Developing the Human Dimension: Current Practices and Future Methods

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ABSTRACT

The strategic white paper "*Winning the Clash of Wills*" declared that better integration of the human domain into military plans and operations is essential to achieving overarching national security objectives. The human dimension reaches beyond simply equipping soldiers with language, culture, moral, and physical skills and must focus more on the subtle cognitive components. While training develops skills and techniques through practice and observation, educating leaders must emphasize the development of new competencies that apply critical thinking and reasoning skills, strategies for problem solving under pressure, and cooperative leadership styles. But Army doctrine does not tell us how to achieve this; it tells us only that we must develop the triad of moral, physical, and cognitive components of the human dimension. Meanwhile, the emerging Army and Air Force learning models call for continuous, adaptive learning using operationally relevant training scenarios to provide outcome-oriented instruction and leveraging informal and formal training opportunities. Exactly how this can be done is the subject of this paper.

This paper describes one of two case studies that provide insights into how to achieve improved learning outcomes using an adult learning model that emphasizes *Critical Moment Strategy* and experiential learning as espoused by Army Learning Model (ALM) 2015 and emerging Human Dimension doctrine. The paper then describes a future state methodology for course design structured to develop self-aware and adaptive leaders. The case studies use simulations, games, and vignette-based exercises that put the learner "in the moment," continuously changing variables to teach soldiers to think critically and out-of-the-box. This methodology is easy to replicate and uses a set of thinking exercises (cognitive battle drills) to reinforce effective thinking habits in tactical situations by applying deliberate practice to leaders' thinking skills. The paper also outlines an *Experiential Learning Model* that addresses different learning styles and turns traditional classroom methodologies upside down.

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INTRODUCTION

> *"Emerging requirements in the global environment in which the United States Army must operate during the coming years require changes in the way military leaders are trained and educated. Gone are the days of textbook solutions oriented against a predictable enemy on familiar terrain. Tomorrow's leaders must be self-aware and adaptive and able to operate anywhere in the world at a moment's notice. We need new ways to develop experience and intuition before we deploy these young leaders into combat."*
>
> —General Scott Wallace, Former Commander, U.S. Army Combined Arms Center and TRADOC

As far back as 2003, General Wallace reminded us that war is influenced primarily by human beings and that new approaches and strategies were needed to fully exploit that human domain. The wars in Afghanistan and Iraq are different than the cold war scenarios many of us grew up with. Their outcomes will be determined by the U.S. military's ability to leverage the human dimension rather than divisions of armor and missiles. The central role of the human dimension in today's military is spelled out in the white paper "*Strategic Landpower—Winning the Clash of Wills*." The paper notes that conflict is inherently human, which seems obvious, but this fundamental aspect of being human has not been sufficiently emphasized or understood in contemporary military thinking. "Time and again, the U.S. has undertaken to engage in conflict without fully considering the physical, cultural, [cognitive] and social environments that comprise what some have called the 'human domain'" (Odierno, Amos, & McRaven, 2013).

Soldiers operate in the midst of persistent conflict, amongst populations with diverse religions, ethnic backgrounds, and societal values. Success under these conditions will require "extraordinary strength in the moral, physical, and cognitive components of the human dimension" (U.S. Army, 2008b). Army Chief of Staff General Ray Odierno declared, "We went to war without understanding human domain or dimension…I don't want to make that mistake again" (Bacon, 2013b). Our leaders will need to adapt quickly to new challenges and be innovative problem solvers, all of which requires a different way of thinking and learning. Today's leaders need training and education that help them not only to understand the socio-cultural aspects of the battlefield (U.S. Army, 2008a), but also to gain the skills to adapt rapidly to a larger set of problems, challenges, and conditions.

Much of today's training focuses on staying "left of bang," teaching leaders to prevent and shape so they don't have to fight (Bacon, 2013a). But to learn to prevent and shape, leaders already must have learned to be self-aware and adaptive. As important as culture and language are, self-awareness, adaptability, and other elements are also essential to building the full cognitive component of the human dimension.

WHAT IS THE HUMAN DIMENSION?

As defined in the Army's *Study of the Human Dimension* (U.S. Army, 2008b), the human dimension encompasses the **moral**, **physical**, and **cognitive** components needed to prepare and employ the Army in full-spectrum operations. The moral component is rooted in character, which generates behavior. The physical component incorporates not only traditional aspects of fitness, but also nutrition, psychology, resilience, and sports medicine. This paper, however, is concerned with only the cognitive component—thinking, learning, and application.

Intellectual agility, adaptability, cultural competence, critical thinking, and self-awareness are crucial skills in the cognitive component for leaders of the future. These leaders will need higher-order cognitive skills to take on responsibilities and make decisions that in the past fell to more senior leaders. They will need the abilities to synthesize information rapidly, to quickly and correctly assess situations, to maintain situational awareness on the move, and to adapt to complex operations compressed in time and space (U.S. Army, 2008a). Corporals and young sergeants will

need the interpersonal skills traditionally required for senior leadership, and the ability to use those skills in changing conditions. While we generally have focused on the moral and physical aspects of the human dimension, we continue to struggle with how to develop the intellectual and cognitive capability; improvements in the latter having been only incremental rather than transformational. In effect, TRADOC and other service training and educational components have been, we daresay, rearranging the deck chairs on the Titanic as she slowly sinks.

Cognitive Skills

Cognitive skills are "soft" skills—they are harder to teach, develop, and measure. Because they are intangible, we tend to gloss over them and don't give them the emphasis they need. The cognitive readiness skill has been defined by Fletcher (2004) as "the mental preparation…an individual needs to establish and sustain competent performance in the complex and unpredictable environment of modern military operations." Fletcher summarizes this preparation in terms of three fundamental abilities: recognizing patterns in chaotic situations, modifying prior solutions as required for the current situation, and implementing plans of action based on identified solutions. Tillson, et al. (Tillson, Freeman & Burns 2005) recommend that training for cognitive readiness focus on the skills of intuition—"the way we translate experience into action" (Klein, 2004); creative thinking—the ability to abstract plans from one field of knowledge to another (Roger, 2011); critical thinking—"purposeful, reflective and careful evaluation of information as a way to improve one's judgment" (Gerras, 2008); and decision making—the process we use to collect, analyze, and act on available options in a way that allows us to forecast outcomes of each option. Adaptability and self-awareness, two of the most important cognitive skills for training in the human dimension, are described in the following sections.

Adaptability

Adaptability, as defined by the Institute for Defense Analyses (IDA), is "the operable capacity to bring about an effective response to an altered situation" (Freeman & Burns, 2010). Adaptability is a function of the following component skills: intuition, critical thinking, creative thinking, self-awareness, self-regulation, and social skills. A 1995 study by IDA identified the need to prepare U.S. forces to respond to unpredictable threats by teaching adaptability, and noted that repetition with feedback is essential for improved performance (Tillson, et al., 2005).

Adaptability enables us to see the world in different ways, similar to the way that chess masters recognize how the pieces on the chessboard match several game patterns. The patterns in the context of the human dimension refer to more than the tactical layout of operational forces—patterns of what leaders think the enemy will do, or what leaders believe the terrain looks like. A chess master sees patterns of all available options, and then mentally crosses off options as pieces are taken from the board and those options no longer exist. So too should the expert tactician see in his mind's eye (i.e., using his mental models) all options available to both friendly and enemy forces, as well as the physical and cultural influences that shape the environment. The tactician should then take action to influence the situation by altering selected battlefield conditions as needed. It is this type of adaptability that provides a wider range of options: the process of refining one's pattern set in ways that create multiple options for a given situation.

Adaptive thinking, part of the general characteristic of adaptability, requires competence in negotiation, consensus building, effective communication, analytical thinking, critical thinking, and creative problem-solving (Raybourn, 2006). Yet in our current teaching model, there is little room for the experimentation needed for leaders to learn by trial and error. One essential element of training adaptability is the crucible experience (Freeman & Burns, 2010). A crucible is "a defining moment that unleashes abilities, forces crucial choices, and sharpens focus…it is seen by the individual as the turning point that set him or her on the desired, even inevitable, course" (Bennis & Thomas, 2002). Crucible experiences are catalysts for personal growth and can be incorporated into game-based learning to help learners explore who they are under challenging conditions (Raybourn, 2011).

Self-Awareness

Self-awareness means knowing how to assess one's own abilities, knowing one's own strengths and weaknesses, knowing how to correct weaknesses, and knowing when to change course because our well-developed pattern recognition skills tell us the original course of action is no longer viable. Self-awareness goes beyond seeing the battlefield and seeing the enemy. It includes recognizing when we need to ask for help and acknowledging our own character strengths and weaknesses so we can balance them with other team members' strengths and weaknesses. An example of self-awareness is portrayed in *On Point: The United States Army in Operation Iraqi Freedom* when

Lieutenant Colonel Hughes takes actions to resolve an April 2003 conflict in Najaf, actions that Hughes had not learned in a military school, but which he realized were necessary to contain the situation. (See box below.)

> *While moving his forces into the town of Najaf, Iraq, LTC Christopher Hughes came across an angry crowd that assumed U.S. forces were there to attack a local Mosque and religious leader. They started throwing rocks at the soldiers. Despite his military objectives, LTC Hughes responded by ordering his soldiers to take a knee and point their weapons to the ground. As the crowd began to calm down, he withdrew, skillfully applying an avoidance approach to conflict rather than risking a potential no-win situation by firing on an unarmed but angry crowd. He was later able to return and form a bond with the locals.*

Self-awareness also means having an awareness of one's biases. Cognitive biases are the inevitable downside of the pattern recognition skills that fuel adaptability. These are mental errors caused by simplified information processing, which is a part of pattern recognition. The thinking patterns developed by the mind may distort, exaggerate, or dismiss new information in ways that produce errors in thinking or judgment (Gerras, 2008). Common forms of bias include mirror-imaging (assuming the other person thinks like you), anchoring (relying on a prior analysis without assessing new information), fundamental attribution error (the tendency to overemphasize personal factors), confirmation bias (selecting information that confirms one's preconceptions), and hindsight bias (seeing past events as more predictable than they actually were) ("Heuristics and Biases," 2012). Learning to look at additional options and identifying the conditions that are likely to exist if those options are viable is one way to avoid the confirmation bias commanders often experience. Typically, commanders look for data that confirm the plan they have chosen and give less attention to data that don't fit their mental models of the plan.

The best defense against biases is to think bigger, to accept that other options are available to each actor in the scenario, and to identify the conditions we believe must exist for each option to work. Commanders must then determine whether those conditions exist. Practicing this process builds self-awareness and objectivity. It helps leaders develop an enhanced set of mental models, which results in what we often call improved intuition. This practice may be time-consuming at first, but as we describe below, in the exercises at the School for Command Preparation (SCP) and the Armor Captains Career Course (ACCC), we saw substantial improvement in command skills over a week of repetitive drills.

STATE OF THE ART IN HUMAN DIMENSION TRAINING

Current Practices

Current practices in U.S. Army education include faster learning through technology, learning that is primarily instructor-led, predetermined course lengths, and a focus on individual tasks, conditions, and standards. Microsoft PowerPoint remains the standard way to convey information, and small-group instruction has, because of time constraints, turned into large-group-type lectures given to small groups. While small groups have plenty of interaction, it's not the type of interaction that shares the experiences more widely. Concepts of critical thinking are taught as a subject rather than embedded in every lesson or exercise. Distributed learning, although used (U.S. Army, 2011), is not blended effectively to reinforce learning and does not place learners "in the moment," which would force them to hone their skills. The Army Learning Management System manages content and processes, including training information, scheduling, collaboration, and career planning, in a one-size-fits-all solution. Elements of the Army Learning Model (ALM) currently used include blended learning (classroom learning plus technology-delivered learning) but the doctrine tells us only what to do, not how to do it (U.S. Army, 2011). Courses that focus on critical operational skills, group learning, and duty position requirements are not designed with the 20-something millennial in mind and are not as effective as they could be.

Today's tight constraints on resources available for training and education are not lost on us. Rather than advocating for more resources, we simply suggest that with better learning models and approaches, we could achieve a better outcome with the resources available. We do advocate for integrating formal and informal learning opportunities to improve the availability of information and practice time. Millennials may spend two hours a day playing *Call of Duty*. Surely we can create enjoyable games that teach the skills, values, and knowledge needed for success.

The Need for a New Learning Model

Current learning practices that are not working well for training in the human dimension include courses that are primarily instructor-led lectures accompanied by PowerPoint slides, with predetermined course lengths, a focus on individual tasks, and training about the concept of critical thinking as opposed to training through the practice of critical thinking. A new learning model is needed to address these problems.

Individual differences in learning styles also need to be addressed. Although learners may be tested to determine their favored learning styles, current practices do not include tailoring teaching styles to match a learner's preferred style. How do instructional designers handle group learning when the group contains learners with as many as four different learning styles? Since it is not practical to develop separate versions of the same lesson, we propose incorporating multiple-learning-style activities into a single lesson.

One consequence of these less-effective training practices is how long it takes to develop mastery in a given area. In the current TRADOC approach of Task, Condition, & Standards, we develop mastery only over an extended period of time, and the time required to change conditions and increase standards is rarely available, given the way lessons are designed today. Using this approach, our schools don't have time for the repetition required to gain mastery, as evidenced by the "one and done" mantra we heard repeatedly from faculty and students at the schools we visited.

Ideally, the new model will enable developing better leaders with increased expertise and experience in the same time that is used for training today. The only way to acquire expertise is through repetitive yet mindful performance under the supervision of a coach, under varying conditions (Lussier, Ross, & Mayes, 2000), a technique known as *deliberate guided practice* (Leonard & Swap, 2005). Deliberate guided practice is particularly effective in training adaptive thinking in complex situations (Lussier & Shadrick, 2003). An assessment of the *Think Like A Commander* experiential learning program used in the SCP and the ACCC (Shadrick & Lussier, 2004) found "significant performance gains in…the rapid analysis of [complex] situations to identify key considerations for decision-making" (Shadrick & Lussier, 2004). So, the model must include deliberate guided practice to ensure development of necessary expertise. But what about the time involved? Repetitive performance is time-consuming. Evidence from a range of domains, including chess, music, mathematics, tennis, swimming, and long-distance running, shows that it takes 10 years to become an expert (Ericsson, Krampe, & Tesch-Rome, 1993). How can an experiential learning model (ELM) modify the amount of time required to become an expert?

The solution proposed by this paper is a *critical moment strategy* (CMS), which means designing experiential learning that puts the learner in a critical moment just prior to a key decision point. This means developing short scenarios that encompass the immediate prelude to the critical decision point, the decision point itself, and the immediate aftermath. Isolating and focusing on a critical decision point results in shorter exercises, thus enabling more exercises to be conducted and speeding up the process of becoming an expert. Shorter exercises also provide more opportunities for what-if forecasting and experimenting with possible future situations.

Many repetitions of a short scenario can be completed in the same time as a few repetitions of a longer scenario. Although a longer scenario may contain a richer situation with more nuances, the disadvantage is the increased time required to complete the number of repetitions needed to develop expertise. The learner must work through each dimension of enemy, friendly, terrain, culture, social relations, and so on to identify the possible courses of action and their prerequisite conditions, and then take action. In the courses described, a coach (instructor) was present to ask questions that would make learners more aware of how they were thinking, what processes they were using, and what cues and factors they were checking to see if conditions had been met. What we noticed was that students required four to seven repetitions to fully understand the best way to think about the problem set and to start showing significant improvement (Shadrick, Lussier, & Prevou, 2003).

The question is how to integrate the CMS into a lesson plan that will teach to multiple learning styles, build knowledge and understanding, develop critical reasoning and thinking, and improve problem solving and decision making. The CMS is best employed as part of a larger model in which it is used to generate the repetition needed to improve personal mastery. This approach is well-tested and was the basis for the curriculum in two Army courses in the early 2000s. It was implemented in part due to Army Training & Leader Development Panel reports that indicated professional military education was failing the Army (U.S. Army, 2001b). Two case studies illustrate examples of effective training practices that can be integrated into an ELM, but only one is discussed in this paper.

What *Is* Working? A Case Study

From 2000 to 2003, the SCP at Fort Leavenworth underwent a curriculum transformation, partly in response to outcomes cited in the Army Training & Leader Development Panel report (U.S. Army 2001b), which said our professional military schools were not achieving the desired results nor were students satisfied with their training. In the initiative called TCDC 2000, SCP changed its curriculum to be more experiential and hands-on and more relevant to commanders and their decision-making. In the original course, 24-40 officers spent two weeks in lectures on doctrine and developing an offensive operations order, culminating in a day-and-a half battle simulation. During each week, one colonel and four or five lieutenant colonels role-played commanders while the rest role-played staff officers. Students reflected on their actions and outcomes but were not graded. Each seminar was taught by one instructor with a second instructor assisting only during exercises. The pace was designed to be comfortable for the least proficient student in the class. According to student feedback forms, the more proficient officers found the course boring and a rehash of material they already had been taught.

With TCDC 2000, teaching teams were standardized. Every class was taught by the same team of LTC instructors, and additional instructors provided support during exercises. Seminars were added to keep groups to about eight people. The course was redesigned to focus on being a commander and learning to think like a commander. All "staff work" and "staff products" were produced by the faculty. Abbreviated standard orders were generated that quickly could be modified as desired by the student commanders of each exercise repetition. This change enabled every student to experience being a commander, and a robust task organization allowed for tailoring simulations to each class. Additionally, the large defense and offensive fight was broken into 10 smaller and shorter fights centered on specific decision points. Finally, all exercises focused on decision making—what decisions had to be made, what conditions had to be set and how, and what the battlefield looked like when conditions changed and alternative courses of action were needed. Using the SCP simulation system, we could review and dissect every decision in each operation, helping the commanders develop their thinking processes and understand what factors influenced their decisions. Everything was captured by the system or an instructor. Two additional sets of exercises were designed to teach student commanders to think more broadly and more rapidly. This set of exercises was called "Think Like a Commander[i]" (Prevou & Costanza 2002), a series of 10 (five offensive, five defensive) tactical decision problems that put students in the critical moment. A set of scaffolded post-exercise questions helped students learn to widen their options, test assumptions, and consider consequences. These simple exercises provided deliberate thinking practice, opened students' minds to new questions and courses of action, and generated rich discussions the following day about the main tactical problem.

A second set of exercises was called "Duffer's Drift" after Sir Edward Swinton's classic tale (Swinton, 1905) of a new British Army lieutenant serving his first tour in combat during the Boer Wars. The character surveys his defensive positions along a "drift" and falls asleep. While sleeping, Lt Backsight Forethought dreams of the enemy attacking his position, finding a weakness in the defenses, and killing his troops. Upon awakening, Lt Forethought improves this weakness in his plan. For seven nights, Forethought has the same dream as the enemy exploits another weakness, and again he corrects the deficiency each morning. After the seventh day, the enemy actually attacks the position but withdraws, defeated. The dreams allowed Forethought to think like the enemy and widen his course of action to cover nearly every option.

In our modern version of Duffer's Drift, the focus of the simulation was on armored combat in a desert environment at the Army task force and BCT level. SCP provided the game software as part of their JANUS simulations as well as training documentation and guidance as part of the Tactical Commanders Development Program (TCDP). This allowed students to get a quick overview of the mission and plan before being thrust into the role of commander. The Duffer's Drift Exercise had four modules, each designed to emphasize one or more tactical concepts. Every module consisted of approximately seven tactical engagement scenarios, each of which required multiple decisions that get progressively more difficult. Each scenario lasted 30-45 minutes. Every morning, the students would be placed in the Duffer's Drift simulation and then conduct an after-action review (AAR) with the instructors afterwards. The emphasis was on seeing everything the enemy could do and making decisions about how to influence available resources and battlefield stance. Daily, having had time to reflect overnight, the students were given a few minutes to adjust their resources and fight the battle again. In each increasingly difficult scenario, instructors modified a single variable (the enemy course of action). In most cases, during the first through fourth runs, the enemy was able to defeat or bypass the commander and his unit. However, by the fifth through seventh runs, the student commanders had learned to anticipate enemy action by seeing the battlefield more effectively, and their battlefield calculus (the speed at which they could cover X amount of ground and the number of forces needed to beat an enemy of a specific size) had

improved substantially. The Duffer's Drift exercise allowed trial-and-error learning to be practiced in a structured and facilitated way. After the students "broke the code" (usually in 4-7 scenarios), they continued to win against the enemy, often more quickly and more decisively. At this point, instructors could change modules and introduce a new variable for change. The result was a broader understanding of the entire battlefield and better information synthesis, or what we would call situational understanding. When students moved on to the other offensive and defensive scenarios, they were able to transfer their learning to the new simulated battles and performed at higher levels. Learning was enhanced by noting the conditions, cues, and factors that drove each decision.

TCDC transformed a process-focused two-exercise course to an action-oriented decision-making course with 27-30 opportunities to practice, fail, adjust, and practice more, all without adding an additional instructor or time. But there were challenges. The course was labor-intensive for the 10 instructors, and when fewer than 10 were available, we had to borrow instructors to keep the student-to-instructor ratio at 3:1. Also, faculty had to learn to facilitate rather than lecture. Almost half of the pre-existing instructors at the initiation of TCDC could not adapt to the new format and found positions elsewhere.

After the new SCP methodology was fully operational, the instructors and ARI Unit Chief at Fort Knox, Kentucky, applied a similar, but somewhat more limited, approach at the ACCC, and saw substantial improvement in command skills over a week of repetitive drills (Lussier & Shadrick, 2003). This is in contrast to the minimal change in skills observed after conducting the single-event training exercises commonly used in command leadership training.

THE FUTURE STATE OF HUMAN DIMENSION TRAINING

An Experiential Learning Model

Future learners will be digital natives. Increased practice of hypertext and multi-tasking skills, in which digital natives excel, may mean that future learners will be less good at critical thinking and reflection (U.S. Army, 2008b). Any new learning model should focus on shoring up these possibly weak cognitive components. The ELM presented here emphasizes the practice of both reflection and critical thinking skills.

Experiential learning is "the process whereby knowledge is created through the transformation of experience" (Kolb, 1984). Experiential learning has the potential to alter social behavior (Li, Greenberg & Nicholls, 2007), and thus may be used to train behavioral skills as well as cognitive skills.

An ELM can be designed to address the problems described in the previous section and to incorporate the proposed solutions. This paper proposes that the ELM used successfully at the SCP and the Army Command and General Staff College/Intermediate Level Education (ILE) be institutionalized for the educational curriculum and be considered for use in skills training courses. The best candidates for ELM are adult learners who have life experience. Institutionalization of the ELM will require changes not only in content and delivery, but also in class format: reduction in class size, incorporation of repeated variations on an initial exercise, and introduction of new material only after the group's learning needs have been identified by analyzing performance in the initial exercise.

Kolb (1984) identifies three models of experiential learning: the Lewinian model of action research and laboratory training, Dewey's model of learning, and Piaget's model of learning and cognitive development. The ELM proposed in this paper is based on the Lewinian Model with minor blends of the other two. Kolb highlights two aspects of this model as particularly noteworthy: using a here-and-now concrete experience to validate and test learning abstract concepts, and using feedback processes to generate information about how the concrete experience deviated from desired goals. Kolb asserts that immediate personal experience is the focal point for learning. It gives life, texture, and subjective personal meaning to abstract concepts and at the same time provides a concrete, publicly shared reference point for testing the validity of ideas created during the learning process (Kolb, 1984).

Following Lewin, our six-step ELM (see Figure 1) begins with a Concrete Experience (CE). Steps may be repeated, but they should be conducted in order for maximum effect. The ELM begins with a brief introduction and set-up, followed by the CE, which quickly immerses students in a problem that provides an anchor for learning and tests students' knowledge. The Duffer's Drift exercise described above is an example of a CE. The CE is followed by the Publish and Process (PP) step, which is part AAR and part reflection exercise. Only then is new content introduced, in the Provide New Information (PNI) step. In the Action step, the new knowledge is repeatedly applied to different

situations and changing experiences. Finally, the Practical Exercise or Evaluation (PE) is where learning is tested. Each step is described in more detail below.

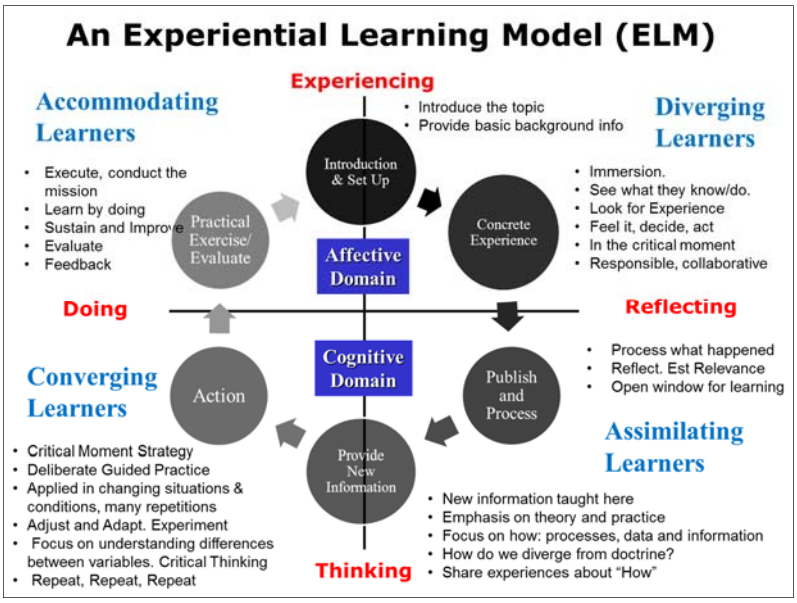

Figure 1. The Experiential Learning Model

The *Introduction & Set-Up* sets the stage for the CE rather than for the lesson as a whole. It goes quickly and provides only enough information and direction to lead the students into the CE. We have found that giving too much information up front may create bias or limit student thinking. We prefer to let the students generate questions that they often answer themselves working through the CE problem.

The *Concrete Experience (CE)* encapsulates the full range of lessons to be taught through an iteration of the ELM; if those lessons are learned correctly, the CE will reach a successful conclusion. The CE can be used multiple ways—it can serve as a pre-assessment to see what learners know, or it can be analogous to the primary lesson topic to test understanding of the concept. For example, if we are teaching a complex process, the CE might be to analyze a different and simpler process just to understand how students think about processes and how they work together to solve the CE problem. The CE, which generally lasts between 2 and 15 minutes, should provide a good anchor for the overall lesson. Anchored instruction assumes that most learning is context-dependent. It acts as a focal point that generates interest and enables students to identify and define problems being solved (Bransford, Sherwood & Hasselbring, 1990). Anchoring teaches critical thinking, since it enables students to see the pivotal features of a problem situation. Ideally, the anchor entails a variety of sub-goals and sub-problems and is analogous to a situation whose successful conclusion would require mastery of the lessons being taught (Bransford, et al., 1990). An important aspect of the CE is reaching the students' affective domain. The activity should produce emotions; involving the affective domain makes the learning more personal. Regarding learning styles, the CE is especially effective with Diverging learners, since it challenges them to work "outside the box," and also with Converging learners, who are action-oriented.

The next step, *Publish and Process (PP)*, is an AAR of the CE scenario. It is an opportunity for introspection and reflection and helps establish the relevance and importance of the material students are learning. The instructors facilitate a discussion about what "should" have happened, and they identify the critical decisions, the conditions required for making those decisions, and the options available to the leader. Factors that led to the outcome of the CE are identified, and students talk about how they felt during the CE. The students' participation in this process is essential, not only for educational purposes, but also so the instructors can learn more about the students' mental models, biases, and tendencies. Attitudes towards learning and winning emerge as well. The PP encourages deliberate engagement in self-reflection, a skill that may be weaker in future learners than in previous generations (U.S. Army, 2008b). The PP is especially effective with the learning styles of Assimilating learners, who want to make sense of things, and Accommodating learners, who like to be heard and explain their rationale.

The PP must be tightly facilitated lest it run on, and instructors should be careful not to let it turn into a litany of complaints about how and why the CE was unfair. Instructors should keep students focused on what they learned about the decisions, conditions, and options of the CE. They will use this knowledge when they reach the Action stage of the ELM. The PP step is where Lewin's feedback loop takes place, running back and forth between students and instructors. The cycle continues in true electrical engineering fashion—the feedback from each step affecting the next step in the process. Instructor feedback to students affects the students' performance in the next exercise, and student feedback to instructors has an impact on how the instructors run the next exercise.

After PP comes the *Provide New Information (PNI)* step, which is intended to review or introduce new concepts that seemed weak in the CE performance. Instructors cover new information relevant to the subject matter being learned

in a context that may or may not be related to the CE. If, for example, the lesson is about decision making, the PNI may range beyond the decisions made in the CE to a broader discussion of what kinds of decisions are needed, who makes them, and what kinds of conditions and outcomes bracket those decisions. PNI is the step in which doctrine, tactics, techniques, and procedures are presented. The PNI is similar to the traditional lecture format, but it includes discussion and questions as they arise, often mid-lecture. The PNI is a more efficient use of time than traditional lecture format, since the instructors can quickly acknowledge and reinforce what the students already know and spend the bulk of their time on the gaps in student knowledge identified by the CE and the PP. The PNI is an excellent place to discuss what-ifs and what-then alternatives as well as how the new material relates to other topics. This part of the ELM is excellent for capturing the attention of the Assimilators, who want things neatly packaged and orderly, and the Convergers, who want to know what they need to know so they can move onto the next activity.

The next stage is *Action*, where learners apply what they have learned to multiple and changing situations. For the Action stage, instructors construct a series of episodic operations similar to the sequence of dreams experienced by Lieutenant Forethought in *The Defence of Duffer's Drift.* Each time the simulation is played out, one variable is changed, altering enemy courses of action, for example, or adjusting resources or locations of friendly forces. Altering only one variable with each iteration helps learners see the battlefield and the enemy more clearly. If time allows, instructors should run as many alternative situations as possible to allow students to experiment with how to apply the new material. After students have mastered the basics, conditions may be changed to see how students apply the new knowledge under different circumstances. An AAR should follow each exercise.

After a quick situational update, the Action scenario begins just before the first decision point, intentionally allowing a bit less than adequate time for the learners to get a good read of the battlefield. The scenario plays out until it reaches the point where a predetermined crisis arises and is recognized. This exercise should demonstrate how the new material is applied in the situation and must provide cues and factors that, if recognized early enough, could be acted upon to avert the crisis. The Apply exercise runs at a rapid pace and is intended to elicit both cognitive and affective responses from the learners. The learners should feel as if they have been placed in a critical moment and must decide and act. In this way, the scenario tests the character of the learners and forces the realization that new thought processes or a different type of thinking is required to be successful in new situations. After the Apply step, the model iterates by returning to the PP, followed by more new content in the PNI, and then back to Action step.

After this process has been repeated several times (seven to ten times when possible), students have a multi-layered understanding of the full range of actions available to both friendly and enemy sides, as opposed to understanding only whatever is considered the most likely response in each situation. The students gain a better appreciation for the decisions required, the conditions that set the stage for those decisions, and how and where to look for those conditions. This trial-and-error opportunity allows learners to experiment and find out what works, what doesn't work, and why. The Action stage of the ELM develops critical thinking skills and teaches leaders how to acquire the situational awareness they need; it develops the leaders' adaptability skills by allowing them to learn multiple ways to solve problems and to develop options rapidly.

To evaluate learning, a *Practical Exercise (PE)* is conducted that embodies all lessons learned from the multiple iterations in a single complex situation. The PE tests the students' knowledge and comprehension, as well as their ability to apply new learning, analyze and assess new problems and situations, and synthesize new solutions. The PE may be deferred to a larger exercise where five or six separate lessons will be tested. The PE should have learning value as well as being an evaluation of learning and, like all activities in the model, must include a feedback mechanism. The final act of the PE is to have the students try to articulate what they think they learned, what they still need to work on, and how they will continue to develop those skills. This reflection teaches self-awareness and is a critical part of the metacognitive process needed to fully develop self-aware and adaptive leaders.

Future Scenario

In our future classroom, students start each morning immersed in a Duffer's Drift-like activity to awaken their senses and prime them for hands-on activities. Courses are taught in a blended learning environment using simulations and gamification, and both formal and informal learning time are structured using web-based and mobile apps. Course content is structured in the ELM framework, and students can experiment with various approaches, learning from trial and error the way they do when they play video games. Conditions are always changing, and as soon as students master one level, they advance to another. Cognitive development is honed with thinking exercises such as *Think Like a Commander* (or Logistician, or Medial Platoon Leader…), using scenarios that help them build the mental models

needed to apply the course material. Online communities of practice connect students to practitioners in the field and afford the opportunity for learning from peers. Micro lessons of one to three minutes of content are available to help fill in learning gaps. Competition between small groups forges teamwork and a sense of cohesiveness. Students have 24-hour access to simulations and games and hone their skills further with round-the-clock challenges and tournaments. Instructor teams continuously engage and challenge their students, and classroom time is focused on deliberate practice and reflective dialogue.

CONCLUSIONS AND RECOMMENDATIONS

This paper describes the weaknesses of current training practices with regard to better developing the human dimension, and identifies the elements of a new learning model that has proved successful in overcoming these shortcomings. These elements include deliberate practice, critical moment strategy, repeated practice of critical thinking exercises, and incorporating multiple learning styles in every teaching session.

We have presented an ELM built on Kolb's learning theory, in which adaptive thinking is fostered by presenting serial variations on an initial scenario as part of a "critical moment strategy." An ELM teaches leaders to respond not only to elements they recognize from prior experience, but also to new variations on their prior experience. This process lies at the heart of developing key elements of the human dimension such as personal mastery and expertise and being able to extrapolate from known situations and prior experience to new circumstances while adaptively working through complex problems. Kolb-style experiential learning is being adopted in domains ranging from combat tactical operations to leadership (Ng, van Dyne, & Ang, 2009) to management (Kolb & Kolb, 2009) to medicine (Armstrong & Parsa-Parsi, 2005).

The U.S. Army has called for converting most classroom experiences into collaborative problem-solving events, tailoring learning to individual learners' styles, and dramatically reducing slide presentation lectures in favor of a blended learning approach. The ELM presented here addresses all three of these requirements. It incorporates many collaborative problem-solving events. It addresses individual needs in two ways: first, by delivering training experiences for multiple learning styles, and second, by tailoring each "critical moment" exercise to the students' needs. It reduces information presentation dramatically, replacing it with mini-lectures and social learning approaches that focus on learning how to learn. Finally, it provides numerous opportunities for deliberate guided practice. For these reasons, the military should adopt an ELM for all training and education courses and start changing the educational paradigm immediately.

Gen. Douglas MacArthur, in a report to the President in 1933, said, "In no other profession are the penalties for employing untrained personnel so appalling or so irrevocable as in the military" (U.S. Army, 2001a). Today's military leaders are embroiled in a world of uncertainty. Yet our pedagogy focuses on training specific procedures and tactics that are fast becoming obsolete. We have been training for certainty in war; instead, we must educate our leaders for the uncertain. Developing self-aware and adaptive leaders begins by creating strategies to improve how we learn, which in turn builds the human dimension. Knowing what to do and how to do it requires developing mental models that that been shaped by diverse experiences and exercising those mental models with deliberate guided practice. The ability to recognize changes in a situation, quickly make sense of them, and act accordingly is the hallmark of the future leader.

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[i] Footnote: *Think Like A Commander* (TLAC) was developed by the first author with assistance from the Army Research Institute (ARI) and SCP faculty. TLAC was used at SCP and the Armor Captains Career Course for over four years. Current versions of TLAC include the multimedia graphics video productions developed by the Institute for Creative Technology, University of Southern California, with a grant from the U.S. Army Simulations Command. These productions depict Stability and Support Operations in Afghanistan and Iraq.