task simulation after they take the individual online courses but before they attend the full-scale collective exercise. Presently, this simulation-based training is delivered via the Small Group Scenario Trainer (SGST) software and served through the Joint Knowledge Online backbone. (See also Reitz et al., 2013, which summarizes the part-task team-training additions to the BLTS.)

While the developers worked on the BLTS enhancements and expansions, other team members conducted a series of **stakeholder interviews** intended to gauge the level of buy-in for the BLTS and to uncover additional recommendations for it. Twenty-three ($N = 23$) Joint Staff J7 personnel participated, including nine observer/trainers, five desk officers and/or exercise planners, and five personnel from JKO. During the interviews, stakeholders expressed strong support for the blended learning concept—a marked change from the previous year, when many viewed blended learning with deep reservations. However, the interviewees recognized that the need to invest even greater effort into socializing the blended learning concept, both internally within the directorate as well as with stakeholders from the combatant commands. Interviewees also raised questions about the administrative processes associated with the BLTS, offering suggestions on how to streamline the creation, verification, and maintenance procedures, and suggesting ways to better align the online courses and team-training scenarios with their corresponding live exercises. Finally, a number of interviewees recommended that the blended learning “team” needed to work more closely with the deployable training team (DTT) assigned to an event, so that the online components received sufficient attention and resourcing. This included tighter incorporation with existing JELC (i.e., the formal processes outlined in the Joint Training System for planning and executing individual exercises). Based upon the interviews, the researchers derived new recommendations for the BLTS, and from our anecdotal observations, conducting these interviews helped spread information about and encourage greater buy-in for the system. (These interviews are outlined in a technical report; see Schatz, Killilea, & Reitz, 2013.)

At the end of fiscal year 2013, the research team prepared for another **empirical testing** opportunity, this time with an emphasis on the newly integrated part-task team-training component of the BLTS. Joint Training developers created a BLTP aligned with the Judicious Response 2013 exercise; however, instability surfaced in the combatant command’s area of responsibility, and Judicious Response was cancelled. As a result, the research team could only execute a small-scale pilot of the BLTP, which was given its own exercise name of Savannah Shield. Serendipitously, the limited-scale pilot test uncovered several flaws in the administrative processes associated with the execution of the part-task trainer; the following paragraphs outline some examples of these issues.

The Savannah Shield BLTP began with five e-learning courses: two lower-level fundamentals modules and three courses designed in support of Savannah Shield. All participants were assigned to take the courses; however, many participants failed to complete them. Later, the lack of consistent, foundational knowledge among the pilot-test participants proved to be an issue. Fourteen ($N = 14$) participants, co-located in a single computer lab, completed some parts of the part-task team-training pilot, delivered via the SGST software. However, during this one-day training event, those 14 staff members logged in and out of the system, periodically attending to other events during the training, and some assigned participants chose not to attend at all. Further, the trainees did not gather as a group until the event began, which limited the amount time available for system familiarization (“buttonology” training), discussion of exercise goals, and any opportunity to talk about individual roles or responsibilities. As a result, the opportunity to train an intact staff team was not optimized and the disrupted training environment diminished the impact of the learning opportunity for the participants.

The research team had prepared a robust data collection approach; however, sub-optimal participation in the training limited the utility of these measures, and in the end, the most interpretable results came from the reaction surveys. Only nine Savannah Shield participants completed a 30-item reaction survey at the end of the simulation-based training ($n = 9$; the other five trainees chose not to participate in the research); in addition, nineteen observer/trainers ($n = 19$) completed the same questionnaire during a pre-event run-through of the scenario, a few days prior. Table 4 summarizes the results of both groups’ surveys. All items were recoded so that *strongly agree* (i.e., 5 out of 5) is the most positive response while *strongly disagree* (i.e., 1 out of 5) represents the most negative. No meaningful trends in individual subscales were noted; thus, the percentages in Table 4 represent an aggregation across all 30 items on the reaction questionnaires.

Table 4. Savannah Shield Reactions

| | Observer/ Trainers | Training Audience |
|-----------------------|-----------------------|----------------------|
| Strongly disagree (1) | 5% | 0% |
| Disagree (2) | 18% | 13% |
| Neutral (3) | 26% | 32% |
| Agree (4) | 44% | 47% |
| Strongly Agree (5) | 6% | 8% |

1 = Most Negative –to– 5 = Most Positive

In general, both the observer/trainers and training audience saw value in completing a part-task team training scenario prior to a larger-scale collective exercise. Approximately half of the participants *agreed* (4 out of 5) that the team-training component was beneficial and a good complement to the other Savannah Shield BLTP training elements (i.e., the online courses and planned collective exercise). However, the open-ended responses from the reaction surveys, along with the behavioral observation checklists submitted by the observer/trainers and the event’s after-action report, all strongly suggested that refined business processes were required. In sum, the training components seemed effective but the processes for delivering them needed revision.

Despite—or, more precisely, *because of*—the challenges encountered during the Savannah Shield pilot test, the project team developed a variety of recommendations for new business processes. These lessons learned also informed ongoing **requirements development** and our continuous **strategic messaging** about the system.

Phase 3 (Fiscal Year 2014)

In FY 2014, the blended learning team continued to make **incremental improvements** to the BLTS—in particular, to its documented logistical processes. We shared lessons learned from the Savannah Shield pilot test with other learning officers and took steps to mitigate process gaps in future iterations. This benefitted the Joint Force Headquarters National Capital Region (JFHQ-NCR), when the blended learning team supported their out-of-cycle training request in December 2013, and the new processes substantially improved delivery of the BLTS during the Turbo Challenge and Ultimate Caduceus exercises. (See Table 5.)

Table 5. Summary of Tasks for FY 2014

| | Q1 | Q2 | Q3 | Q4 |
|--------------------------|----|----|----|----|
| Incremental improvements | X | X | | |
| BLTS (V3.0) development | X | X | | |
| Empirical testing | | X | X | |
| Future planning | | | X | X |
| Strategic messaging | X | X | X | X |

In April 2014, we **empirically tested** the BLTS V3.0 during Turbo Challenge and Ultimate Caduceus, two concurrently executed U.S. Transportation Command (TRANSCOM) exercises. Turbo Challenge emphasized transportation-related actions, and Ultimate Caduceus focused on associated patient-movement objectives. Both

exercises supported U.S. Northern Command’s Ardent Sentry exercise. The BLTPs developed for Turbo Challenge and Ultimate Caduceus included different content, but they shared identical structures, development processes, and execution timelines. Both BLTPs consisted of two online courses and a part-task team-training scenario, aligned closely to narrative and objectives of the exercises. The BLTPs also included two scheduled instances where the observer/trainers received interim metrics reports on trainees’ demographics and online performance. Refer to Figure 5 for the delivery timeline and Figure 6 for the study design.

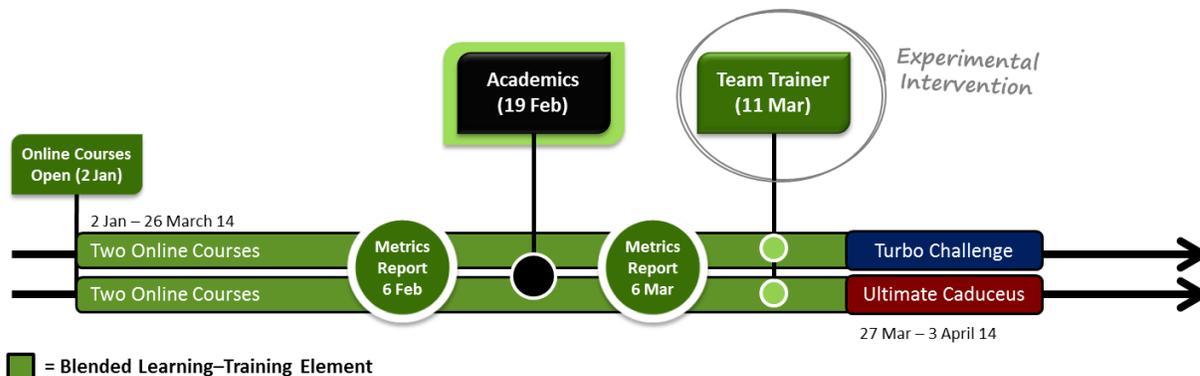


Figure 5. Timeline of Delivery for the Turbo Challenge and Ultimate Caduceus BLTPs

More than 200 staff members participated in Turbo Challenge and Ultimate Caduceus, and TRANSCOM leadership assigned e-learning courses to a majority of these personnel (depending upon their demographics). The training audience could access the e-learning courses up to three months prior to the event, and 92 participants completed at least one course. Staff members who participated in our research were assigned to complete two courses. That is, both experimental and control participants completed the e-learning courses.

| | | | | | | | | |
|---------------------|-------|--------------------|-------|-------------------------|------------|-------|----------|-------|
| Experimental | O_1 | X_{Online} | O_2 | X_{Acad} | X_{Team} | O_3 | X_{Ex} | O_4 |
| Control | O_1 | X_{Online} | O_2 | X_{Acad} | | | X_{Ex} | O_4 |
| | | O = Measure | | X = Intervention | | | | |

Figure 6. Phase 3 Study Design

O_1 and O_2 represent online testing, and X_{Online} signifies the online courses. X_{Acad} is academics. X_{Team} denotes the experimental intervention (part-task team trainer), and O_3 represents the feedback surveys after it. X_{Ex} indicates the exercises, and O_4 denotes the data collection at their conclusion.

Intervention and Data Collection. Two-weeks before the exercises, experimental participants from Turbo Challenge and Ultimate Caduceus completed separate team training scenarios ($n = 27$ and $n = 12$, respectively). The Turbo Challenge scenario focused on mission analysis in the context of civilian disaster response, and the Ultimate Caduceus scenario involved patient movement training in the same context. The live training exercises were held from 27 March–3 April 2014. Due to the typical attrition expected in any applied

research study, data from only sixty personnel ($N = 60$; experimental group $n = 31$; control group $n = 29$) were collected during the exercises at time O_4 . The set of experimental apparatus included surveys used in Savannah Shield, refined based upon feedback from that event, and three new knowledge tests.

Learning. Participants in the experimental condition correctly answered a greater percentage of questions on the three subject-matter knowledge tests delivered at the end of the exercise (time O_4). However, as anticipated (in part because all groups took the online courses) the differences in knowledge levels between groups were small, and with the small sample size, they did not reach statistical significance (see Figure 7).

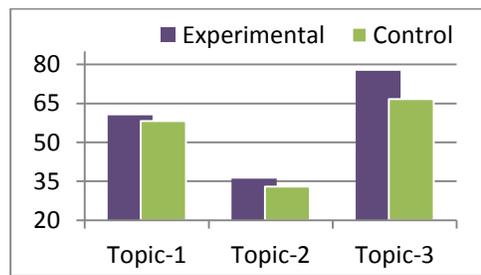


Figure 7. TRANSCOM Knowledge Test Scores

Reactions. Participant responses to Likert-scale statements were collected. For instance, after completing the team-training scenario (time X_{Team}), experimental participants were asked to agree or disagree with the statement, “I am more confident on performing the assigned task than I was before

performing the assigned task than I was before

training;” 68% of participants indicated that they *agreed* or *strongly agreed*. Further, participants indicated that the training system should be used to train service members (26% *agreed*, 52% *strongly agreed*). Later, at the end of the exercise (time O_5) both the experimental and control groups were asked to retrospectively rate their level of preparedness, coming into the event. While both groups *agreed* that they felt prepared for the exercise (experimental: 71% and control: 62%), the participants who completed the part-task training were more likely to *strongly agree* than the control group that they felt prepared (experimental: 13% vs control: 10%). Experimental participants were also much less likely to have a *neutral* opinion about their pre-exercise preparation (experimental: 6% vs control: 28%). That is, experimental responses skewed slightly more positive.

Performance. In addition to the experimental team, observer/trainers and other exercise SMEs were enlisted to collect observational data about the applied performance of personnel in the live exercise. Though anecdotal, this input helped uncover some impacts of the part-task team training. For instance, a member of the Turbo Challenge joint planning team (identified as an experimental participant, *ex post facto*) performed notably well on a mission analysis task but openly remarked on his lack of confidence. When asked why he felt uncertain about his quality performance, he revealed that he had not participated in a mission analysis effort before and his only experience with it was from the blended learning courses and part-task trainer. He attributed his successful performance to the part-task pre-training simulation.

To summarize the TRANSCOM outcomes, the quantitative data showed a slight and generally not statistically significant benefit to the inclusion of the part-task team trainer. However, the qualitative data revealed advantages that were observable by the observer/trainers on topics outside of the scope of the quantitative tools.

Successful delivery of the comprehensive BLTP at TRANSCOM demonstrated that the BLTS has become a fully operational capability that can now routinely support events across the joint training enterprise. Further, with this new capability, Joint Staff J7 can consider **future enhancements** to the Joint Training System that the system could not logistically support before. (See Fautua, Schatz, et al., 2014 for a description of two possible future enhancements: supporting multi-lifecycle event planning and enabling training for mission command mindsets across echelons.) Finally, as before, throughout FY 2014 our team continued to emphasize the importance of **strategic messaging**—including this paper—to create a shared vision among stakeholders, exchange data and communicate ongoing lessons learned, and receive feedback and suggestions on our ideas and methods.

TEN RECOMMENDATIONS

Although the capacity for blended learning has existed for years, large-scale institutionalization of it presented unique challenges for the joint training enterprise. Using an HSI research and development approach, we overcame these barriers and successfully created the concept, processes, and initial instructional repository for joint blended learning. Through this effort, we uncovered countless lessons learned. Below are ten high-level recommendations that we felt others might benefit from. (This set of recommendations is offered as a supplement to the numerous best practices already documented throughout the literature, e.g., Bersin, 2004.)

(1) Provide the “why.” One of the main principles of adult learning theory (andragogy) holds that adults are goal-oriented; adults want to understand the purpose and value of a given learning intervention. In a blended learning context, stakeholders across all organizational levels (from individual trainees to their topmost learning officers) need to understand how the blended learning content relates to other training elements, how it directly supports their missions, and how it adds value to the training continuum. For the training audience, emphasize *What’s In It For Me (WIIFM)* messages early. For training developers and administrators, explicitly connect the dots between the blended learning components and the larger training and operational goals. Revisit these connections frequently during the project’s design, development, and feedback phases.

(2) Get compliance and commitment from trainees and their leaders. We realized a hard-won lesson that compliance does not necessarily yield commitment. For example, in the Savannah Shield pilot, the command’s leadership requested the training but did not make an overt display of their commitment to it (e.g., by following-up with personnel who did not complete the assigned online courses). Plus, because the WIIFM was not clear to them, the training audience generally complied by attending the team training but found it difficult to commit to it. They were not fully engaged or thoughtful, and as a result, gained less value from the experience.

(3) Design blended learning content so that it also enables sustainment training. Each new BLTP aligns with a specific live training event, but BLTPs are also designed so that they can serve as small-scale standalone training. That is, the commands can readily reuse their tailored courses, part-task scenarios, and other media elements to support periodic training, such as on-boarding new staff members coming into their agencies or maintaining their personnel's knowledge and skills between larger-scale training events.

(4) Train to the staff—not to the exercise. In large organizations, training developers may feel tempted to focus on the goals and logistics of scheduled training events, viewing these events as ends unto themselves. The risk is that each event begins to seem like a “one-shot” and that training outcomes are “complete” after it. When approached in this manner, linkages between training opportunities are lost and system-level improvements (i.e., double-loop learning) cannot readily occur. Instead of focusing on the major training events as outcomes, they should be viewed as tools in a toolbox of variously sized training interventions. For the joint training community, the BLTS supports this outlook by providing new mechanisms for connecting the different training events, collecting data to help inform the design of future training, and encouraging stakeholders to view the various training interventions as parts of an interconnected whole.

(5) Embed diagnostic measures that support the adaptation of future training. Clearly, the summative assessments in any instructional setting should be diagnostic and support the delivery of feedback or remediation to learners. In blended learning, there is an additional burden to include diagnostic assessments that inform the *blending* process across linked training activities. For instance, in the BLTS e-learning, we included open-ended free-response questions. Even though the online learning management system cannot “grade” these responses, the observer/trainers can review them prior to an academics or exercise event and gain a greater understanding of the training audience's mindset than they could by simply reviewing the aggregated multiple-choice scores.

(6) Schedule opportunities for remediation. Within the BLTS, blended learning elements are delivered over the course of several weeks, and the system includes processes that enable later training elements to be adapted based upon results of the earlier ones. However, the BLTS originally lacked processes for inserting *ad-hoc* remediation activities into the delivery of a given BLTP. For instance, the trainers noticed some gaps in personnel's knowledge during the Turbo Challenge part-task simulation, and their leadership discussed the issues with their team during the after-action review. However, we had not built-in administrative methods for providing additional remediation in response to those issues. As a result, some of the same gaps were observed during the corresponding live exercise.

(7) Do not assume that trainers know how to “blend” from an instructional perspective. Provide guidelines and suggestions to trainers on how to adapt the delivery of later training elements in response to the results from earlier ones. Even the best instructors may struggle to meaningfully link and dynamically adjust one learning event in response to another, and military personnel may not have received formal training on these practices. Help trainers by exposing them to general instructional methods for blending, and when providing them with interim data also include recommendations for specific actions to take in response to it. For example, we found that simply giving observer/trainers access to the data dashboard did not enable them to effectively modify their delivery of academics; the dashboard needed to also include actionable steps for adjusting the academics based upon the data.

(8) Use blended learning opportunities to also collect system-wide feedback. Because blended learning incorporates computer-based training, it provides an easy mechanism through which to collect feedback from trainees. This feedback might include data about training effectiveness, which helps shape the design of immediately connected or even future training events, or the feedback might include other reactions about the training system. Incorporate intentional processes into the blended learning system to facilitate this sort of double-loop learning and continuous system improvement. (This principle also closely supports Recommendation #4, above.)

(9) When building a blended learning system, emphasize human–system integration. When institutionalizing blended learning at a large scale, use HSI best practices including concurrent, iterative, and incremental project management methods and strong emphasis on human-centric design. Include stakeholders frequently, and spend energy on strategic messaging. Finally, embrace interim “failures” (like Savannah Shield); temporary problems encountered during system implementation help designers resolve possible pitfalls in a controlled, smaller scale setting. Negative results yield some of the best opportunities for further exploration and growth of a capability.

(10) Change the culture. Effectively institutionalizing blended learning involves more than simply attaching e-learning courses to a live training event. Producing good quality blended learning requires development of new, “silo-bridging” business processes and an organizational culture shift with regard to the way stakeholders view training (*à la* some of the preceding recommendations). In large-scale organizations, a multiplicity of stakeholders will interact with the blended learning system, and due to interdependencies among blended learning elements, misunderstandings or disengagement from a given stakeholder group could damage the entire system. However, when stakeholders share a common vision and appreciation for blended learning, they can collectively produce powerful training experiences that efficiently hone and reinforce their staff’s knowledge, skills, and attitudes, while simultaneously supporting double-loop learning and future training innovations.

CONCLUSION

In summary, the joint training BLTS required three years to institutionalize as a value-added capability within the Joint Training System, and we anticipate that the system (to include its concept, processes, and content repository) will continue to mature in the years to come. Through this process, we uncovered many recommendations and trust that these lessons will help other agencies as they develop or enhance their own blended learning methods.

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REFERENCES

- Bersin, J. (2004). *The blended learning book: Best practices, proven methodologies, and lessons learned*. San Francisco, CA: John Wiley & Sons.
- Bonk, C. J., & Graham, C. R. (Eds.). (2006). *Handbook of blended learning: Global perspectives, local designs*. San Francisco, CA: Pfeiffer Publishing.
- Branson, R. K., Rayner, G. T., Cox, J. L., Furman, J. P., King, F. J., & Hannum, W. H. (1975). *Interservice procedures for instructional systems development* (NTIS No. ADA 019 486 through ADA 019 490). Ft. Monroe, VA: U.S. Army Training and Doctrine Command.
- Fautua, D. T., Schatz, S., Reitz, E., Bockelman, P. & Julian, D. (2014). Enhancing joint training through blended learning—training: Simulation, mission command, and a learning continuum. Presentation given at MODSIM World 2014, April 2014. Hampton Roads, VA.
- Fautua, D., Schatz, S., Reitz, E., & Killilea, J. (2012a). Joint Continuum of eLearning: implementing engaging, effective, and meaningful military e-learning. In *Proceedings of the Interservice/Industry Training, Simulation and Education Conference (IITSEC)*, Washington, DC: NTSA.
- Fautua, D., Schatz, S., Taylor, A., Reitz, E., Bartlett, K., & Killilea, J. (2012b). *Continuum of eLearning: 2012 Project Summary Report* (Technical Report) Orlando, FL: DSCI MESH Solutions.
- Pew, R. W., Mavor, A. S., et al. (2007). *Human-system integration in the system development process: A new look*. National Academies Press.
- Reitz, E. A., Schatz, S., Alston, A. L., & Fautua, D. (2013). Training staff in the Joint Event Life Cycle: A blended learning approach. In *The Interservice/Industry Training, Simulation & Education Conference (IITSEC)* (Vol. 2013, No. 1). National Training Systems Association.
- Schatz, S., Killilea, J., & Reitz, E. (2013). *Continuum of eLearning: Stakeholder Interview Summary* (Technical Report No. COR_30_0713_01). Orlando, FL: DSCI MESH Solutions.
- U.S. Department of Education, Office of Planning, Evaluation, and Policy Development (2010). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies*. Washington, D.C.
- U.S. Joint Staff (2012, August 15). *Joint Training Manual for the Armed Forces of the United States* (CJCSM 3500.03D). Washington, DC: Joint Chiefs of Staff.
- U.S. Joint Staff (2012, June 8). *The Joint Training System: A guide for senior leaders* (CJCS Guide 3501). Washington, DC: Joint Chiefs of Staff.