

Technical Report 1226

Learning the lessons of leadership: Case method teaching with interactive, computer-based tools and film-based cases

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for the Behavioral and Social Sciences**

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LEARNING THE LESSONS OF LEADERSHIP: CASE METHOD TEACHING WITH INTERACTIVE, COMPUTER-BASED TOOLS AND FILM-BASED CASES

EXECUTIVE SUMMARY

Research Requirement:

Given the rapid pace of U.S. Army deployments, a need exists to accelerate the development of the Army's junior leaders. Today's Army warfighters face stressful and demanding situations that are "close to war" but may not be covered by standard tactics and doctrine. Thus, it is important to develop adaptive leaders who can function effectively in a complex environment, facing situations they have never before experienced, and to do so as quickly and efficiently as possible for the large number of leaders required for the current operating environment.

Procedure:

The Army Excellence in Leadership (AXL) system was developed by the University of Southern California's Institute for Creative Technologies (ICT) and the United States Army Research Institute of the Behavioral and Social Sciences (ARI) to deliver case method instruction in an interactive multimedia environment. The development of the AXL system was an iterative process. First, the literature on leadership and tacit knowledge was reviewed, and captains were interviewed to ascertain common leadership challenges encountered while deployed. Second, a filmed case study and instructional content was developed and incorporated into a multimedia instructional system called Think Like a Commander—Excellence in Leadership (TLAC-XL). Third, after evaluations of TLAC-XL were conducted, the system was revised to address identified problems and renamed the Army Excellence in Leadership (AXL) system. This report describes the technical and instructional aspects of the TLAC-XL and AXL systems. Evaluation research regarding these systems can be found elsewhere in Zbylut, Metcalf, Kim, Hill, and Rocher (2007), Zbylut and Ward (2004a), and Zbylut, Ward, and Mark (2005).

Findings:

Specific findings in the report describe the efficacy of film as a medium for presenting case studies, as well as past findings on the TLAC-XL system as a whole and how such research informed the current version of the AXL system. With respect to the efficacy of film, filmed case studies yield several advantages over paper-based cases or multimedia versions of a scenario presented in PowerPoint. A filmed version of an AXL case study can be shown more quickly (13 minutes) than it takes a student to read a paper version of the same case (22 minutes on average). Results also suggested that AXL films are better than paper or PowerPoint at conveying the personalities of characters in the case study. Self-reports of arousal indicated that film can be more stimulating than PowerPoint and just as stimulating as a paper version of the same case, while other findings indicated that film is more emotionally evocative than both paper

and PowerPoint versions of a scenario. With respect to how much information from a scenario students are able to retain, film performed as good as or better than paper and PowerPoint versions of the same scenario. Although students were able to retain details about story plot points and scenario background equally well in paper and film versions of a case study, retention of what characters said during the scenario was stronger when the case study was presented via film rather than paper. The reverse pattern was found with PowerPoint and film, with film performing the same as PowerPoint with respect to retention of character dialogue and film outperforming PowerPoint with respect to retention of plot points and scenario background. These findings suggest that the multimedia component (i.e., character voices and pictures of characters) may play an important role in retaining information about which characters said what during a story, and film might be a superior medium for accurately conveying the nature of a character in case method instruction.

This report also summarizes findings from early work in the AXL project on TLAC-XL. Problems identified through research on the TLAC-XL system were addressed in the AXL system, producing an innovative technology solution for delivering case method instruction. Several case method best practices were incorporated into the technology of the AXL system, including the ability to interview individuals from the case study and opportunities to explore different points of view. Additional functionality was added into the AXL system to make it fully authorable for instructors, trainers, and course designers. The result is a system that allows for the presentation of filmed and text-based case studies, authorable modules that include a variety of question types (e.g., reflection, rating tasks, multiple choice questions), and content that branches depending on student answers.

Utilization and Dissemination of Findings:

This report documents an approach for implementing case method instruction in a computer-based environment. For applied researchers who are engaged in similar work, this report outlines issues and challenges encountered early in the project and demonstrates approaches for addressing such problems. The report also documents how case method best practices in traditional classroom environments can be translated into virtual environments. For individuals wishing to use the AXL system, this report describes the AXL system and also indicates how AXL instruction overlaps with different leadership areas identified in Army leadership doctrine and Sternberg's military tacit knowledge framework (Sternberg et al., 2000).

LEARNING THE LESSONS OF LEADERSHIP: CASE METHOD TEACHING WITH INTERACTIVE, COMPUTER-BASED TOOLS AND FILM-BASED CASES

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LEARNING THE LESSONS OF LEADERSHIP: CASE METHOD TEACHING WITH INTERACTIVE, COMPUTER-BASED TOOLS AND FILM-BASED CASES

INTRODUCTION

Given the rapid pace of U.S. Army deployments to global hot spots, there is an existing and ever growing need to accelerate the development of the Army's junior leaders. Today's Army warfighters face extremely stressful and demanding situations that are "close to war" but, in many cases, are not covered by standard tactics and doctrine. There is little room for error—tactical decisions can have strategic consequences (McCausland & Martin, 2001), and mistakes can cost lives. The challenge is how to develop adaptive leaders who can function effectively in a complex environment, facing situations they have never before experienced (Wong, 2004), and to do so as quickly and efficiently as possible for the large number of leaders required for the current operating environment.

Many skills needed to be an effective leader are learned through experience (McCall, Lombardo, & Morrison, 1988; Sternberg et al., 2000). In order to provide leaders with the requisite experience, the Army has explored various types of computer-delivered training and instruction for developing Army leaders. For instance, the Army has used large-scale constructive simulations such as Corps Battle Simulation (CBS), Joint Conflict and Tactical Simulation (JCATS), and Janus to provide environments where leaders can practice tactical skills related to mission planning, briefing, and operational execution. While these skills are necessary for battle command, they focus primarily on the tactical and technical aspects of the job. However, training and instructional interventions that target the "human" dimension of leadership are also necessary. The United States Army defines leadership as "influencing people by providing purpose, direction, and motivation while operating to accomplish the mission and improving the organization" (U.S. Department of Army, Field Manual 6-22, 2006, p 1-2). Learning how to influence people, how to provide purpose, direction and motivation is not targeted currently by most constructive simulation environments. Recent research on virtual humans attempts to address these deficits in training by providing simulations that involve interpersonal scenarios and tactics for dealing with crowds (e.g., Haynes, Maloor, Lyell, & Zbylut, 2006; Rickel et al., 2002; Swartout et al., 2006).

Another approach to computer-based training is through intelligent tutoring systems. The intelligent tutoring concept of automating human tutor functions has wide applicability (vanLehn, 1988). The field has done significant work in structured domains or using techniques where the learning content can be readily articulated or routinized, such as language skills (Johnson et al., 2004) and college physics (vanLehn et al., 2002; vanLehn et al., 2005). As with constructive simulations, there are few intelligent tutoring systems that explicitly support the development of the leader tacit knowledge such as motivating subordinates, effective communication, how to build a positive command climate, and other human dimensions that a leader must master to be effective.

This paper describes work conducted during the Army Excellence in Leadership (AXL) project. This work was a collaborative effort between the United States Army Research Institute for the Behavioral and Social Sciences (ARI) and University of Southern California's Institute

for Creative Technologies (ICT). The AXL system is a computer-based approach for helping leaders develop leadership tacit knowledge and skills. The AXL system builds on the insight that leadership is typically learned by experience and through a process of analysis and reflection of those experiences. Specifically, AXL provides an online, media-rich environment for delivering case method instruction. Before describing AXL, however, this report first provides an overview of leadership skills and tacit knowledge, followed by a general description of the case method instructional approach. This report then describes the current AXL system, as well as earlier versions of AXL.

The Interpersonal Skills of Leadership

Army Doctrine defines leadership as an influence process (U.S. Department of Army, Field Manual 6-22, 2006). Because leadership and influence primarily occur within the context of two or more individuals interacting with one another, it is not surprising that several researchers have noted that interpersonal skills are critical for effective leadership. Warren Bennis (1994) defined a leader as someone who focuses on people rather than on systems and structure, someone who inspires trust through integrity rather than relying on control. Similarly, Sternberg and colleagues (2000) found that successful leaders were individuals who rapidly learned how to do their jobs in a *social* context. Sternberg et al. reported that three broad categories of knowledge distinguished effective military leaders from ineffective leaders, and these were intrapersonal behavior, interpersonal behavior, and teamwork and organizational behavior. Of these three categories, Sternberg et al. indicated that interpersonal skills were especially important for junior officer to be effective. Such skills include the ability to motivate, direct, supervise, influence the boss, develop subordinates, communicate, take care of Soldiers, establish trust, and cooperate with others. Since most junior officers serve in roles in line units as commanders and platoon leaders, they have direct contact with the Soldiers they lead, and consequently they spend much of their time engaged in interpersonal interactions with Soldiers. Sternberg and associates (2000) termed this knowledge broadly as tacit knowledge for military leaders (TKML).

In another investigation of the interpersonal performance dimensions of military leaders, Carpenter and Wisecarver (2004) collected 1186 critical incidents from 175 Soldiers and found that Soldiers from all Military Occupation Skills (MOS) and ranks believed that interpersonal skills are important. Carpenter and Wisecarver then constructed and validated an interpersonal performance taxonomy that indicated the primary dimensions of interpersonal performance were:

- | | |
|---|---|
| (1) Rewarding others | (9) Informing |
| (2) Influencing others | (10) Gathering information |
| (3) Coordinating | (11) Demonstrating courtesy |
| (4) Training and developing | (12) Helping others |
| (5) Managing perceptions | (13) Socializing |
| (6) Managing others relationships | (14) Adapting to the social environment |
| (7) Controlling/regulating activities of others | (15) Formal staffing |
| (8) Role modeling | (16) Informal staffing |

Both the work of Sternberg et al. (2000) and Carpenter and Wisecarver (2004) overlap with many of the leadership competencies recently outlined in Army leader doctrine. This

overlap is noted in Table 1 and provides a basis for a leader development program or curriculum in the area of interpersonal skills.

Unlike many jobs, in which a deficiency in one skill set might be compensated for with excellence in another skill set, poorly developed interpersonal skills can interfere with a leader's ability to successfully meet the requirements of the leadership role. In their research on successful executives, McCall, Lombardo, and Morrison (1988) identified ten "fatal" flaws of leaders that can derail an otherwise successful career. Many of these flaws involved a deficiency in the leader's interpersonal skills, such as insensitivity to others, arrogance, betrayal of trust, failing to deal with performance problems, over-managing, and inability to adapt to a boss with a different style.

Given the importance of interpersonal skills to effective leadership, leader development interventions are required to help leaders cultivate social expertise. Research on tacit knowledge provides one foundation for creating such interventions. The next section provides an overview of tacit knowledge research.

The Tacit Knowledge of Leaders

Tacit knowledge can be characterized in three ways (Cianciolo, Antonakis, & Sternberg, 2004; Ericsson, 1996; Hedlund, Sternberg, Horvath, Forsythe, & Snook, 1999; Hedlund, Sternberg, & Psotka, 2000; Hedlund, Antonakis, & Sternberg, 2002; Polanyi, 1983). First, tacit knowledge is acquired in the context of everyday activities, even with little support from the environment and minimal awareness that it is being acquired. Second, tacit knowledge is procedural in nature and has practical usage, and it is this ability to successfully apply procedural knowledge that distinguishes effective from ineffective performers in a given domain. Third, tacit knowledge relates directly to one's personal goals.

The concept of tacit knowledge has its origins in the philosophy of science and was described by Polanyi (1983) as a way of accounting for the fact that "we can know more than we can tell." To illustrate this concept, Polanyi uses the example of how we are able to recognize a friend's face and differentiate it from a million others. We use certain features to allow us to recognize our friend's face, but we may be unable to fully articulate the variables that would enable someone else to recognize that person in the same way we do. Similarly, we may be able to recognize others' moods and expressions without being able to verbalize how we know someone is feeling a certain way, except in vague terms. Polanyi also indicated that tacit knowledge is prevalent in professional domains. For example, scientists operate in their profession by making extensive use of tacit knowledge, which enables "(1) for a valid knowledge of a problem, (2) for the scientist's capacity to pursue it, guided by his sense of approaching its solution, and (3) for a valid anticipation of the yet indeterminate implications of the discovery arrived at in the end" (Polanyi, 1983, p. 24).

Sternberg et al. (2000) expanded upon the ideas of Polanyi and studied people who were successful in daily life across a variety of professions. They concluded that practical intelligence, which is the ability to adapt to and manipulate everyday environments, plays an integral role in effectiveness, perhaps to an even larger extent than the crystallized intelligence

Table 1
Summaries of Leadership Taxonomies for FM 6-22, Sternberg et al. (2000), and Carpenter and Wisecarver (2004)

Leadership Competencies (FM 6-22)	Tacit Knowledge for Military Leaders (Sternberg et al., 2000)	Interpersonal Performance Dimensions (Carpenter & Wisecarver, 2004)
<p>Leads Others: This competency focuses on motivating, inspiring, and influencing others, particularly subordinates. This competency includes behaviors such as establishing clear intent and vision, using appropriate influence techniques to energize others, maintaining and enforcing professional standards, and balancing requirements of mission with follower welfare.</p>	<ul style="list-style-type: none"> • Establishing Credibility • Motivating Subordinates • Dealing with Poor Performers • Taking Care of Soldiers 	<ul style="list-style-type: none"> • Managing Perceptions • Rewarding Others • Influencing Others
<p>Extends Influence beyond Chain of Command: Leaders sometimes need to influence individuals who are not their subordinates. This competency focuses on influence beyond the leader's traditional line of authority (e.g., multinational and interagency situations). This competency includes behaviors such as understanding the sphere, means, and limits of influence; building trust; negotiating and resolving conflict, and building and maintaining alliances.</p>	<ul style="list-style-type: none"> • Establishing Credibility • Establishing Trust • Influencing the Boss • Cooperating with Others 	<ul style="list-style-type: none"> • Managing Perceptions • Influencing Others
<p>Leads by Example: Leaders serve as role models for others. This competency includes behaviors such as modeling Army values, leading with confidence in adverse situations, and seeking diverse ideas and points of view.</p>		<ul style="list-style-type: none"> • Role Modeling
<p>Communicates: Communication requires that leaders convey ideas clearly, as well as listen to others. This competency includes behaviors such as active listening, determining appropriate information-sharing strategies, employing effective verbal and nonverbal communication strategies, ensuring shared understanding, presenting recommendations so that others understand advantages, and being sensitive to cultural issues.</p>	<ul style="list-style-type: none"> • Communicating 	<ul style="list-style-type: none"> • Informing • Gathering Information

Leadership Competencies (FM 6-22)	Tacit Knowledge for Military Leaders (Sternberg et al., 2000)	Interpersonal Performance Dimensions (Carpenter & Wisecarver, 2004)
<p>Creates a Positive Environment: This competency targets the leader's skill in building and maintaining a positive and functional work climate and improving the organization as a whole. Leader behaviors in this competency include fostering teamwork, cohesion, cooperation, and loyalty; encouraging initiative and innovation; creating a learning environment; encouraging open communications; expressing concern for employee well-being; anticipating people's on-the-job needs; and setting and maintaining high expectations for individuals and teams.</p>	<ul style="list-style-type: none"> • Cooperating with Others • Taking Care of Soldiers • Establishing Trust • Managing Organizational Change • Protecting the Organization 	<ul style="list-style-type: none"> • Managing Others/Relationships • Coordinating • Helping Others • Demonstrating Courtesy • Socializing • Adapting to Social Environment
<p>Develops Others: Leaders help their subordinates to develop the knowledge, skills, and abilities to perform effectively in this job, as well as the next. This competency includes leader behaviors such as assessing current developmental needs of others; fostering job development and job enrichment; counseling, coaching and mentoring; and supporting institutional-based development.</p>	<ul style="list-style-type: none"> • Developing Subordinates 	<ul style="list-style-type: none"> • Training and Developing
<p>Gets Results: This competency focuses on how well the leader accomplishes team, mission, and organizational objectives. This competency includes behaviors such as identifying individual/group capabilities and task commitment, clarifying roles, identifying and managing resources, rewarding good performance, and adjusting to external influences on the mission or organization.</p>	<ul style="list-style-type: none"> • Motivating Subordinates • Directing and Supervising Subordinates • Dealing with Poor Performers 	<ul style="list-style-type: none"> • Rewarding Others • Managing Others/Relationships • Controlling/Regulating Activities of Others • Adapting to Social Environment • Formal Staffing • Informal Staffing
<p>Prepares Self: Leaders high in this competency take action to ensure that they are mentally, physically, and psychologically fit to perform their duties. This competency also includes a self-awareness component, as well as the following behaviors: evaluating and incorporating feedback from others; expanding technical knowledge, tactical knowledge, and interpersonal capabilities; and maintaining cultural and geopolitical awareness.</p>	<ul style="list-style-type: none"> • Managing the Self 	<ul style="list-style-type: none"> • Adapting to Social Environment

Note. For a complete description of leadership competencies, the reader is referred to FM 6-22.

typically measured by standard intelligence tests. Additionally, the researchers indicated that practical intelligence was a form of tacit knowledge, accumulated from experiences over time and difficult to articulate explicitly. Sternberg and colleagues conducted numerous investigations on tacit knowledge of Army leaders, and the culmination of this work is described in detail in Sternberg et al. (1999). This work resulted in tests of tacit knowledge for leaders at the platoon, company, and battalion levels, but more importantly, resulted in a theoretical classification of the types of tacit knowledge gleaned by Army leaders through experience. The tacit knowledge identified by Sternberg et al. consisted of practical knowledge about how to influence and deal with others, how to develop subordinates and engage them in problem solving activities, communication, and supporting and cooperating with others.

Like domain-specific expertise, tacit knowledge is acquired over time and through experience. Given the current military operational tempo and environment, however, many junior leaders are required to be effective across a full spectrum of operations whether or not they have had the requisite experiences necessary for developing expertise. Moreover, “the Army is experiencing accelerated migration of leader tasks from higher to lower leader echelons than previously needed” (Brown, 2003, p. 69). As a result, junior officers may be called on to demonstrate more sophisticated leadership capability than their junior leader counterparts of two decades ago. Thus, one training challenge is how to accelerate tacit knowledge acquisition without the luxury of providing years of developmental experiences to junior leaders.

The next section considers the dual challenge of expressing the tacit knowledge of interpersonal skills and constructing deliberate and structured learning experiences in order to accelerate the tacit knowledge acquisition process. Specifically, the following sections describe the use of stories in a case method-teaching framework as a way of conveying and supporting the acquisition of the tacit knowledge needed to be a successful leader. Stories convey context and situated behavior that transcend the use of abstract procedural descriptions of leadership behavior. While procedural descriptions provide a guideline for behavior, stories provide a vicarious experience for recognizing when and how to apply an integrated set of skills. Case method instruction provides both an experience and a framework for learning from experience.

LEADER DEVELOPMENT WITH STORIES AND CASE-METHOD TEACHING

Sternberg and his associates (2000) proposed an approach to leader development based on the use of stories they acquired from interviews of military officers. They suggested that the stories be made available by indexing them according to their tacit knowledge categories and the rank of the officers involved. Leaders could then access these stories to learn from the situations that their peers faced. By evaluating the situation, the course of action, and the consequences, leaders could develop the tacit knowledge that their peers gained from experience. Matthew, Cianciolo, and Sternberg (2005) tested this idea and demonstrated that tacit knowledge could, indeed, be improved through the use of scenarios and reflection.

Despite the surge in tacit knowledge research since the 1990s, it should be noted that stories and scenarios have long been used in one widely recognized approach to leader development—case method instruction (e.g., Bass, 1990; Hays, 2005; Hughes et al., 2002; Yukl,

2002). In actuality, case method instruction has been a popular approach for developing leaders since the early twentieth century when Harvard made case method instruction an integral part of its Business School curriculum (Gragg, 1982; Jennings 1996). Since that time, case method instruction can be found in many professional disciplines, including the medical, teaching, and legal domains (e.g., Jennings, 1996; Stewart & Dougherty, 1993; Tarnvik, 2002; Wright, 1999). While many variations of case method instruction exist today, case method instruction generally consists of two fundamental components. First, case method instruction requires a case study or description of a situation in which several events and challenges occur. Second, after students have had a chance to review the case, an instructor facilitates discussion of the issues and problems embedded in the case.

Case method instruction provides a means for students to learn from the challenges and mistakes of others. A case is a synopsis of the experiences, decisions and actions of others that students can analyze or explore. Cases also provide a vicarious learning experience by placing the student in the shoes of another individual. By studying a case, the student does not need to suffer the consequences of the mistakes made by actors in the case in order to learn from the experience. Furthermore, while it may take a long period of time to accumulate enough experiences to develop tacit knowledge, a student can study many cases that provide a diverse set of experiences in a compressed period of time. Additionally, instructors can purposefully select cases to target specific learning objectives and skills. In real life these experiences may only be stumbled upon haphazardly, and when such experiences do occur, the individual may or may not be concerned with pausing to reflect on those experiences.

Cases provide a concrete experience for students to explore practical, job-relevant issues in a safe and controlled environment. However, it should be emphasized that the discussion, analysis, and reflection that follows exposure to a case are just as important as the case itself. Cases serve as a springboard for discussing why actors in the case made particular decisions or reacted in certain ways, thus giving students insight into the nature of people in different contexts (Gragg, 1940/1982). Understanding how other people behave and make decisions is key to developing interpersonal proficiency.

Case method instruction is effective because it encourages active participation by students, resulting in deeper understanding and improved retention (Brown, Collins, & Duguid, 1989; Golich, Boyer, Franko, & Lamy, 2000). Students formulate and present their points of view about the case in a classroom discussion. While discussing the problems presented in the case, students are confronted with alternative points of view. These points of view challenge the student – revealing alternative interpretations of people and events, encouraging the student to reexamine his or her assumptions, or compelling the student to formulate coherent, rationale arguments to support his or her position. Furthermore, by both listening to others and presenting one's own views, the student has the opportunity to develop and practice both interpersonal and critical thinking skills.

The following sections describe best practices from leader development and traditional case method instruction, as well as limitations that can be addressed through technology to extend and support case method instruction in a variety of learning environments.

What Makes a Good Case?

A defining characteristic of a “good” case is that it presents real world situations containing problems, issues, and dilemmas similar to the ones that a student might confront outside the classroom. This characteristic maps to M. David Merrill’s (2002) first principle of instruction: learners should be engaged in real world problem solving. While many cases are extracted from historical accounts, it should be noted that it is not required that a case be a true event (Jennings, 1996; Maltby, 2001). Instead, it is more important that the case be reasonably realistic and complex, and also stimulate intelligent discussion among students in such a way that students will be better prepared for dealing with real world problems. To be sufficiently complex and useful for discussion, the case should be oriented around three to five major issues related to the learning goals set by the instructor (Golich et al., 2000).

A case for discussing military leadership issues has additional needs. By definition, leadership is an influence process (Department of Army, FM 6-22), and therefore much of leadership occurs within the context of interpersonal interactions. Thus, a good case for exploring military leadership issues should not only incorporate the technical and tactical backdrop in which many leadership challenges occur, but also requires sufficient character development and description of character behavior to capture the interpersonal dynamics of a situation. Because many nuances of interpersonal behavior (e.g., nonverbal behavior, personality, motivation) may be inadequately described in a narrative or “paper-based” case, it has been suggested that the film medium may be better suited for leadership cases (Richardson, 1994).

Learning from the Case

Case method instruction is not simply about providing a case, but rather creating a learning experience around a case. Yukl (2002) indicated that successful leadership training should start with clear learning objectives, meaningful content, appropriate sequencing and a mix of training methods. He emphasized that these complex skills require a significant amount of practice, and the provision of relevant, timely feedback. It is not sufficient to teach leadership as a set of simple procedures—learning transfer is much more effective when the student has the opportunity to apply a principle in a variety of situations and receive timely feedback on performance.

Case method instruction provides students one such environment in which to practice applying principles and receive feedback. In case method instruction, the student is exposed to a situation; the student then analyzes the situation and derives an explanation of what happened and why. During the discussion phase of case method instruction the student receives feedback from both the instructor and peers. The instructor is responsible for facilitating the sharing of feedback.

The instructor must follow the discussion as closely as the students. A skilled instructor leads the class through a discussion in a manner that maximizes the construction of knowledge and elaboration on important issues. An instructor accomplishes this by keeping the discussion on track with an overall question map but without spoon-feeding answers to students. A well-

selected and well-constructed case will contain ambiguities so that there will not be clearly defined right and wrong answers. Rather, there will be candidate solutions or recommendations that have pros and cons. By encouraging students to actively participate, an instructor enables exploration of these possibilities and thereby maximizes learning opportunities.

Learning occurs when the students first grapple with the case on their own and then in a guided context with an instructor. Other class participants provide varying insights and critiques that would not have otherwise been considered, so it is important that the students listen to others. Through participation and group discussions, students learn not only how to apply their critical thinking skills, but they also learn how to articulate a position, listen to others, and compare alternative views for their relative merit.

Role of Instructor: Orchestrate the Discussion

When leading a case discussion, the instructor acts like an orchestra conductor rather than a lecturer (Golich et al., 2000). In this metaphor, the role of the instructor is to elicit participation by all the students, while attempting to coordinate their individual inputs. The art of facilitating discussion involves tracking and guiding the discussion by asking key questions, encouraging the students to construct knowledge rather than being told what to think, and provide feedback that challenges or affirms the viewpoints articulated during the discussion. To achieve this, the instructor has to keep in mind the desired learning outcomes and have a map of questions that will lead toward the goal (Gentile, 1990). The question map may resemble the preparation process taken by the student, going through stages of familiarization, analysis, and developing recommendations.

During the familiarization stage of the class discussion, the questions establish the groundwork for subsequent analysis. Open-ended questions like, “What was going on in this situation,” “Who were the actors,” and “What led to failure in this situation,” serve to establish the issues in the case as well as prime the participants for the more detailed phases that follow (Golich et al., 2000).

During the analysis phase, the instructor guides the discussion by asking questions that begin to target the sources of the problems identified during case familiarization. Examples include examining the underlying assumptions of the various actors’ decisions, the factors that influenced the outcome, and taking a critical look at the appropriateness of the actions and decisions of the actors. The case discussion tends to be a democratic process: the role of the students is to voice their opinions, listen to the viewpoints of others, and challenge others’ assertions in an appropriate manner. All the while, the instructor guides the discussion consistent with the goals of the lesson plan.

The goal of the final phase of discussion is to make recommendations and evaluate alternative courses of action. One way of guiding students toward this goal is to ask a hypothetical question about what might have resulted if an actor had taken a different action, or ask for a prediction of what might happen next in the scenario. As solutions are generated and discussed, the instructor guides the class toward a set of potential solutions that could be applied

in the case. In the end, the instructor provides a summary of the issues and solutions that reinforce the focal points of the learning experience.

Role of Student: Prepare and Participate

The literature on case method instruction encourages having the students review and analyze the case ahead of time. In so doing, the stage is set for a successful classroom discussion. The three stages to student preparation are familiarization, analysis, and developing recommendations (Golich et al., 2000). During familiarization, the student first skims the case, looking for themes, issues and problems (Corey, 1999). If the instructor provides study questions, the student reviews them prior to making a detailed review of the case. Once the major themes and issues have been outlined, the student is ready to perform a detailed analysis, beginning with a careful reading of the case and its appendices. The student should outline in more detail the problems in the situation, the people and parties involved and their reactions to the situation, the assumptions made, and the evidence for and against the decisions that were made. Finally, once the problems have been analyzed, the student should formulate recommendations for addressing the issues in the case (Golich et al., 2000).

During the class, students are expected to actively participate in the discussion. Their participation includes both offering their points of view to the other members of their class and active listening to connect the points of view being shared with their own. Student participation in a discussion, reflection, and exposure to different points of view are found to help a student's sensemaking process (Brown et al., 1989; Golich, et al., 2000; Palus, Horth, Selvin, & Pulley, 2003). This sensemaking process helps students better understand the specific case being analyzed and should also help them develop overall sensemaking abilities critical for effective leadership.

Limitations of Traditional Case Method Teaching

While case method instruction has become ubiquitous in higher education, there are a number of potential limitations to this approach.

Inadequate Representation of Interpersonal Issues

Traditionally, cases are paper-based and generally do not employ the full array of story-telling techniques, such as emphasis on character dialogue or rich contextual detail. In particular, text-based cases have difficulty adequately conveying the interpersonal aspects of leadership. While a good writer can activate the reader's imagination when describing a situation, the nuances of the relationships between individuals, and the conflicts among different points of view (Gerrig, 1993; Gerrig & Rapp, 2004; Green, Brock, & Kaufman, 2004), much of what happens at an interpersonal level involves nonverbal communication, which may employ visual perception of the facial expressions and gestures of another person. Beyond the words that are spoken, a speaker's attitude and emotions are also expressed by the voice itself, through tone, volume, inflection and so on. What one perceives through the aural and visual senses often are not well-described or are not concisely delivered within a textual narrative.

Lack of Student Preparation Time

One assumption of case method instruction is that the students will receive the case ahead of time and analyze it before entering a classroom discussion. If the training context does not allow for student preparation outside the classroom, then the students will need to do their analysis in real-time during the teaching session. Given the current operational tempo of the U.S. Army, Soldier training time is highly constrained and packed with a variety of activities. Homework and other preparation before class is unrealistic when the students are expected to fulfill other professional development and job responsibilities while also participating in leader development education (Wallace, 2006). When this situation exists, the case has to be easily presented during the class in a short span of time.

Inaccessibility of Text-based Cases

Many cases used in business schools and other university contexts are presented as written materials. The unfortunate situation is that many people in the United States do not enjoy reading, nor do they read proficiently enough to comprehend moderately dense prose and make simple inferences. According to a recent study by the U.S. Department of Education, only 13-15% of the adult population is considered to be proficient in literacy, meaning that they can read complex prose and analyze different points of view (Kutner, Greenburg, & Baer, 2005). Thus, case study materials that are presented through media other than the written form can create an opportunity for individuals who do not read well to participate in case method instruction. Additionally, given variability in student reading speed, long text-based cases can absorb a large component of class time, and this may be unfeasible in some classroom environments.

Amount of Effort Required for Facilitator Preparation

It takes a significant amount of time for an instructor or facilitator to prepare a case (Diamantes & Ovington, 2003). Again, using the metaphor that the instructor is like an orchestra conductor, he or she must know all the parts and how they are supposed to play together ahead of time. This means having a deep understanding of the case, the actors, the interrelationship among the issues, and how they relate to the learning goals. To facilitate discussion effectively, the facilitator needs to have a plan for the projected discussion that includes a question map, a schedule and sense of pacing, and an idea of what misconceptions the students may carry into the discussion.

Experience Level of Facilitator

In an ideal classroom situation, an experienced instructor or facilitator guides the discussion, provides feedback, and ensures that the learning goals are achieved. Experienced facilitators recognize when a discussion is going off-course and know how to get it back on track. They also know how to recognize the difference between an opinion and a misconception, and they provide feedback that is appropriate to the situation. Without experience, the discussion can veer toward different extremes, devolving into a lecture by facilitator, or heading unchecked into an argument (Golic et al., 2000).

Finding and Creating Cases is Effortful

Good cases are realistic, complex, emotionally and intellectually engaging, and provocative. Therefore, creating a good case requires substantial effort to both research and write (Wylie, 2003). Defining or selecting a scenario that addresses the learning objectives of the course is challenging. The right level of detail needs to be provided; enough information should be presented that the student can do an analysis of the target issues without the case providing an obvious answer. In addition, the case should show a potential for transferring what it is studied in the case to a real life work context.

AXL FILM-BASED CASES

In spite of these limitations, case method instruction has become a popular technique used in university classrooms, corporate training, and in the military. The Army Excellence in Leadership (AXL)¹ project proposes a case method instruction approach that attempts to overcome some of these limitations and address the challenges of tacit knowledge development with a focus on interpersonal skills. AXL uses film-based cases in an interactive, computer-based environment to deliver a learning experience that accelerates the development of interpersonal skills in leaders. In the following sections, three components of the AXL project will be described: the AXL film-based cases; an initial proof-of-concept teaching system, Think Like a Commander-Excellence in Leadership (TLAC-XL); and a complete prototype system, AXL.Net.

As previously discussed, Sternberg and his associates suggested that stories could be used as a way to provide a surrogate experience for Soldiers to develop tacit knowledge (Sternberg et al., 2000). Their basic idea was that, by reading the stories of peers, an officer could acquire an understanding of the situations others faced and how they dealt with them, a step toward transferring the tacit knowledge of one leader to another. Later research indicated that reflecting on Soldier's stories did result in gains in tacit knowledge (Matthew et al., 2005). Additionally, stories have the ability to create an immersive, high-fidelity environment, affecting both cognitive and emotional states and increasing connectivity to real world situations (Gerrig, 1993; Gerrig & Rapp, 2004; Green, Brock, & Kaufman, 2004; Manovich, 2001). AXL takes the idea of telling real-life stories a step further by creating a film narrative to portray a complex leadership situation.

AXL film narratives differ from the standard text-based cases traditionally used in case method instruction in several ways. First, AXL cases tell stories. Tactical and decision-making cases, such as those used in military scenario-based training like Think Like A Commander (Shadrick & Lussier, 2004) or in higher education (e.g., Harvard Business School), tend to portray a scenario as a mix of event descriptions, data, and other factors to be considered or analyzed. Because the purpose of these cases tends to be training individuals how to make effective decisions using the information and resources available, these cases tend to focus more on embedding relevant decision-making information and variables rather than the development

¹ AXL has previously been called the Critical Leadership Analysis System (CLAS) and Think Like a Commander—Excellence in Leadership (TLAC-XL).

of a story-like narrative. While these cases may contain some narrative to make the scenario easier to read and comprehend, these scenarios generally lack a story-like plot structure, well-developed characters and dialog, and the elements of surprise and suspense that create tension in the viewer. It should be noted that the lack of such storytelling elements in decision-making cases is not an indictment of the types of cases used in decision making exercises. These cases contain the information relevant for decision-making exercises. However, storytelling elements such as plot and character development may be helpful for cases that target leadership development, because stories may be more effective at conveying information relevant to the role of leader: specifically, character personality, character history, motivation, emotion, and interpersonal context. It is this development and portrayal of characters that is expected to be particularly important for a case study on leadership. Since leadership, by definition (FM 6-22), is an influence process involving interpersonal interactions, a leadership case that approximates reality should have characters with personalities, emotions, and attitudes. A character, whether in the role of leader or subordinate, embodies the positive and negative traits that one will encounter among members of an organization. Seeing how a character's behavior affects other people and the organization's ability to perform its mission can powerfully indicate the pros and cons of leader behavior.

Second, AXL film-based cases present story information using both visual and aural media. Film is better able to present the emotional state of a story's characters and the non-verbal cues that provide other indications of what is happening during a particular communication act. Film shows what text can only describe. While it is true that a great author can create powerful images of what a character is thinking or feeling or how one character interacts with another, film relies on the perceptual senses rather than the imagination. The tone of voice and manner of speech also feed the senses of the observer in a manner that more closely approximates what happens in real life.

A substantial body of research in the field of cognitive psychology indicates that presentation of information through dual modes of presentation is superior to the presentation of information using a single modality (e.g., Baddeley, 1986; Paivio, 1986). Recently, these findings have been leveraged in the construction of multimedia learning environments, most notably in the work of Mayer and colleagues (e.g., Mayer, 1996; Mayer, Dow, & Mayer, 2003; Mayer & Sims, 1994; Mayer, Sobko, & Mautone, 2003; Moreno, Mayer, Spires, & Lester, 2001). Mayer's (2001) dual processing theory of multimedia learning proposes that individuals are able to construct both visual (e.g., pictures and animations) and verbal (e.g., written and audible words) representations simultaneously (Mayer, 2001, 2004). Learning is enhanced when the visual and verbal processing channels are tapped concurrently because trainees are able to construct both visual and verbal mental representations, as well as make connections between those two representations. Moreover, because the visual and verbal processing channels operate under somewhat distinct processing demands, the trainee is better able to ingest more information than if all of the information were transmitted using a single modality. That is, when information is presented using a single modality, the information can quickly exceed the capacity of the processing channel. However, when information is distributed across multiple modalities, the information now has two potential avenues to enter the individual's mind. To provide an analogy, one might imagine the brain as an empty auditorium and bits of information as people. In trying to fill the auditorium with people, it is better to have two doorways instead of one,

because more people can enter the auditorium if there are multiple doorways. Similarly, in trying to fill the brain with information, it is better to have two avenues for delivering content rather than one.

Third, film-based stories can give the viewer a sense of the stress in a situation through the compression of time, the juxtaposition of events, and uncertainty about what might be happening on the screen and what might not be shown. When sitting in a classroom, it can be difficult to imagine the time pressure on a commander who is communicating, analyzing a situation, making decisions and providing interpersonal leadership, all in real-time. By unfolding events in quick succession, a film can help the viewer get a sense of the time urgency and uncertainty of an operation and how it relates to the interpersonal issues that arise in an organization under stress, issues that more experienced leaders seem to recognize and less experienced leaders may need to learn to recognize (Ben-Yoav Nobel et al., 2006). Additionally, various filming techniques can be used to induce mood and arouse emotion. For instance, psychologists have commonly used pictures, film, and music to induce mood (e.g., Dreisbach & Goschke, 2004; Gendolla & Krusken, 2002; Gendolla, Abele, & Krusken, 2001; Ottati & Isbell, 1996). These same mood induction techniques can be employed in filmed case studies to provide a more realistic and immersive learning experience.

Finally, film is more accessible to a broader audience than text. While text-based cases require a certain level of reading proficiency, literacy is less of an issue in watching a film (Kutner et al., 2005). Film also is advantageous in that rich detail can be presented in a more compact time frame than in a text narrative. What may take several pages to describe fully in text may be portrayed in a matter of minutes in film. This is because film is able to present different pieces of information concurrently, while text is limited to a sequential presentation of information. For example, film can simultaneously show explosions, nonverbal exchanges between individuals, and injuries within a matter of moments.

In sum, film is expected to yield many advantages over traditional paper-based instruction, particularly within the context of leader development interventions. The AXL system utilizes two filmed case studies, *Power Hungry* and *Tripwire*. The next sections describe the creation of these case studies in greater detail.

Power Hungry: An Afghanistan Context

In 2002, a project team from ICT worked with ARI and military subject matter experts (SMEs) to construct, author, and film an initial case about military leadership at the company level. The case is presented as a 13-minute fictional film entitled *Power Hungry*. The situation is a security mission for a food distribution operation in Afghanistan. In the scenario, a new company commander, Captain (CPT) Young, is seen engaging in a number of questionable leadership actions, which ultimately lead to the failure of the mission as a food riot erupts among the civilian population.

Power Hungry was the result of a creative process that integrated three goals: (1) realism of the scenario, (2) embedding of leadership tacit knowledge, and (3) the creation of a

compelling narrative. All three goals were balanced through an iterative creation process that began with real-world stories and ended with a fictional scenario.

To ensure realism, the leadership issues portrayed in the fictional scenario were based on the real-life experiences of U.S. Army captains who had recently completed their assignment as company commanders. A team from ICT and the United States Army Research Institute (ARI) interviewed ten captains – members of the United States Military Academy (USMA) Tactical Officer Education Program (TOEP) – over a two-day time period. Each interviewee was asked to tell stories – rather than their own generalizations – that illustrated the leadership challenges they experienced as a commander. The story elicitation process was not focused on specific leadership issues, allowing the interview subjects to freely share their experiences. In total, sixty-three stories were gathered and subsequently categorized by leadership issue. The interviewing approach adopted was similar to the tacit knowledge elicitation approach advocated by Sternberg et al. (2000).

Following interview data collection, a subset of the issues identified was selected as the basis for the leadership points that were interwoven with the *Power Hungry* scenario. There were a number of factors considered when choosing the leadership issues. One consideration was applicability of the issues to the greatest number of leaders. Another consideration was the suitability of the dilemma for the purposes of the narrative being constructed. Based on the stories gathered and input from SMEs in Afghan culture at the Center for Army Leadership (CAL), a humanitarian assistance scenario in Afghanistan was chosen as the operational setting for the scenario.

A professional Hollywood writer created the narrative and developed a film script. Elements of the most compelling stories gathered during the interview process were woven into the fictional narrative. Story elements that illustrated leadership points also were consciously interwoven. As the fictional narrative was created, an iterative process was used to identify additional opportunities to either weave in or reinforce various leadership issues through some of the characters. A final script was created and then used to shoot the film in a mountainous, desert-like area of Southern California. The script was reviewed by an SME from CAL. Scenes from *Power Hungry* are shown in Figure 1.



Figure 1. Scenes from *Power Hungry*.

In the film, CPT Young has been given the mission to run a food distribution operation in an area where food is in short supply. The company quickly runs into a number of obstacles, beginning with how to secure the site given the nature of the terrain – soft soil, located in a bowl surrounded by hills, and two possible entry points. It is necessary to create lanes with wire to keep control of the crowds that are expected to arrive soon. The company’s lieutenants begin rigging the site, but their plan does not satisfy the commander, who directs the executive officer to start over, giving minimal guidance. To further compound the situation, two warlords arrive at the site, offering to “help” with security. Turning away the warlords proves difficult, particularly due to conflicting advice from a Brigade Command Sergeant Major, CSM Pullman, who happens to be in the area escorting a media crew. CSM Pullman plays a significant but ambiguous role in the case. He offers advice that seems to suggest that he has inside knowledge about the Brigade Commander’s intent, but his advice runs counter to the commander’s instincts in several instances. At CSM Pullman’s suggestion, the commander meets with one of the two warlords to discuss the situation. Meanwhile the situation worsens as the executive officer is unable to prevent the food trucks from arriving at the site early. Ultimately the food distribution mission fails, with the warlords obtaining control over the food trucks. A text-based version of the *Power Hungry* story is available in the facilitator’s guide for *Power Hungry* (Zbylut & Ward, 2004b).

The mission in the scenario was selected for its relevance to the Army’s contemporary operating environment. Since the primary focus of the case study was for use in leadership development, however, the scenario experience had to be designed to balance tactical context with interpersonal issues commonly encountered in deployment environments. Given Soldier proficiency in tactics, there was a concern that the students might focus primarily on the tactical problems confronting the commander (e.g., how to best provide site security, where to deploy troops). While these are crucial issues, the project goal was to develop a richer understanding of the situation that included consideration of how leadership issues can significantly impact these tactical elements. The tactical situation, while important, was actually meant to provide the context for discussing the interpersonal and cultural factors that led to failure in the mission. Thus, special attention is given in the film to the relationships between the company commander and his subordinates, the local warlord, and a command sergeant major from brigade headquarters.

Leadership Issues in *Power Hungry*

Woven into the narrative fabric of *Power Hungry* are a number of leadership issues that contributed to tactical failure in the mission. These issues emerged from interviews with deployed captains, as well as Army leadership doctrine available at the time, FM 22-100. These issues are classified into the following overlapping categories and are described in greater detail in the *Power Hungry Instructor’s Manual* (Zbylut & Ward, 2004b):

1. Communication
2. Mission Clarity and Shared Vision of Intent
3. Providing Guidance
4. Command Influence
5. Shaping Command Climate
6. Model of Command
7. Respecting the Experience of NCOs
8. Cultural Awareness

Communication, Mission Clarity, and Sharing a Vision of Intent

Several communication issues were embedded into the film. CPT Young's leadership style was abrasive, which contributed to poor communication throughout the story. Moreover, CPT Young was not an effective transmitter of information, nor did he listen effectively to his Soldiers' concerns. However, the first breakdown in communication in *Power Hungry* actually began prior to CPT Young's arrival at the food distribution site. During the interview process, captains emphasized the importance of understanding the commander's intent and how failure to understand intent impacted mission success. Thus, *Power Hungry* begins with CPT Young beginning the mission with an unclear understanding of his commander's intent. As the situation in *Power Hungry* unfolds, it becomes apparent that CPT Young did not fully understand his company's mission. Initially, CPT Young believed that the mission was to provide security for a food distribution operation. However, as CPT Young interacted more with CSM Pullman, his concept of the mission begins to shift from one of providing security to one of building relationships with the locals. As CPT Young's concept of the mission changes, his goals and priorities change, resulting in an inadequate use of human and tactical resources and wreaking havoc on the mission. Moreover, CPT Young's incoherent vision for the mission contributed to confusion on the part of his subordinates, because he could not convey the commander's intent.

Providing Guidance to Inexperienced Soldiers and Respecting the Experience of NCOs

Leaders must maintain a balance between micromanaging and providing enough guidance and supervision for Soldiers to complete tasks effectively. One lesson that emerged from interviews with captains was that, while an authoritative style of leadership can be appropriate for combat situations where critical decisions must be made and executed immediately, sometimes it is useful to find ways of getting subordinates to own an idea through dialogue and persuasion. In *Power Hungry*, CPT Young's guidance to the Executive Officer (XO), first lieutenant (1LT) Perez, was to "think outside the box" and stop asking questions about things he does not know. This particular part of the narrative is rooted in one former commander's complaint about lieutenants who wanted to be told everything about what to do and how to do it. In *Power Hungry* 1LT Perez does not ask to be micromanaged; he simply asks for guidance that he needs to do his job. CPT Young, rather than seizing the opportunity to coach his subordinates, reacts negatively to 1LT Perez's request for direction, shutting down future lines of communication. In turn, 1LT Perez models CPT Young when one of the platoon leaders poses a similar question to him, thereby perpetuating the poor command climate initiated by CPT Young.

While CPT Young failed to provide his inexperienced Soldiers the guidance they needed to perform their tasks, CPT Young severely underutilized his experienced human resources. Specifically, CPT Young failed to capitalize on the experience of his first sergeant, 1SG Jones. 1SG Jones could have been invaluable to CPT in terms of his knowledge of the Soldiers in the company, advice on how to deal with the situation, and expertise in establishing site security. CPT Young also failed to effectively use the presence of a command sergeant major (CSM) on his site to his advantage.

Upward Influence and Command Influence

Leadership is defined as an influence process, requiring influence down the chain of command, outside the chain of command, and up the chain of command. Thus, while one challenge of command is how to influence one's subordinates, a complementary issue is how to influence one's superiors. In *Power Hungry*, the failure to influence upward is illustrated both within the company, between 1LT Perez and CPT Young, and between CPT Young and the battalion commander. In *Power Hungry*, the failure to influence upward occurs for a few different reasons. First, the command climate within the battalion discouraged questions and requests for clarification, resulting in a ripple effect on the lower levels. When leaders discourage their subordinates' requests for help (e.g., through a lack of support, through overt messages to just "deal with" the situation), subordinates are less likely to engage in upward influence attempts. A second reason why upward influence attempts are discouraged occurs when a leader does not want his or her superior to think that he or she does not have control of a situation. This may be a matter of pride or not knowing when to ask for help. In *Power Hungry*, CPT Young fails to ask for help when warlords arrive on site, even though he should have. Instead CPT Young appeals to the Command Sergeant Major to "pull some strings" with his brigade commander, to find out more about one of the warlords. The conventional wisdom is that if CPT Young thought he was in trouble, he should have appealed to his higher headquarters directly and attempted to persuade his boss that the situation was deteriorating and he needed help before the situation escalated.

Another influence issue embedded within *Power Hungry* is the issue of command influence. Within the *Power Hungry* scenario, CPT Young is the formally designated authority on the ground. However, within the scenario there is a subtle power struggle between the Captain and the Command Sergeant Major. Because CPT Young does not have a firm understanding of the situation or the intent for the mission, he is intimidated and distracted by the Brigade CSM's presence. CPT Young allows the Brigade CSM to shape his understanding of the mission, which is geared more toward maintaining positive relations with the local population rather than site security. This contributed to CPT Young's losing focus on securing the site before the food convoy's arrival.

Model of Command and Command Climate

Leaders serve as role models for how their Soldiers should behave. Thus, Army leaders must embody Army values, exude warrior ethos, and be an exemplar of effective military leadership. CPT Young made multiple mistakes as a leader, such as his lack of emotional restraint, poor decision making, and poor communication.

When leaders are poor role models, it can have a negative impact on the command climate throughout the ranks. One of the lessons identified in the interviews with U.S. Army captains was that when a commander uses an overbearing commanding style, it has a ripple effect through the organization. If subordinates feel like they have been "shut down" and are not being listened to, they may stop taking the initiative that could compensate for weaknesses in a commander's plan. To illustrate how an overbearing style of leadership can affect motivation and initiative in a unit, the CPT Young character was created. From the beginning of the

scenario, CPT Young establishes that he does not encourage questions, rebuking the executive officer (XO), 1LT Perez, for asking for clarification. Instead, the XO is commanded to “think outside the box” and to figure things out for himself. The command climate created by these simple statements contributed to the eventual demise of the mission by discouraging subordinates from asking questions when they were confused. To emphasize the importance of leader behavior in command climate, 1LT Perez mimics CPT Young’s behavior when interacting with a platoon leader who asks him a question about the security plan. At the same time, CPT Young did not show respect for the experience of some of his key personnel, especially the first sergeant, who ultimately should have been establishing the security around the site rather than leaving it to 2LT Wychowski, who was unclear about what was being asked of him.

Cultural Awareness

Current leadership doctrine, FM 6-22, indicates the importance of cultural awareness. Cultural awareness (or lack thereof) plays a central role in *Power Hungry*, because much of the current operating environment requires that Soldiers at all levels be culturally savvy. In *Power Hungry*, CPT Young must deal with uninvited warlords on his distribution site, but he is unsure of how to proceed. CPT Young’s primary mistake, however, was in underestimating the sophistication of the enemy and in failing to comprehend the enemy’s motivation for arriving on the site. CPT Young’s lack of cultural awareness contributed directly to the outcome of the food distribution mission.

Power Hungry is not focused on providing leaders with regional expertise about a local culture. Instead, the cultural teaching objective in *Power Hungry* is to help leaders build an understanding of how cultural issues are interrelated with security and tactical issues. Thus, while one aspect of *Power Hungry* deals with the company’s lack of cultural understanding and how that impacted the mission, another aspect of *Power Hungry* deals with the warlord’s cultural understanding of Americans and how that cultural knowledge allowed the Afghans to execute their plan.

When *Power Hungry* was first developed, the leadership doctrine available at that time was FM 22-100. Since that time, the Army has published new leadership doctrine, which describes leadership as a set of higher order competencies. Table 2 indicates how the themes embedded in *Power Hungry* are related to competencies outlined in FM 6-22.

Table 2
Relationship of *Power Hungry* Themes to FM 6-22

Leadership Competencies (FM 6-22)	TKML (Sternberg et al., 2000)	Interpersonal Performance (Carpenter & Wisecarver, 2004)	<i>Power Hungry</i> Themes
<p>Leads Others: This competency focuses on motivating, inspiring, and influencing others, particularly subordinates. This competency includes behaviors such as: establishing clear intent and vision, using appropriate influence techniques to energize others, maintaining and enforcing professional standards, and balancing requirements of mission with follower welfare.</p>	<ul style="list-style-type: none"> • Establishing Credibility • Motivating Subordinates • Dealing with Poor Performers • Taking Care of Soldiers 	<ul style="list-style-type: none"> • Managing Perceptions • Rewarding Others • Influencing Others 	<ul style="list-style-type: none"> • Mission Clarity and Shared Vision of Intent • Communication • Command Influence
<p><i>Extends Influence beyond Chain of Command:</i> Leaders sometimes need to influence individuals who are not their subordinates. This competency focuses on influence beyond the leader's traditional line of authority (e.g., multinational and interagency situations). This competency includes behaviors such as: understanding the sphere, means, and limits of influence; building trust; negotiating and resolving conflict, and building and maintaining alliances.</p>	<ul style="list-style-type: none"> • Establishing Credibility • Establishing Trust • Influencing the Boss • Cooperating with Others 	<ul style="list-style-type: none"> • Managing Perceptions • Influencing Others 	<ul style="list-style-type: none"> • Cultural Awareness
<p><i>Leads by Example:</i> Leaders serve as role models for others. This competency includes behaviors such as: modeling Army values, leading with confidence in adverse situations, and seeking diverse ideas and points of view.</p>		<ul style="list-style-type: none"> • Role Modeling 	<ul style="list-style-type: none"> • Model of Command • Respect for Experience
<p><i>Communicates:</i> Communication requires that leaders convey ideas clearly, as well as listen to others. This competency includes behaviors such as: active listening, determining appropriate information-sharing strategies, employing effective verbal and nonverbal communication strategies, ensuring shared understanding, presenting recommendations so that others understand advantages, and being sensitive to cultural issues.</p>	<ul style="list-style-type: none"> • Communicating 	<ul style="list-style-type: none"> • Informing • Gathering Information 	<ul style="list-style-type: none"> • Respect for Experience • Cultural Awareness • Communication

Leadership Competencies (FM 6-22)	TKML (Sternberg et al., 2000)	Interpersonal Performance (Carpenter & Wisecarver, 2004)	<i>Power Hungry</i> Themes
<p><i>Creates a Positive Environment:</i> This competency targets the leader’s skill in building and maintaining a positive and functional work climate and improving the organization as a whole. Leader behaviors in this competency include: fostering teamwork, cohesion, cooperation, and loyalty; encouraging initiative and innovation, creating a learning environment, encouraging open communications, expressing concern for employee well-being, anticipating people’s on-the-job needs, and setting and maintaining high expectations for individuals and teams.</p>	<ul style="list-style-type: none"> • Cooperating with Others • Taking Care of Soldiers • Establishing Trust • Managing Organizational Change • Protecting the Organization 	<ul style="list-style-type: none"> • Managing Others/Relationships • Coordinating • Helping Others • Demonstrating Courtesy • Socializing • Adapting to Social Environment 	<ul style="list-style-type: none"> • Model of Command • Command Climate
<p><i>Develops Others:</i> Leaders help their subordinates to develop the knowledge, skills, and abilities to perform effectively in this job, as well as the next. This competency includes leader behaviors such as: assessing current developmental needs of others; fostering job development and job enrichment; counseling, coaching and mentoring; and supporting institutional-based development.</p>	<ul style="list-style-type: none"> • Developing Subordinates 	<ul style="list-style-type: none"> • Training and Developing 	<ul style="list-style-type: none"> • Providing Guidance
<p><i>Gets Results:</i> This competency focuses on how well the leader accomplishes team, mission, and organizational objectives. This competency includes behaviors such as: identifying individual/group capabilities and task commitment, clarifying roles, identifying and managing resources, rewarding good performance, and adjusting to external influences on the mission or organization.</p>	<ul style="list-style-type: none"> • Motivating Subordinates • Directing and Supervising Subordinates • Dealing with Poor Performers 	<ul style="list-style-type: none"> • Rewarding Others • Managing Others/Relationships • Controlling/Regulating Activities of Others • Adapting to Social Environment • Formal Staffing • Informal Staffing 	<ul style="list-style-type: none"> • Providing Guidance • Cultural Awareness • Respect for Experience
<p><i>Prepares Self:</i> Leaders high in this competency take action to ensure that they are mentally, physically, and psychologically fit to perform their duties. This competency also includes a self-awareness component, as well as the following behaviors: evaluating and incorporating feedback from others; expanding technical knowledge, tactical knowledge, and interpersonal capabilities, and maintaining cultural and geopolitical awareness.</p>	<ul style="list-style-type: none"> • Managing the Self 		

Note. For a complete description of leadership competencies, the reader is referred to FM 6-22. Bolded portions of competency descriptions indicate doctrinal components embedded in the *Power Hungry* film.

Tripwire: An Iraq Context

In 2004, ICT and ARI began the process of creating a second AXL case, *Tripwire*. The approach and the final goal for *Tripwire* was similar to the approach used to develop *Power Hungry*. To develop the *Power Hungry* case, stories were collected from former company commanders and issues and situations from their accounts were woven into a fictional narrative. In retrospect, the approach, while effective, was very much a bottom-up process. Also, the approach was a similar approach to the one taken by Sternberg et al. (2000) and others to create an inventory or set of leadership competencies based on interviews with leaders. This approach was again utilized, but a more top-down theoretical view of the case creation process also was adopted. Specifically, there was concern that allowing themes to emerge from a limited number of interviews would result in an inadequate representation of the leadership content domain. Additionally, one goal of the AXL project was to begin the creation of a “case library” that would ultimately encompass the full range of leadership skills, so the overlay of a theoretical taxonomy was helpful in identifying other leadership issues that might have been less prevalent in the *Power Hungry* scenario. Although a number of different concept taxonomies were considered, the tacit knowledge categories identified by Sternberg et al. (2000) was ultimately selected because the taxonomy was based on data collected from Army leaders and the goal of the AXL system was to facilitate the acquisition of tacit knowledge. This taxonomy, as well as new officer interviews, was used to guide the leadership issues embedded in *Tripwire*.

Like *Power Hungry*, *Tripwire* is a brief fictional film portraying leadership at the company level. Like *Power Hungry*, establishing security is again a primary mission concern, but in *Tripwire* the goal of security is to ensure the safe arrival of an Iraqi official for a meeting in an Iraqi town. The security situation is complicated by the presence of several possible improvised explosive devices (IEDs). Although the captain in *Tripwire* is not as interpersonally abrasive as the captain in *Power Hungry*, CPT Holston of *Tripwire* makes a number of questionable leadership decisions, including failing to listen to the advice of his Soldiers and allowing himself to become dehydrated. Like *Power Hungry*, the scenario ends with mission failure and an engagement between the U.S. Army and local insurgents.

Similar to *Power Hungry*, *Tripwire* was inspired by the real-life experiences of captains. ICT and the Hollywood screenwriter interviewed nine captains at USMA (different from the captains interviewed for *Power Hungry*) who had recently completed their assignments as company commanders. A number of them had deployment experience in the Middle East. The captains were once again asked to share the stories of their leadership challenges, resulting in forty-four stories gathered. Members of the USMA Behavioral Science and Leadership faculty provided subject matter expertise regarding the leadership issues portrayed in *Tripwire*.

One compelling issue identified through the interviews and by the subject matter experts (SMEs) was the handling of IEDs. IED procedures, detection, and safe detonation were all factors in the tactical approach to IEDs, but leadership issues related to the handling of IEDs also emerged. Specifically, IEDs required leaders to consider the issue of balancing the mission with troop safety, and the *Tripwire* script was developed to include opportunities for students to explore this issue in greater detail. In order to ensure the realism of the depiction of IED threats

(real and perceived), members of the U.S. Army IED Task Force provided input to the story and script.

Tripwire begins with an Army battery in the midst of relieving a Marine company. The battery has begun patrols and encounters a suspicious book bag by the side of a road. A young man is detained and claims that the bag only contains prayer books. Despite warnings from the interpreter that the bag contains a Qur'an, CPT Holston orders the bag to be shot rather than wait for an Explosives Ordnance Disposal (EOD) team to arrive. CPT Holston's decision to shoot the bag proves to be in error, with the bag indeed holding religious books. The battery encounters further problems during the scenario, including the death of an interpreter, insurgent activity, and the XO receiving news that his fiancé is pregnant with another man's child. A text-based version of the *Tripwire* story can be found in an instructor's guide for facilitating discussion of *Tripwire* (Metcalf & Zbylut, 2007).

Leadership Issues in *Tripwire*

Like *Power Hungry*, a number of leadership issues are embedded into the narrative fabric of *Tripwire*. *Tripwire* depicts an operational scenario that ends in failure, but also highlights the potential causes that underlie the failure. The interpersonal skills identified in the Tacit Knowledge for Military Leaders framework were used to guide the leadership issues embedded in *Tripwire*, as was SME input. Four leadership issues in particular were emphasized in *Tripwire*: balancing mission and troops, taking care of Soldiers, establishing trust, and cultural awareness. Other interpersonal elements of the TKML framework and *Power Hungry* were incorporated to a smaller extent in the film: establishing credibility, cooperating with others, respect for NCO experience, communicating, directing and supervising subordinates, and managing the self. Table 3 indicates how the issues of *Tripwire* map onto current Army leadership doctrine and the TKML framework.

Balancing Mission and Troops

Leaders must constantly balance the need to accomplish the mission and take care of Soldiers. Sometimes the two goals conflict, and leaders must be able to determine the importance of each goal. In *Tripwire*, CPT Holston faces a particularly challenging situation by needing to balance his overall mission to maintain the security of a town, his immediate mission to provide security for an Iraqi official who will be visiting the town, and the welfare of his Soldiers. It is revealed during the scenario that CPT Holston previously lost Soldiers to IEDs, experiences that seem to weigh on him. As a series of possible IED threats emerge during preparations for the arrival of the Iraqi official, CPT Holston appears to be more focused on micromanaging the IED threats than focusing his effort on his primary mission of securing the official. Moreover, as incidents of violence break out in the town, CPT Holston decides to take a more passive stance to protect his Soldiers from risk, even though his subordinates challenge him on his prioritization.

Table 3
Relationship of *Tripwire* Themes to FM 6-22

Leadership Competencies (FM 6-22)	TKML (Sternberg et al.)	Interpersonal Performance (Carpenter & Wisecarver)	<i>Power Hungry</i> Themes	<i>Tripwire</i> Themes
<p>Leads Others: This competency focuses on motivating, inspiring, and influencing others, particularly subordinates. This competency includes behaviors such as: establishing clear intent and vision, using appropriate influence techniques to energize others, maintaining and enforcing professional standards, and balancing requirements of mission with follower welfare.</p>	<ul style="list-style-type: none"> • Establishing Credibility • Motivating Subordinates • Dealing with Poor Performers • Taking Care of Soldiers 	<ul style="list-style-type: none"> • Managing Perceptions • Rewarding Others • Influencing Others 	<ul style="list-style-type: none"> • Mission Clarity and Shared Vision of Intent • Communication • Command Influence 	<ul style="list-style-type: none"> • Taking Care of Soldiers • Establishing Credibility • Balancing Mission with Troops
<p><i>Extends Influence beyond Chain of Command:</i> Leaders sometimes need to influence individuals who are not their subordinates. This competency focuses on influence beyond the leader's traditional line of authority (e.g., multinational and interagency situations). This competency includes behaviors such as: understanding the sphere, means, and limits of influence; building trust; negotiating and resolving conflict, and building and maintaining alliances.</p>	<ul style="list-style-type: none"> • Establishing Credibility • Establishing Trust • Influencing the Boss • Cooperating with Others 	<ul style="list-style-type: none"> • Managing Perceptions • Influencing Others 	<ul style="list-style-type: none"> • Cultural Awareness • Upward Influence 	<ul style="list-style-type: none"> • Establishing Trust • Establishing Credibility • Cooperating with Others • Cultural Awareness
<p><i>Leads by Example:</i> Leaders serve as role models for others. This competency includes behaviors such as: modeling Army values, leading with confidence in adverse situations, and seeking diverse ideas and points of view.</p>		<ul style="list-style-type: none"> • Role Modeling 	<ul style="list-style-type: none"> • Model of Command • Respect for Experience 	<ul style="list-style-type: none"> • Respect for Experience
<p><i>Communicates:</i> Communication requires that leaders convey ideas clearly, as well as listen to others. This competency includes behaviors such as: active listening, determining appropriate information-sharing strategies, employing effective verbal and nonverbal communication strategies, ensuring shared understanding, presenting recommendations so that others understand advantages, and being sensitive to cultural issues.</p>	<ul style="list-style-type: none"> • Communicating 	<ul style="list-style-type: none"> • Informing • Gathering Information 	<ul style="list-style-type: none"> • Respect for Experience • Cultural Awareness • Communication 	<ul style="list-style-type: none"> • Communicating • Cultural Awareness • Respect for Experience

Leadership Competencies (FM 6-22)	TKML (Sternberg et al.)	Interpersonal Performance (Carpenter & Wisecarver)	Power Hungry Themes	Tripwire Themes
<p><i>Creates a Positive Environment:</i> This competency targets the leader's skill in building and maintaining a positive and functional work climate and improving the organization as a whole. Leader behaviors in this competency include: fostering teamwork, cohesion, cooperation, and loyalty; encouraging initiative and innovation, creating a learning environment, encouraging open communications, expressing concern for employee well-being, anticipating people's on-the-job needs, and setting and maintaining high expectations for individuals and teams.</p>	<ul style="list-style-type: none"> • Cooperating with Others • Taking Care of Soldiers • Establishing Trust • Managing Organizational Change • Protecting the Organization 	<ul style="list-style-type: none"> • Managing Others/Relationships • Coordinating • Helping Others • Demonstrating Courtesy • Socializing • Adapting to Social Environment 	<ul style="list-style-type: none"> • Model of Command • Command Climate 	<ul style="list-style-type: none"> • Establishing Trust • Taking Care of Soldiers • Cooperating with Others
<p><i>Develops Others:</i> Leaders help their subordinates to develop the knowledge, skills, and abilities to perform effectively in this job, as well as the next. This competency includes leader behaviors such as: assessing current developmental needs of others; fostering job development and job enrichment; counseling, coaching and mentoring; and supporting institutional-based development.</p>	<ul style="list-style-type: none"> • Developing Subordinates 	<ul style="list-style-type: none"> • Training and Developing 	<ul style="list-style-type: none"> • Providing Guidance 	
<p><i>Gets Results:</i> This competency focuses on how well the leader accomplishes team, mission, and organizational objectives. This competency includes behaviors such as: identifying individual/group capabilities and task commitment, clarifying roles, identifying and managing resources, rewarding good performance, and adjusting to external influences on the mission or organization.</p>	<ul style="list-style-type: none"> • Motivating Subordinates • Directing and Supervising Subordinates • Dealing with Poor Performers 	<ul style="list-style-type: none"> • Rewarding Others • Managing Others/Relationships • Controlling/Regulating Activities of Others • Adapting to Social Environment • Formal Staffing • Informal Staffing 	<ul style="list-style-type: none"> • Providing Guidance • Cultural Awareness • Respect for Experience 	<ul style="list-style-type: none"> • Directing and Supervising Subordinates • Cultural Awareness • Respect for Experience
<p><i>Prepares Self:</i> Leaders high in this competency take action to ensure that they are mentally, physically, and psychologically fit to perform their duties. This competency also includes a self-awareness component, as well as the following behaviors: evaluating and incorporating feedback from others; expanding technical knowledge, tactical knowledge, and interpersonal capabilities, and maintaining cultural and geopolitical awareness.</p>	<ul style="list-style-type: none"> • Managing the Self 			<ul style="list-style-type: none"> • Managing the Self

Note. For a complete description of leadership competencies, the reader is referred to FM 6-22. Bolded portions of competency descriptions indicate doctrinal components embedded in the *Tripwire* film.

Taking Care of Soldiers

Taking care of Soldiers requires that a leader maintains awareness of the Soldier's current state of mind, since a Soldier's mental and emotional state can affect mission outcomes, group dynamics, and unit cohesion. While it may not be physically possible to constantly monitor the well-being of subordinates, CPT Holston should have been more aware of the state of key personnel. He failed to recognize a number of warning signs about the emotional state of his XO, 1LT Porter, who recently received a breakup letter from his fiancé. 1LT Porter seems distracted during operations and has compromised task performance. Additionally, in *Tripwire* 1SG Morino is aware of 1LT Porter's personal problems and fails to take action.

Establishing Trust

Trust is a critical ingredient for unit cohesion: trust of one's comrades, trust in the unit's leaders, trust in the Army, and trust in the moral dimension of the mission (Wong et al., 2003). Although CPT Holston leads his battery, his subordinates disagree with his ideas in a slightly disrespectful manner throughout the scenario. At one point after being questioned about his passive stance, CPT Holston says explicitly that they just need to trust him and accept what he says. It does not appear that his subordinates actually do trust his judgment, however, and in this situation they may be correct.

Cultural Awareness

Cultural awareness is a critical skill for every warfighter to have, especially in today's contemporary operating environment (Petraeus, 2006). The challenge is that there is no single set of rules or expertise for cultural awareness. FM 6-22 indicates that "culture consists of shared beliefs, values, and assumptions about what is important" (p. 6-7). Understanding a culture and the people that one encounters in a culture is a considerable interpersonal skill that can have a significant impact on the outcome of a situation. In *Tripwire*, the local situation greatly affects the battery and the outcome of the scenario. A lack of a common understanding of the local situation and how to handle it becomes an important point of contention between CPT Holston and his command team. CPT Holston relies in part on his previous experience in a different town, but he finds that his past experiences are not similar to the situation that he experiences in *Tripwire*.

Summary of AXL.Net cases

Two filmed cases were created for the AXL project: *Power Hungry* and *Tripwire*. Interviews with captains were used to determine the leadership issues and challenges embedded in the *Power Hungry* case. For *Tripwire*, captains again were interviewed, but Sternberg et al.'s (2000) TKML framework was used to identify additional leadership topics for inclusion in the case study. Each case study is paired with an instructor's manual for facilitating discussion of the various leadership themes in a traditional classroom environment (Metcalf & Zbylut, 2007; Zbylut & Ward, 2004b). Advances in technology and online training, however, afford opportunities for exploring alternative delivery mechanisms for case method instruction. The

next sections describe the evolution of the AXL.Net system, beginning with an early software prototype called Think Like a Commander—Excellence in Leadership (TLAC-XL) and followed by a description of the current AXL.Net system.

THINK LIKE A COMMANDER-EXCELLENCE IN LEADERSHIP (TLAC-XL)

In late 2002, ICT developed pilot software for a proof-of-concept system called Think Like a Commander – Excellence in Leadership (TLAC-XL). TLAC-XL was motivated by a recognition that leader development education, including classes using the case method teaching approach, would be well-served by content and tools that augment traditional classroom teaching and discussion. Classroom discussion, while effective, requires coordination and expense to bring the group together. Classroom time is also limited. Soldiers in the current operating environment receive a significant and varied amount of teaching while in garrison, with leader development-related lessons being only one part of the curriculum. In non-military settings, education and professional development time is also limited and expensive.

Previous research has focused on addressing some of these challenges. Quite a bit of research has focused on the creation of instructional systems with intelligent tutors and/or natural dialogue functions (e.g., Graesser et al., 2003; Graesser et al., 2004; Graesser, Person, & Hu, 2002; Graesser, Wiemer-Hastings, Wiemer-Hastings, & Kruez, 1999; Hill & Johnson, 1993a, 1993b; Hill & Johnson 1994). At least two computer-based applications have been applied to the *Think Like a Commander* (TLAC) framework, whose instructional concept originally served as a foundation for the instructional approach in TLAC-XL. TLAC was developed by the Army Research Institute and the faculty of the U.S. Army Command and General Staff College and uses eight basic questions to develop a leader's thinking in a tactical decision-making situation (Lussier & Shadrick, 2003; Shadrick & Lussier, 2004). These eight questions tap eight dimensions identified by experts as important in tactical thinking: mission, enemy, terrain, assets, timing, bigger picture (context), visualize the battlefield, and contingency plans. In its original conceptualization, TLAC consisted of 8 vignettes: four offensive scenarios and four defensive scenarios. Scenario content was delivered in a multimedia format, consisting of maps, troop movements and locations, and other relevant tactical descriptors. While vignettes were delivered via computer, an instructor would facilitate student analysis of each vignette. The instructional process relied primarily on the concepts of deliberate practice and scaffolding, with the instructor presenting highly structured guidance to students on how to think about the first scenario. Over the course of the eight scenarios, the instructor provides less and less guidance, until finally students are able to think about the scenarios much in the same way as a tactical expert with minimal prompting from an instructor.

The Automated Tutoring Environment for Command (ATEC) was designed to be a web-based environment for delivering existing TLAC materials and replacing the classroom learning experience with an intelligent tutoring system (Ryder, DePaul, Zachary, & Iordanov, 2002). The approach leveraged the idea of deliberate practice to habituate the TLAC analytical approach. ATEC delivered existing TLAC materials including a short vignette, operation orders, and maps, as well as limited tutoring where the intelligent tutor prompted the student with questions similar to a human instructor and used a keyword spotting natural language understanding system to

provide follow-up and feedback. The system modeled the knowledge that the students *should* demonstrate (as opposed to the knowledge the student *did* demonstrate) with the intent of providing feedback and follow-up questions based on whether the student reached the expected answer or knowledge. However, the proof-of-concept system did not include any dialogue management, and the results suggested the need for a sophisticated means of tracking the state of the student in the deliberate practice situation. Given the challenging nature of such a natural language understanding effort (still an open research question), these results suggest that a more open-ended form of tutoring with a focus on reflection, rather than achieving a “schoolhouse” answer, is more feasible.

Another computer-based environment for teaching TLAC concepts was the Command Mentoring (ComMentor) intelligent tutoring system (Domeshek, 2002). The intelligent tutoring system modeled Socratic techniques for facilitating learning. ComMentor centered the learning experience on a tactical decision group presented through maps, force structures, and text descriptions for situational awareness. The student takes actions within the system by inputting text. The system uses natural language understanding to parse their actions and insert probing questions for students to describe their reasoning, reflect on possible outcomes, and, at the end, reflect on the actions taken. Domeshek (2002) presented a combined domain model and scenario model and indicated that the Socratic dialogue with a combination of knowledge about the tactical elements available and the tactical situation in the scenario were compelling. Domeshek’s report also suggested that presentation of related stories would be useful for illustrating teaching points.

TLAC-XL was designed to take some of the instructional principles successfully employed by TLAC in improving tactical thinking and apply those principles to the domain of interpersonal leadership and cultural awareness. The original TLAC-XL concept was to provide a structured, computer-based learning experience for company commanders analyzing the *Power Hungry* case using a synthetic mentor. As with previously described systems, the TLAC-XL design started with the TLAC framework, which is targeted at company-grade officers. TLAC-XL, however, introduced another factor beyond those identified in TLAC: interpersonal leadership issues.

The initial goal of the TLAC-XL system was two-fold: to support the habituation of the TLAC framework and to support student understanding of the leadership issues that impact the tactical issues addressed by TLAC. The system design used the TLAC framework as the overarching model for student analysis. All eight topics in the TLAC framework were covered in TLAC-XL. Additionally, six leadership issues were covered in TLAC-XL: mission clarity, shared vision of intent, command influence, model of command, cultural awareness, and employing the experience of NCOs. The TLAC-XL issues were overlaid onto the TLAC tactical issues.

While TLAC consisted of 8 tactical vignettes, the pilot version of TLAC-XL only consisted of one case study, *Power Hungry*. Only one case study was included at the time because initial research was geared toward testing the software and general instructional approach prior to investing significant time and resources in developing multiple case studies. TLAC-XL consisted primarily of two instructional phases, presentation of *Power Hungry*

followed by computer-facilitated analysis of TLAC themes and leadership issues in the film.

An additional feature of TLAC-XL was the ability for students to interview characters from the film to discover more information about the tactical and leadership elements embedded in the film. Each character in the film represented a specific TLAC topic and leadership issue, and students would be prompted periodically to type in questions to the characters to find out more information about the scenario. The eight TLAC issues, the associated TLAC-XL leadership issues, and the associated character interviews explored through TLAC-XL are described in Table 4.

Guiding Questions and the Animated Synthetic Mentor

The TLAC-XL learning experience begins by presenting the student with the *Power Hungry* case within the system. After the film ends, a synthetic mentor is then used to guide students through a series of open-ended questions to facilitate analysis of *Power Hungry*. In a traditional classroom context, feedback or guidance from an instructor or tutor can increase learning. In a distance-learning context where there is no human instructor or peers, it is important to provide some form of guidance and feedback to the student who may not have the benefit of others' points of view. TLAC-XL attempted to address this need by providing automated feedback and guidance through a synthetic mentor or intelligent tutor. Research in the area of multimedia learning suggests that an animated pedagogical agent can be effective in assisting students learn in computer-based instructional environments (Atkinson, 2002; Mayer, Sobko, & Mautone, 2003; Moreno, Mayer, Spires, & Lester, 2001).

The synthetic mentor begins by introducing the first TLAC issue – mission – as the topic for consideration. The synthetic mentor then asks the student the first question, “What is the mission,” which is similar to the first question posed in TLAC exercises. The student types his or her response, using free text. The synthetic mentor then asks the second question relating to mission (Again similar to the instructor question posed in TLAC exercises): “What was the commander’s intent?” The student again types in a free text, written response. After reflecting on a series of questions around an issue, the student is prompted to interview one of the characters from the film in order to explore the issue in greater detail.

After completing the questions pertaining to the leadership issue and interviewing the character, the mentor prompts the student to synthesize his or her thoughts around the issue just analyzed. The mentor asks a reflection or synthesis question, and the student types in a short answer using free text. The system applies natural language understanding techniques to determine whether the response is correct, and the system provides feedback about whether the answer is correct or incorrect, as well as the system’s own synthesis of the issue (i.e., the “take away” message from the analysis of this particular TLAC-XL issue). The student then moves on to the next issue and restarts the exercise cycle, again facilitated by the synthetic mentor.

Table 4
TLAC Questions Used to Analyze *Power Hungry* and the TLAC-XL Leadership Issues Associated with Each TLAC Topic

TLAC Issues	TLAC-XL Leadership Issues and Associated Character Interviews
<p>1. Mission</p> <p>a. What is the mission?</p> <p>b. The commander's intent?</p>	<ul style="list-style-type: none"> • Command influence • Unity of command/shared vision of intent <p>Interview: CSM Pullman influenced CPT Young's concept of the mission.</p> <ul style="list-style-type: none"> • Mission clarity • Communication <p>Interview: CPT Young does not have a clear understanding of the mission.</p>
<p>2. Enemy</p> <p>a. What can the enemy do?</p> <p>b. How will I know? (indicators)</p> <p>c. How is that information linked to decisions?</p>	<ul style="list-style-type: none"> • Cultural awareness • Communication <p>Interview: Omar the warlord who CPT Young does not know how to handle.</p>
<p>3. Consider effects of the terrain</p> <p>a. What do you know about the terrain or the geography?</p> <p>b. How can you use it to your advantage?</p> <p>c. How can it be a disadvantage?</p>	<ul style="list-style-type: none"> • Model of command • Developing subordinates (role modeling) • Directing and supervising subordinates • Communication. <p>Interview: 2LT Wychowski sees a command style replicated through the ranks.</p>
<p>4. Use all assets available</p> <p>a. What assets do you have available that you can use?</p> <p>b. What assets does higher HQ have?</p> <p>c. What are the second & third order effects of using other assets?</p>	<ul style="list-style-type: none"> • Employing NCO expertise • Motivation • Trust • Directing and supervising subordinates • Communication <p>Interview: 1SG Jones' experience is not recognized as an asset.</p>
<p>5. Consider timing</p> <p>a. What is the first decision we need to make?</p> <p>b. How much time do we have to make a decision?</p> <p>c. How critical is time in this situation?</p>	<ul style="list-style-type: none"> • Unity of command/shared vision of intent • Communication (shared vision of intent) • Directing and supervising subordinates (command climate) <p>Interview: 1LT Perez does not understand the mission and intent.</p>
<p>6. See the bigger picture</p> <p>a. How does our operation support the bigger plan?</p> <p>b. Given this problem, what are the implications to the tactical situation?</p> <p>c. Are there strategic or operational implications?</p>	<p>No leadership questions. However, TLAC-XL asks scenario-related questions pertaining to these issues.</p>
<p>7. Visualize the battlefield</p> <p>a. How do we visualize the battlefield right now in terms of time, space, and forces?</p> <p>b. What will the battlespace look like in 30 minutes? 1 hour? Longer?</p> <p>c. How do you see the end state? Describe it.</p> <p>d. How can this situation get worse?</p>	
<p>8. Consider contingencies and remain flexible</p> <p>a. What can we do in our planning and preparation to avoid or mitigate this situation?</p> <p>b. What branches or sequels should we consider?</p> <p>c. What information requirements do we have for those branches?</p>	

To support the conversational interactions with the synthetic mentor, we developed an animated character (shown in Figure 2 in the lower right box). We attempted to create a virtual mentor that was lifelike and engaging to the students. Because the *Power Hungry* case was filmed with live actors rather than created through animation, the challenge was to create a mentor that could look photorealistic to be consistent with the “social” fidelity of the film.

We leveraged computer graphics technology to bring this character to life and build a digital talking head that could be animated for an arbitrary input sentence. The approach taken falls within the realm of visual speech synthesis: the facial animation system takes as input a speech signal and outputs the corresponding animation (Cao, Tien, Faloutsos, & Pighin, 2005). Realistic animation of a synthetic human is a difficult task due to the complexity of the human body, one that traditionally involves many digital artists in the special effects industry. We took advantage of motion capture technology to bring realism into the synthetic mentor at an affordable cost. Motion capture allows the accurate recording of live actors' motions. We used this technology to record a large database of speech related motions from a live actor. We then analyzed this data to build a generative statistical model of the actor's facial motions. This model used the database of motions indexed with speech. We organized this database according to the phonemes of the recorded speech: each phoneme is associated with a large number of motion fragments.



Figure 2. Screenshot from the TLAC-XL interface.

Character Interviews and Conversation Graphs

The questions posed by the synthetic mentor provide students with the opportunity to reflect on his or her own understanding of the situation. In a classroom situation, however, a student would also benefit from hearing other student responses to these questions, thereby gaining exposure to different points of view. In the TLAC-XL environment, the student might be working alone on the computer, in which case the student would have limited exposure to the perspective of others. In order to provide exposure to different points of view and to introduce specific leadership issues (e.g., mission clarity, cultural awareness) into the learning experience, TLAC-XL allows students to query characters from *Power Hungry* about their thoughts, motivations, and roles in the scenario. To query characters, students type questions into a text box (see Figure 2). While information about the characters could be presented or “pushed out” to students without the benefit of a natural language interface, the act of constructing questions to ask characters may serve as useful learning purpose. Within the context of a multimedia learning environment, Mayer, Dow, and Mayer (2003) found that students performed better when they were able to query a pedagogical agent interactively, rather than access the same information through non-interactive means. Such a finding may stem, in part, from the active cognitive engagement required to construct a question.

After a student types a question, a natural language understanding (NLU) engine within the system chooses the best response available. This functionality provides the student with an opportunity to reflect on the case and formulate appropriate questions for the characters. The interview functionality also allows the student to find out additional information about the characters, their motivations, and the situation beyond what is seen in the case itself. The interview function mimics an event that happens in some classrooms during case method instruction. When a case is being taught about a real life situation, sometimes one of the people in the case – the “protagonist” – will participate in the classroom discussion. These are opportunities typically limited to select classrooms because individuals from a case study are often unavailable to participate in classroom exercises. The TLAC-XL interview functionality provides a wider audience with the opportunity to interact with characters from the case.

In order to design effective interactions between students and the TLAC-XL system, we encoded the set of possible student/system dialogues as a directed finite-state graph. Each node in the graph represented a dialogue turn where the system said something (using media), and each arc in the graph represented a classification of the student’s typed input. Every node in this graph that has more than one arc transitioning away from the node requires a separate classification of the student input. The section of this graph representing the mentor interactions include 12 separate classifiers for this purpose, mainly to determine whether or not the mentor should agree or disagree with a student’s response to a mentor’s preceding question. However, each of the six character conversations is driven by a single classifier, which selects the most appropriate answer from the character. Graphical representations of the mentor graph and a character interview graph are presented in Figures 3 and 4. More information about this approach to textual classification can be found in Hill et al. (2003).

As seen in Figure 3, the mentor interaction can be viewed as an eight-tiered interaction, where each tier corresponds to a line of questioning that concerns one of the eight TLAC topics.

Within each tier, the mentor begins by asking a few preliminary questions about the topic (e.g. “What was your understanding of the mission?”) that lead to one of the critical leadership issues that were brought up in the case. To explore these leadership issues, the mentor will allow the student to conduct an interview with a relevant character from the case. Each node labeled with a letter in the mentor graph indicates a point where the mentor introduces a character, invoking an embedded subgraph corresponding to a character interview. At the end of an embedded character interview, the mentor asks a follow-up question aimed at determining the student’s understanding of how the leadership issue (i.e., TLAC-XL theme) relates to a TLAC tactical decision-making topic, then moves on to the next point.

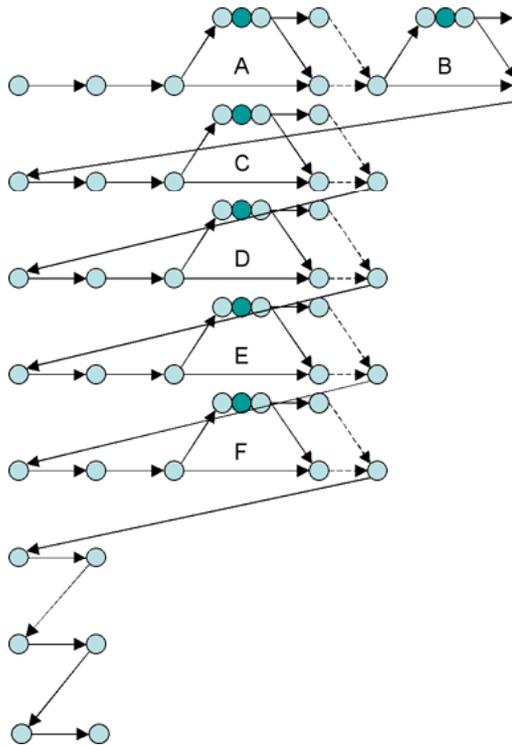


Figure 3. The mentor graph

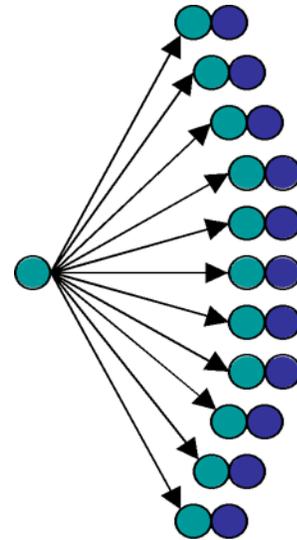


Figure 4. A character interview graph

Figure 4 illustrates the general shape of an embedded subgraph for supporting a student-led character interview. A single classifier is used to route a student's question to one of a set of possible character responses. A sample dialogue between a student and the CSM Pullman character follows:

Student: What do you think about Captain Young?

CSM Pullman: This mission went downhill pretty quick. To tell you the truth, I was surprised the Captain didn't ask me to step in as his XO, given Lieutenant Perez was someplace north of nowhere. I didn't want to look like I was throwing my weight around, but maybe I should have jumped in.

Student: Were you surprised to see the warlords show up at the site?

CSM Pullman: I was surprised when Omar wandered into camp, no question about it. We certainly weren't briefed on any families in the area, other than the ones we were dealing with for local security. On the other hand, what to do with Omar wasn't my call. I was there to keep the locals happy, and, at that point, Omar was a local. I felt it was urgent to get Captain Young to make the decision on what to do with him. Young seemed preoccupied if I recall. So I made 'em "comfortable," if you know what I mean. Put them under the "protection" of some of our boys, and waited for the Captain.

Example of TLAC-XL System Dialogue

TLAC-XL incorporates the eight tactical themes of TLAC (Lussier & Shadrick, 2003; Shadrick & Lussier, 2004) and overlays six leadership themes on those tactical issues. An example of the instructional content overlaid on the TLAC issue of "Mission" is listed in Table 5. It shows the full cycle, beginning with the original TLAC questions and how they were translated into probing questions asked by the mentor. Appendix A contains the lines of question for all eight TLAC topics and the leadership issues in *Power Hungry* that are overlaid on them.

Discussion of TLAC-XL

Research that evaluated the effectiveness of the pilot version of TLAC-XL is described in greater detail in Zbylut and Ward (2004a) and Zbylut, Ward, and Mark (2005). This research included a test run of TLAC-XL in two classes at the Combined Arms and Services Staff School (CAS3; $n = 26$ captains), a comparison between TLAC-XL and a multimedia presentation of the same material in PowerPoint ($n = 97$ lieutenants and captains) across four US Army installations, and an instructor led-discussion of the *Power Hungry* film with members from a Stryker Brigade Combat Team ($n = 23$ Soldiers, with the majority of Soldiers being sergeants). A summary of these findings and lessons learned are presented here; these findings were used to revise the TLAC-XL system and form the basis of the AXL.Net system.

Table 5
Example of TLAC-XL Content Overlaid on TLAC Topic of “Mission”

Topic Area	Instructional Flow of Events in TLAC-XL
<p><i>TLAC questions on Mission:</i></p> <p>a. What is the mission? b. What is the commander’s intent?</p> <p><i>TLAC-XL issues and information embedded in scenario:</i></p> <p>Issues: Command Influence, Unity of Command</p> <p>Information: CSM Pullman gave CPT Young additional information about the commander’s intent.</p>	<p><i>TLAC-oriented questions asked by mentor:</i></p> <p>a. Let’s begin by talking about the mission. What is your understanding of the mission and the commander’s intent? b. What do you think was CPT Young’s understanding of the mission and the commander’s intent?</p> <p><i>Priming question asked by mentor:</i></p> <p>a. How did Command Sergeant Major Pullman’s presence influence CPT Young’s understanding of the mission and the commander’s intent?</p> <p><i>Introduction of character and issue prompt by mentor:</i></p> <p>b. Let’s talk with Command Sergeant Major Pullman directly. You can ask him questions related to the influence that he had on CPT Young.</p> <p><i>Character interview opportunity with CSM Pullman:</i></p> <p>a. Free text interface for the student to type in any question. b. CSM Pullman answers question. c. Repeat interview process until student decides to end interview.</p> <p><i>Follow-up question asked by mentor:</i></p> <p>a. What do you think of Command Sergeant Major Pullman’s comments on the influence he had on Captain Young?</p> <p><i>Feedback by mentor based on natural language understanding:</i></p> <p>b. I {agree/disagree}. Command Sergeant Major Pullman may not believe that he had an influence on CPT Young. However, his presence certainly caused CPT Young to question his understanding of the mission.</p>
<p><i>TLAC-XL issues and information embedded in scenario:</i></p> <p>Issues: Communication, Mission Clarity</p> <p>Information: CPT Young doesn’t have a clear understanding of the mission.</p>	<p><i>Priming question asked by mentor:</i></p> <p>a. How did the clarity of the mission change over time for CPT Young?</p> <p><i>Introduction of character and issue prompt by mentor:</i></p> <p>b. Let’s talk with CPT Young directly. You can ask him questions related to the clarity of his mission.</p> <p><i>Character interview opportunity with CPT Young:</i></p> <p>a. Free text interface for the student to type in any question. b. CPT Young answers question. c. Repeat interview process until student decides to end interview.</p> <p><i>Follow-up question asked by mentor:</i></p> <p>a. What do you think of CPT Young’s comments on the clarity of his mission?</p> <p><i>Feedback by mentor based on natural language understanding:</i></p> <p>b. I {agree/disagree}. CPT Young did not have a clear understanding of the mission throughout. He should have asked more questions when he was first briefed. He should have questioned the presence of Command Sergeant Major Pullman. He should have notified battalion headquarters that the brigade command sergeant major was present at the site.</p>

The Value of Filmed Scenarios

TLAC-XL was inspired by the Think Like a Commander (TLAC) teaching approach (Shadrick & Lussier, 2004), but whereas TLAC focused on the tactical situation, the TLAC-XL concept expanded the scenario scope by considering the interpersonal aspects of leadership. The tactical scenario became the context for examining key leadership issues that influenced the outcome of a situation. Interleaving leadership issues with the tactical scenario enabled students to see how specific interpersonal skills can impact an operation. The *Power Hungry* case and TLAC-XL software were found to be memorable, interesting, and engaging (Zbylut & Ward, 2004a), and the *Power Hungry* case has since been widely used in other instructional settings.

The filmed scenario performed better than other media delivery formats of the same scenario. Previous research (Zbylut & Ward, 2004a; Zbylut et al., 2005) indicated that Soldiers were able to remember more details from the *Power Hungry* scenario when it was presented in film format rather than in a multimedia PowerPoint format. This finding was somewhat surprising since the PowerPoint presentation of the scenario included the entire audio soundtrack from the film running in conjunction with more than 100 still images taken from the film. In addition to differences in memory between the two scenario conditions, the film also led to reports of higher positive affect, greater emotional response, and higher ratings of story and character realism than the PowerPoint version of the scenario. Conversely, higher levels of confusion were reported for the PowerPoint scenario.

Additional research using an undergraduate sample indicated that the filmed version of *Power Hungry* performed better than or as good as text and PowerPoint versions of the scenario across a variety of affective, cognitive, and personality variables². With respect to self-reported arousal, the film was more arousing than PowerPoint and evoked levels of arousal similar to text. With respect to emotional valence, however, the film was associated with higher levels of negative affect than both the text and PowerPoint conditions. Film also appeared to be more effective overall at conveying certain types of information more effectively than other forms of media. While participants in film and text conditions performed similarly on memory task of scenario details, participants in the film condition performed significantly better on a memory task of what different characters said to one another. Character information also seemed to come across more effectively in film in another substantive way. Specifically, participants rated CPT Young as more disagreeable and less emotionally stable and open to experience in the film condition than in either the text or PowerPoint conditions, suggesting that character personality might be better depicted in film format than in other media forms. Taken together, these results suggest that film is an effective way for exposing individuals to case studies about interpersonal interactions.

The Value of Group Discussion

In its original conceptualization, TLAC-XL was built within the traditional computer-based instruction paradigm—namely, instruction was completed by one person on one computer. However, in early pilot tests of the user interface, the researchers made a conscious decision to collect data in small groups. While this decision was made primarily in order to bolster the

² This research is described in greater detail in Appendix B.

sample size we could obtain at a single Army installation, an unintended side effect occurred. Specifically, the discussion that was occurring between Soldiers as they worked through the TLAC-XL content seemed to be highly relevant to the teaching goals of the system. For example, Soldiers would talk about how their deployment experiences were similar or dissimilar to the events that occurred in the film or would discuss solutions that they had used in the past. As another example, Soldiers would sometimes challenge the assertions of their peers or ask a peer to elaborate on his or her reasoning.

In addition to researcher observations, questionnaire results in a variety of settings suggested that discussing the film as part of a group is important. For example, Soldiers who discussed *Power Hungry* as part of their Stryker Leader Course at Fort Lewis strongly indicated that group discussion was valuable (Zbylut & Ward, 2004a). Similar results were found when *Power Hungry* was discussed at Fort Wainwright with an audience of 119 Soldiers, which included a mix of officers and NCOs. Of 93 Soldiers who responded to the open-ended question of what helped them to learn during the lesson, approximately 66% indicated that interacting and discussing things in a group was helpful.

Need for Structured and Probing Questions

TLAC-XL used a synthetic mentor in place of a human instructor counterpart. The synthetic mentor posed a series of highly structured questions related to the TLAC tactical topics and TLAC-XL leadership themes. The intent was to have the student think on his or her own and generate responses to the questions rather than selecting an answer from a menu. While the intent was appropriate—this is the expectation in the case method approach—the dialogue was one-way with the student generating analyses but not receiving feedback from the mentor, even as informed follow-up questions. In observing Soldiers use TLAC-XL, it appeared that, at times, Soldiers were not delving into enough detail on the topics. While structured questions appeared to do a good job at focusing Soldiers on a specific leadership topic, additional probing questions or follow-up questions would help in compelling Soldiers to examine the topics at a deeper level.

Role of the Synthetic Mentor

In observing Soldiers interact with the system, occasionally Soldiers would react negatively to the synthetic mentor when he told them that he agreed or disagreed with their assessment of an issue. In some instances it was clear that the synthetic mentor did not comprehend the answer given by the student, so the act of disagreeing with the student would undermine the mentor's credibility. Given that the assessment was done using the same statistical techniques that were used for classifying student questions, it became evident that this approach would not suffice in giving feedback, particularly where a judgment of correctness was involved. Interestingly, the only difference in the actual feedback given by the mentor was at the beginning of the statement when the mentor said that he agreed or disagreed. The statement summarizing the key lesson from the interview with a character was the same whether the mentor agreed or disagreed with the student. So, while the summary statement may have held value for the student on its own, the message was lost when the mentor tried to give more explicit feedback.

Zbylut et al. (2005) compared the use of the mentor in TLAC-XL to a non-mentor version of TLAC-XL run in PowerPoint. In the PowerPoint version, the discussion questions posed by the mentor in TLAC-XL were presented in text form on slides. The discussion question slides were followed by slides containing the mentor's "take away" message minus the assessment of whether Soldiers answered the questions correctly or incorrectly. Soldiers rated the PowerPoint version of the discussion questions higher than they rated the identical questions delivered by the mentor in TLAC-XL.

These results are not meant to imply that the use of pedagogical agents is inappropriate in computerized instruction. Indeed substantive research has indicated the utility of computerized instructors (e.g., Atkinson, 2002; Mayer et al., 2003; Moreno et al., 2001). Ultimately, the lesson learned here is that guidance and feedback, which are essential to efficient and effective learning, must be delivered in a pedagogically and socially appropriate manner. From a computer graphic standpoint, the mentor was an advance in high audiovisual fidelity. However, it is equally important that the mentor know what to say, know when to say it, and deliver accurate content much like a human instructor. Otherwise the credibility of the system can be undermined.

Usage and Accessibility

The TLAC-XL system was envisaged to be used primarily in a mode where the student would work alone, whether on a computer at home or in a lab. In the course of deploying prototypes of the system, it became evident that (1) there were multiple ways to conduct instruction with the TLAC-XL materials, including instructor-led discussion and computer-facilitated small group discussion, and (2) instructors were interested in using the case studies for conducting lessons on topics beyond those originally identified in the system (e.g., ethics, how to talk to the media). Additionally, the software system was originally designed so that it could be installed on a personal computer with a two CD set. What was quickly learned was that there are practical constraints on deploying the software this way in the Army. The dependency on the hardware and software configuration became problematic, with significant variability across computers complicating the installation process. Also, the software could not be easily changed by anyone besides the programmer who had developed it. Integrating new learning content or an entirely new case required essentially starting over from the beginning from a programming standpoint.

In sum, a number of lessons were learned from the TLAC-XL prototype. First, filmed case studies had wide appeal to Army instructors and Soldiers. Second, the content embedded in the system could be used in a variety of ways other than those originally anticipated—including computer-facilitated small group discussion and instructor-led classroom instruction. Moreover, instructors were able to construct lessons to cover topic areas not originally targeted in the prototype. Third, while structured questions are an important part of facilitating discussion, follow-up questions and feedback are required to compel Soldiers to investigate issues more thoroughly. Fourth, the use of software poses challenges in getting Army instructors the content in a timely and efficient fashion. The next section describes the creation of a new case-method instructional system called Army Excellence in Leadership (AXL), which builds from the lessons learned with TLAC-XL.

AXL.NET PLATFORM AND MODULES

As a follow-up to TLAC-XL, ICT began designing a new computer-based learning environment. ICT considered the findings from the TLAC-XL evaluations, literature searches, observations of expert case method instructors, as well as existing and new research technology approaches. Rather than revise the existing TLAC-XL system, ICT reconsidered the entire approach to using computer-based solutions and film-based cases. The result was the new prototype system called AXL.Net (Hill et al., 2006). AXL.Net is a prototype web-based immersive technology solution that supports case method instruction for U.S. Army leader development. Whereas TLAC-XL was created specifically around the *Power Hungry* filmed case and the TLAC framework, AXL.Net was created to offer a generalized interactive technology solution for case method instruction using film-based cases.

The overarching design for AXL.Net was based on the traditional case method instruction approach (Corey, 1999; Gentile, 1990; Golich et al., 2000; Hill, Gordon, & Kim, 2004):

1. **Review** learning objectives and be immersed in a case.
2. **Familiarize** with the basic story points – identify roles and responsibilities, story points, key events.
3. Critically **analyze** the case – consider stakeholder goals, cause and effect relationships, and alternate decisions.
4. **Synthesize** thoughts – develop rules of thumb, connect to personal experience and real world situations.

The approach outlined above was created with the notion that instruction would be conducted in a classroom setting with a human instructor to facilitate discussion. Thus, this general teaching approach required some modification to translate it into an interactive, computer-based medium. Furthermore, the interactive medium along with the use of filmed cases provided opportunities for learning experiences that were not possible in non-computer-based solutions or without film-based cases. Finally, theories about the acquisition of tacit knowledge were incorporated into the design and approach.

The result of these efforts was two-fold: (1) an open, web-based platform for delivering rich media case method instruction learning experiences, and (2) exemplar modules built around the *Power Hungry* and *Tripwire* cases. In the next sections, the AXL.Net technologies will first be described. The exemplar modules, as well as initial evaluations with these modules, will then be described.

Character Interviews

One of the insights gained in reviewing the literature on case method instruction was that students need to go beyond the initial details presented in the case and dig more deeply into the background details and relevant theory. In TLAC-XL, the ability to interview the characters provided one opportunity to analyze the details of the case more deeply. The technology for conducting the interviews worked fairly well, allowing students to ask a range of questions of the different characters. The purpose of the character interviews is to provide the student with the

perspectives of the different Soldiers in the scenario. By hearing their responses, a picture of the command climate of the unit emerges that aids the student in the inquiry of what caused mission failure.

Previous research with TLAC-XL indicated some problems with the character interview features (Zbylut & Ward, 2004a, Zbylut et al., 2005), and these problems emerged for a few different reasons. First, in the TLAC-XL system, the instructional approach restricted students with respect to which characters could be queried and when. Specifically, characters were presented in a sequential order and in conjunction with different leadership topics such that once a student interviewed a character, the student could never revisit that character to ask additional questions. However, in reviewing the content of possible character answers, connections in content across characters emerged. For example, in *Power Hungry*, every Army character has a response as to what he believed the mission was. In the original TLAC-XL format, a student might be able to access all of the character interview clips about character's beliefs about the mission, but those character answers would be spread out over the course of about 45 minutes of discussion and interspersed between discussions of other leadership topics. This general approach does not facilitate the integration of these different character interview clips because they are spread out in time and across different leadership topics.

Second, some students would attempt to “test” the system by asking irrelevant or tangential questions, such as “Where did you go to school” or “What did you have for breakfast?” As a result, characters often supplied answers that were non-responsive to the questions that were posed. Third, students who were inexperienced tended not to ask as sophisticated questions as their more experienced counterparts, and this led to problems with the more novice students accessing the relevant scenario information that they needed to make sense of the case study.

AXL.Net employed two solutions to deal with these problems. To increase the probability that students would integrate and compare/contrast different character answers with one another, AXL.Net modules will sometimes “feed” specific character interview answers to students rather than wait for students to interview characters. AXL.Net then asked students to examine what the different characters said. Proactive presentation of character interview clips in the same temporal space should increase the likelihood that students will make connections among different character statements. Additionally, proactive presentation ensures that students access specific pieces of character dialogue regardless of what questions students choose to ask of the characters. Figure 5 provides an example in which AXL.Net presented clips of multiple characters indicating what they believed the mission in the scenario was. Students click on the character interview clips to hear what each character has to say.

The second solution was to offer students the opportunity to interview any character at any point during the learning process. The interview functionality was added as a persistent “tool” on every page of AXL.Net, with every character available to interview (Figure 6).

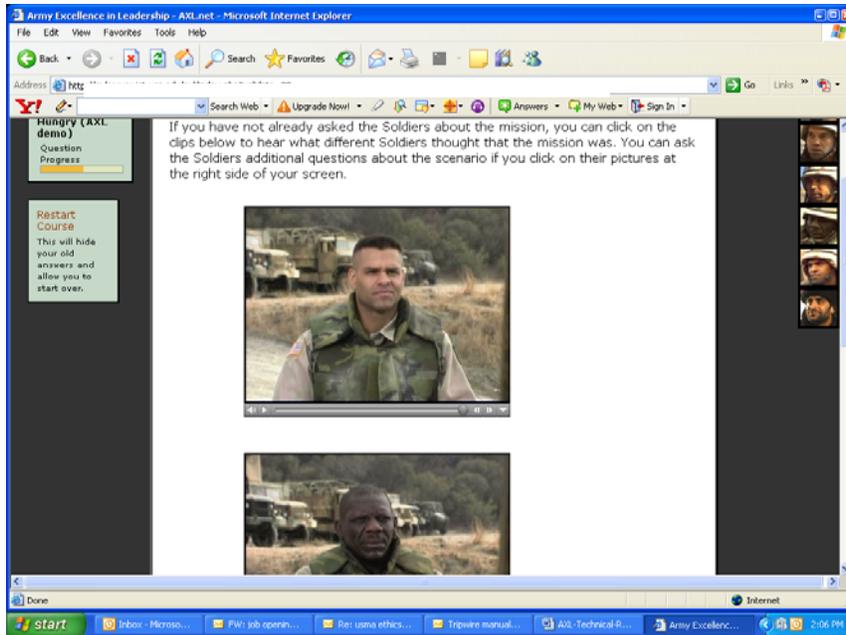


Figure 5. Students click on different film clips to see what characters had to say about the mission in *Power Hungry*.

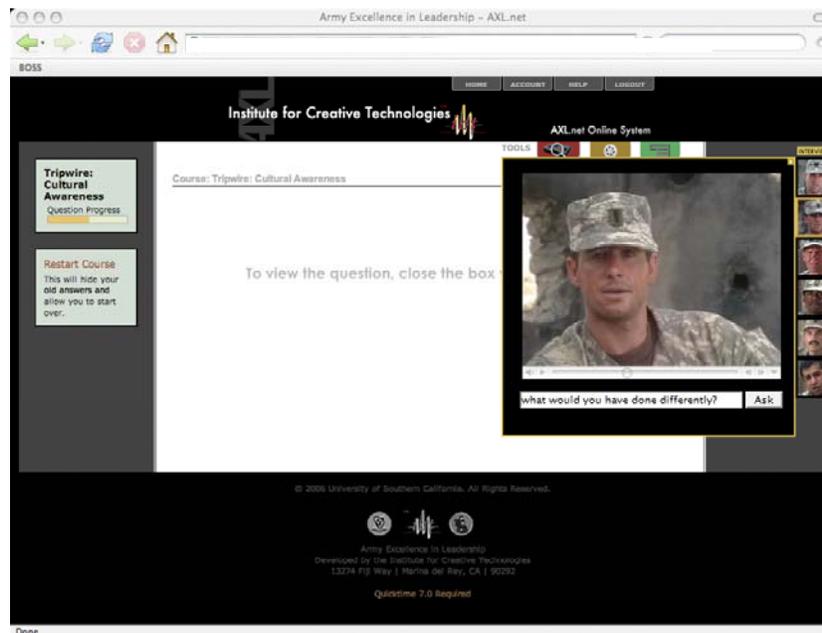


Figure 6. AXL.Net character interview interface. Students can click on any of the character images on the right side of the screen. In this instance, 1LT Porter from *Tripwire* has been selected for interviewing. Similar to TLAC-XL, students can type their question of the character in the text box provided.

To increase the likelihood of an effective “match” between student questions and character answers, the AXL.Net system employed two techniques. One technique was to introduce a more sophisticated classification scheme over the one used with TLAC-XL. This schema added two dimensions. First, an “unrelated” node was created to catch questions that were entirely outside the learning domain (e.g., what did you have for breakfast?). For these unrelated questions, the system returned a text prompt with two pieces of information: (1) the character did not understand the question, and (2) a suggestion for topics that the student might want to ask the character. The prompt did not ever state that the student was asking the wrong kind of question but instead put the blame on the system. This was to address the possibility observed with TLAC-XL—and with even the best natural language understanding (NLU) systems—of occasional misclassifications. The topic suggestions were included to guide the student back on topic without dictating to the student what questions they should ask.

Another dimension added to the classification schema was the possibility of “related” questions, but questions with classification ratings with a low confidence. In this case, the system was coded to assume that the student was asking about the correct general topics but was not asking the questions in the “right” way that the NLU system understood. As a result, the system also returned the same text prompt as for “unrelated” questions, but also opened another window that offered questions identified as most relevant to the question that the student typed in. The related questions were chosen by keyword matching the student’s question to the transcripts of the answers available in the system. When available, the system also chose the top three related questions from other characters. For example, if a student asks 1LT Perez “what did you think of Wychowski,” the TLAC-XL interview system returns “. ” With the new classification technique in AXL.Net, the system returns the text prompt “1LT Perez is not sure how to answer your question. Try asking him about his relationship with CPT Young” and provides a list of suggested questions to ask instead (see Figure 7).

The second technique investigated was the use of mediation in the dialogue to fill in the gaps between what is being asked and what can possibly be selected as a response from the database (Gandhe, Gordon, & Traum, 2006). This approach was motivated by the observation that humans do not always directly answer a question. Rather, depending on the question and the set of knowledge that a human has, he or she will offer a response that connects the question to the answer available. In the AXL.Net system, the video responses are pre-determined and filmed at the same time as the scenario, so they are not easily changed. AXL.Net’s automated mediation system generates a text that provides a similar linking function to human bridging dialogue. The text is then displayed before the video is played. Figure 8 describes the question-linking dialogue-answer framework. Technical details about the approach can be found in Gandhe et al. (2006).

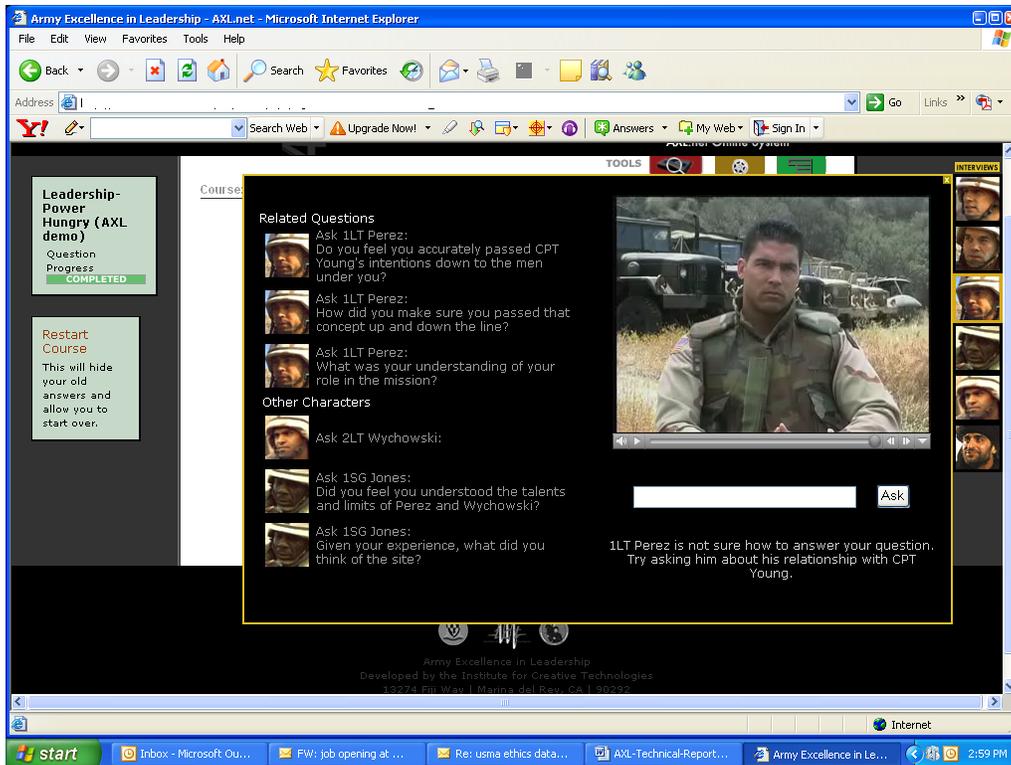


Figure 7. Screenshot of how AXL.Net handles student questions that it is unsure of how to answer. AXL.Net identifies a set of questions that might be relevant to the students' questions. Students can click on any of these suggested questions to be hyperlinked to the character's filmed response to that question.

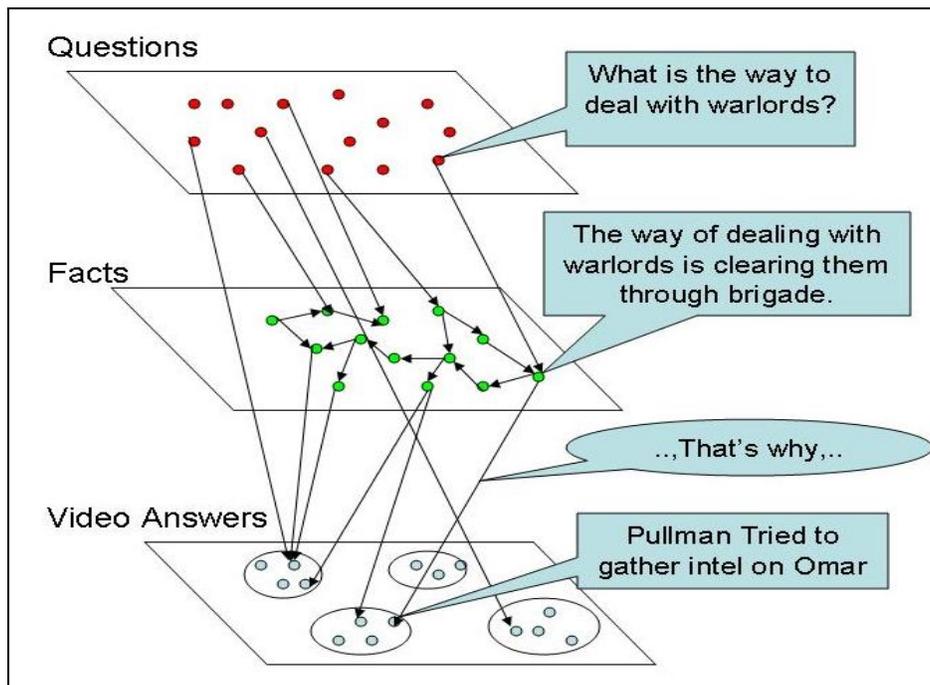


Figure 8. Chart describing the mediation between a student's question and the available character responses.

Tools to Support Case Method Analysis

The AXL.Net case method framework was derived from case method instruction best practices extracted from literature and observation of expert practitioners, as well as the findings from research on TLAC-XL. However, the overarching premise of the AXL.Net approach is that student participation in discussion, reflection, and exposure to different points of view help a student's sense-making process (Brown et al., 1989; Golich et al., 2000; Palus et al., 2003). In traditional case method instruction, an instructor typically leads a discussion through the use of questions (Gentile, 1990; Golich et al., 2000). This activity is not easily duplicated in a distance learning environment without an instructor (Murray, 2007). As previously described, the open-ended questioning in TLAC-XL was not effective, as the dialogue was one-way with the student generating analyses but not receiving feedback from the mentor, even as informed follow-up questions.

One solution in AXL.Net drew on the instructional design principles of guided analysis rather than pure discovery learning (Mayer, 2004). While engaging with the AXL.Net system, students are asked to discuss and reflect on several open-ended questions. These questions compel students to examine the relationships among different characters in the scenario, analyze cause-and-effect relationships, and consider the implications of different courses of action that characters might have chosen in the scenario. Students also are encouraged to relate personal experiences to the situations encountered by different characters in the scenarios. These sorts of questions draw on the instructional concepts of elaborative interrogation (e.g., Martin & Pressley, 1991; Pressley, McDaniel, Turnure, Wood, & Ahmad, 1987; Willoughby, Wood, Desmarais, Sims, & Kalra, 1997) and self-explanations (e.g., Chi & vanLehn, 1991). By reflecting on, analyzing, and discussing answers to these questions, students are better able to learn from their peers and integrate socially constructed knowledge with their personal experience and knowledge. The processes of self-explanation and elaborative interrogation can assist students in retaining information over time and improves the likelihood that they will be able to transfer what is learned to other situations. An example of an open-ended question is presented in Figure 9. The open-ended questions of AXL.Net differ from the questions of TLAC-XL in a few notable ways. Most importantly, AXL.Net has more questions per teaching theme than did TLAC-XL. Some questions also are more explicit in asking students to relate what occurred in the film to their real world experiences. Moreover, the questions have now become interspersed with other student tasks, checks on understanding, presentation of information from Army Doctrine, and presentation of film clips and character interviews.

Unlike TLAC-XL, which consisted primarily of general open-ended questions, AXL.Net leverages the full range of question types possible. A specific improvement in the AXL.Net system is the utilization of close-ended questions (e.g., multiple choice, true/false, rating tasks, ranking tasks) that can help determine the level of student understanding and allows feedback to be delivered to the student. An example of a multiple choice question from AXL.Net and the feedback that a student might receive appear in Figures 10 and 11. Additionally, close-ended questions can be used to branch the instructional content delivered to the student. In the case of procedural, factual, or other determinable knowledge, these forced choice questions enable the system to ensure understanding where right and wrong are important and determinable. The branching function allows for tailored remediation to be provided to these students and bypassed

by those students who demonstrate comprehension. Alternatively, the branching function is used to provide a more tailored experience (outside of performance metrics) that will permit the student to pursue lines of inquiry consistent with the student's interests or background. For example, the system may ask whether a student has been deployed and branch to different sets of questions depending on how the student answers. The branching function also can be used to challenge student assumptions. For example, if a student chooses one course of action over another course of action, the branching function can be used to compel the student to think through the implications of that course of action, as well as the second course of action.

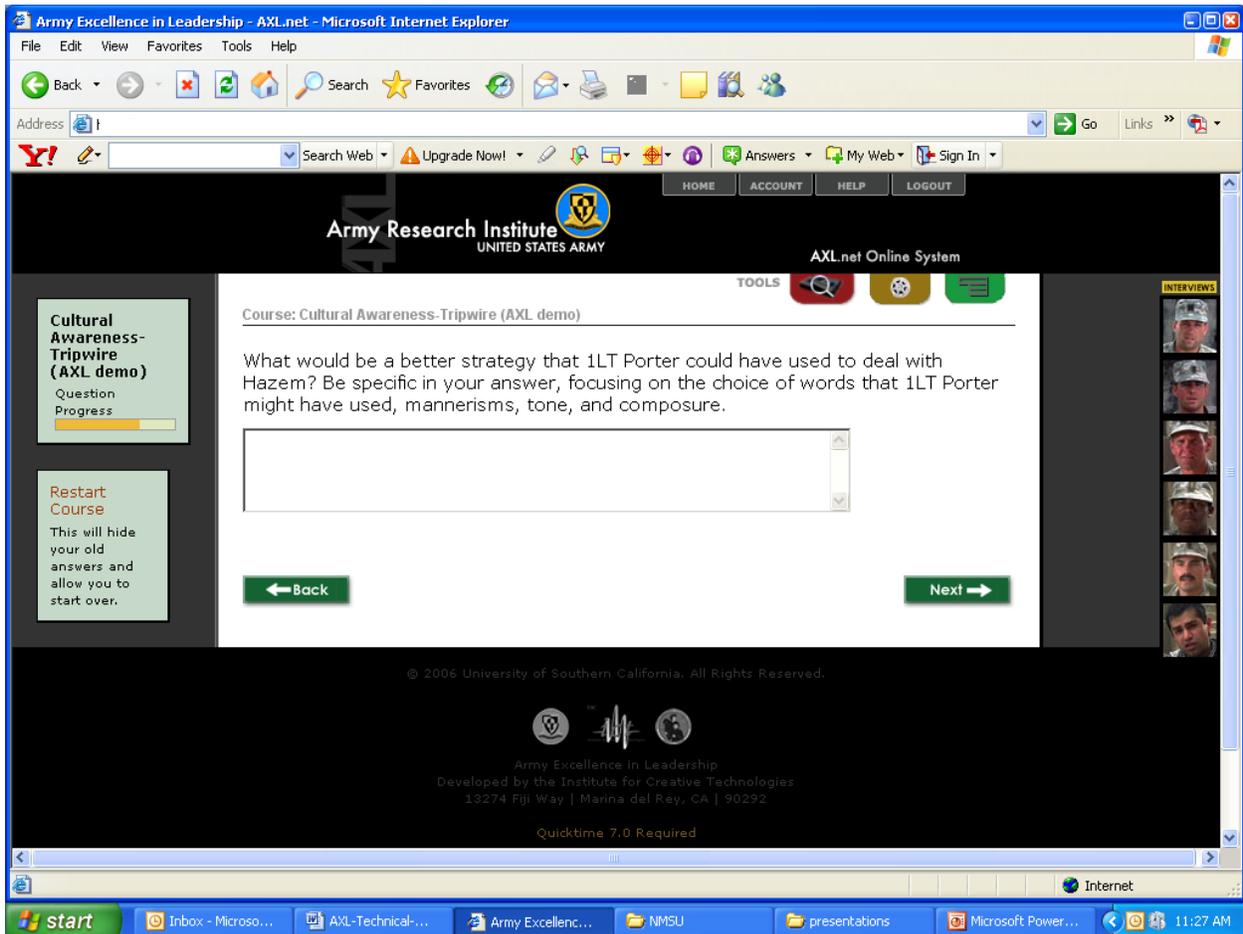


Figure 9. An example of an open-ended question used in a Cultural Awareness module for *Tripwire*.

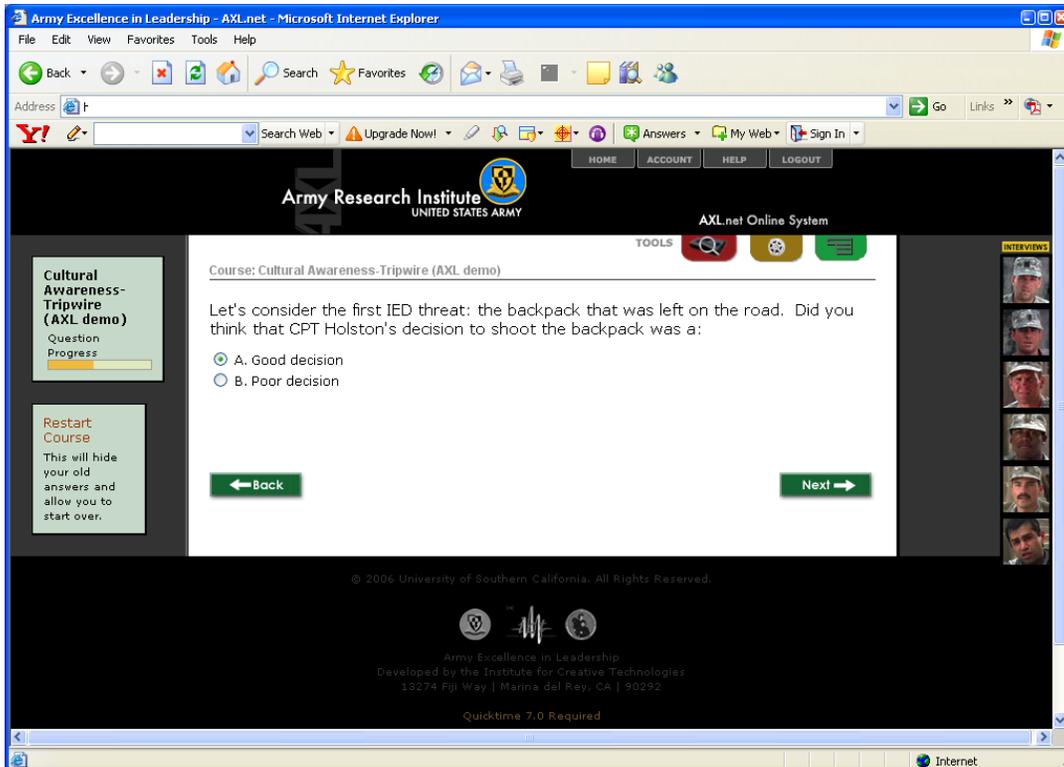


Figure 10. Example of a multiple-choice question in AXL.Net. This question will be followed by feedback to the student. Depending on whether students selected option A or option B, students will receive a different series of discussion questions to explore their assessment in greater detail.

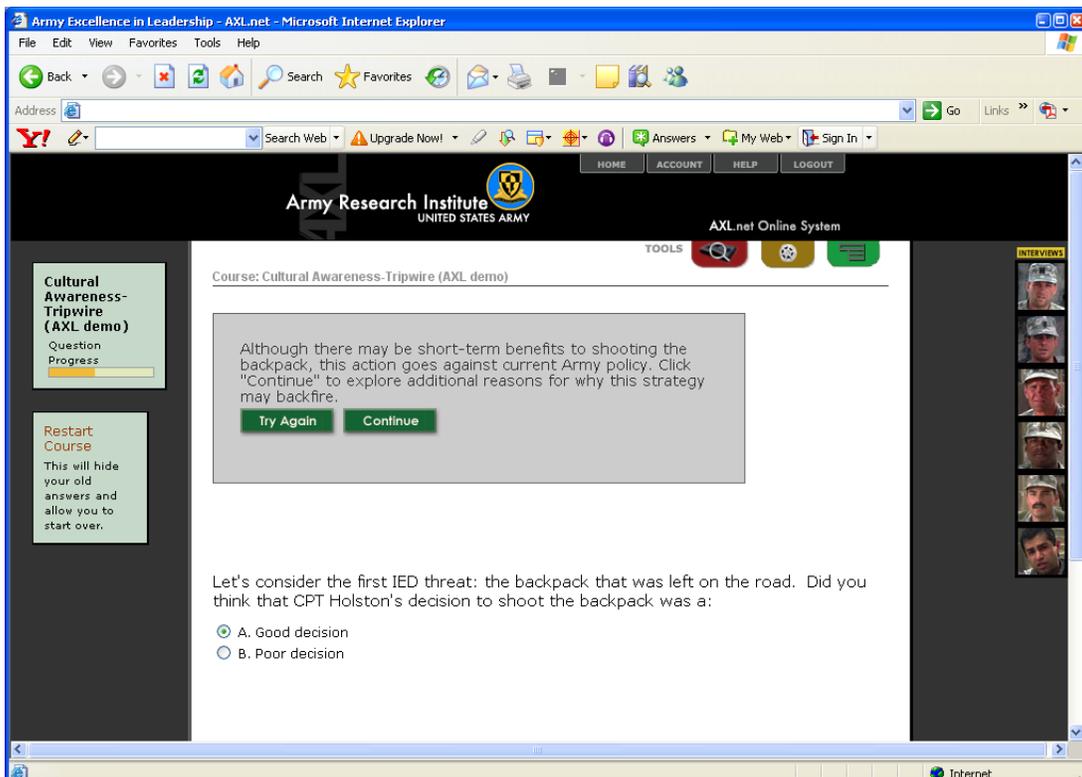


Figure 11. Feedback delivered to the student after answering a multiple-choice question.

AXL.Net also relies on some of the more standard approaches to delivering content in a computer-based learning environment. Specifically, at certain points in a lesson, AXL.Net will present information to students to read and consider. An example of the type of information presented to students in an AXL.Net module is presented in Figure 12. Other types of information presented to students include an overview of the module, learning objectives, and module summaries. AXL.Net also provides downloads for Army reading materials (e.g., FM 6-22) relevant to leadership and cultural awareness.

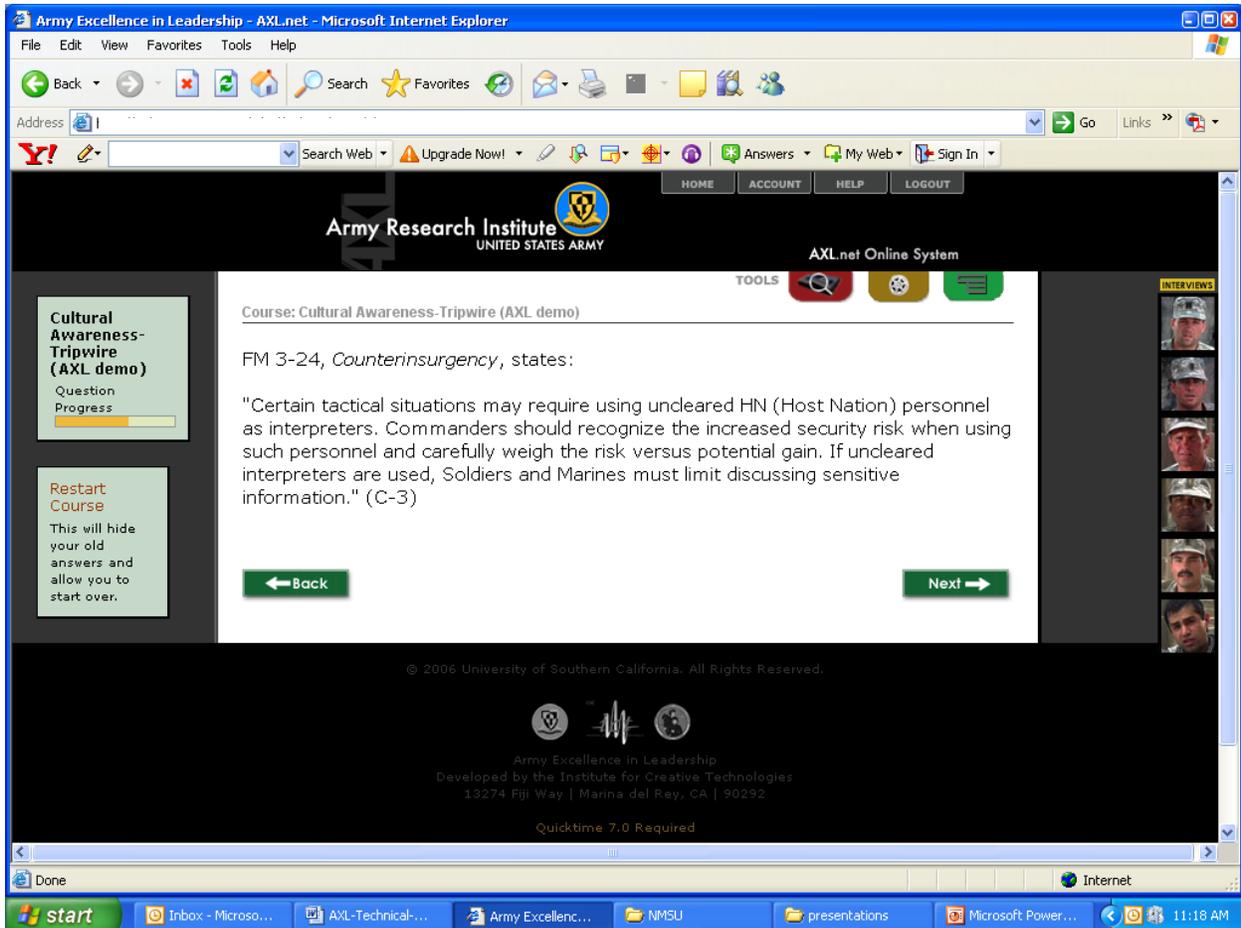


Figure 12. A Cultural Awareness module for *Tripwire* includes information about interpreters from Army Doctrine on counterinsurgency (FM 3-24).

Another capability in the system that supports case analysis is the implementation of a “critical issues” task for the *Power Hungry* and *Tripwire* cases. In the critical issues task, the student is provided with a list of different leadership actions and issues in the scenario that most impacted the mission. In the task, the student is asked to select and rank order the seven most important issues (see Figure 13). Based on the students’ choices and rankings, the system provides the student with feedback about their choices, including drawing attention to issues that

they did not select. The intent of this task is to bring self-awareness to students about the issues that they are emphasizing and potentially call their attention to important issues they may have overlooked, particularly within the categories of cultural awareness and leadership. In instances where students are interacting as a group, the critical issues task can serve as a tool for stimulating debate and discussion.

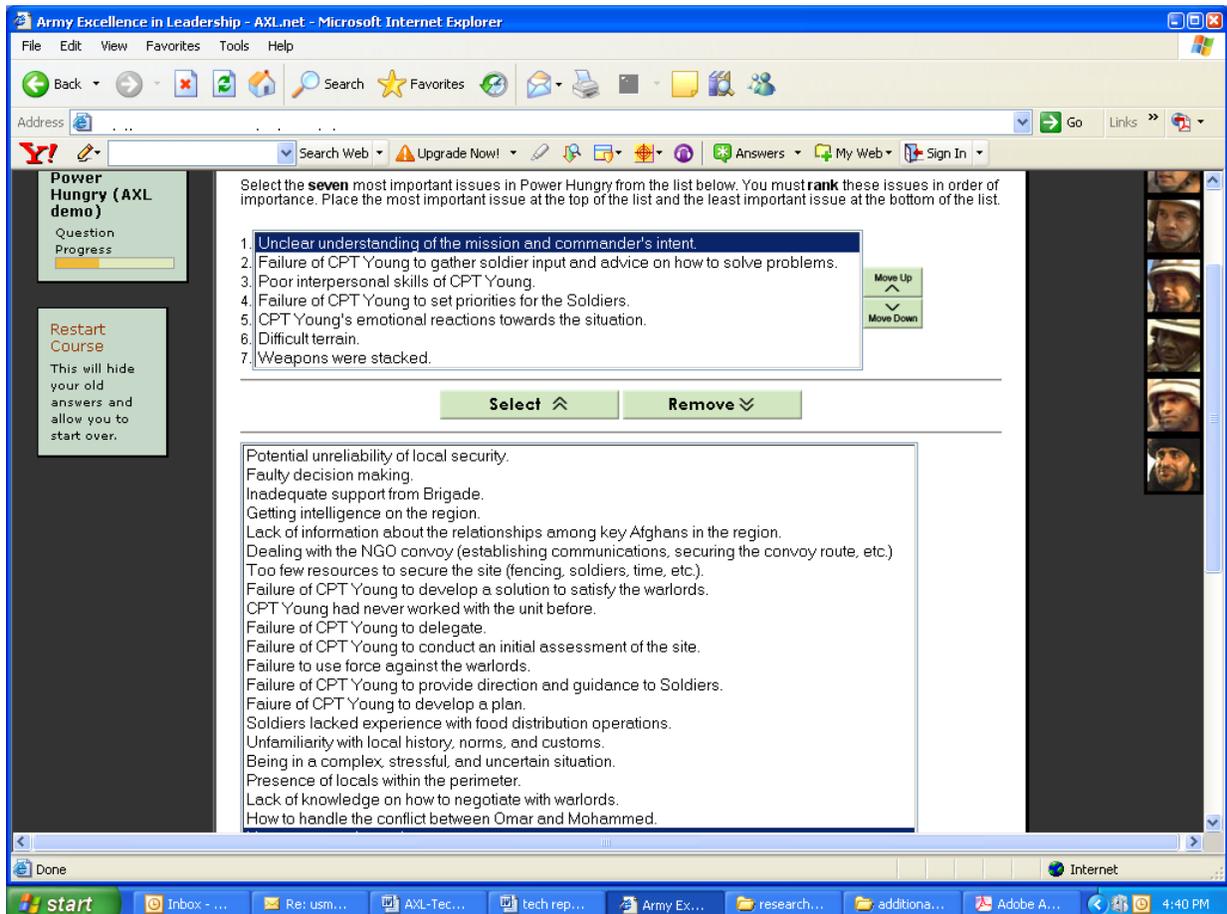


Figure 13. Screenshot of the critical issues task for *Power Hungry*.

The critical issues task is scenario-specific. Thus, there is a different list of critical issues for *Power Hungry* than there is for *Tripwire*. The list of critical issues in *Power Hungry* was developed from leadership issues identified by 16 captains and 25 cadets at the United States Military Academy (Ben-Yoav Nobel et al., 2006). The list of critical issues for *Tripwire* was generated from focus groups interviews and questionnaires administered to 27 junior officers (Zbylut, Metcalf, Kim, Hill, & Rocher, 2007).

Because the critical issues task is scenario-dependent, feedback delivered for the task is also scenario-dependent. In *Power Hungry* modules, feedback is provided for tactical issues, situational issues, leadership issues, and cultural issues; these were the overarching categories

identified in the Ben-Yoav Nobel et al. (2006) research. In the *Tripwire* case, the *Power Hungry* taxonomy of issues did not cleanly map onto the issues generated by the junior officers. Instead, issues fell into the categories of security (tactical actions), leadership, culture, and self-regulation. Because self-regulation (such as managing one's emotions and taking care of one's physical well-being) was built into the *Tripwire* case, self-regulation issues appeared to be identified more commonly than issues falling under the general category of "situational" parameters. In both the *Power Hungry* and *Tripwire* tasks, however, feedback indicates how many of the issues on the master list were in the respective categories and offers feedback about what was and was not chosen. The feedback includes suggestions for re-directing focus to other issues in order to broaden the student's awareness of the myriad of issues built into the scenario. An example of feedback for the critical issues task is provided in Figure 14.

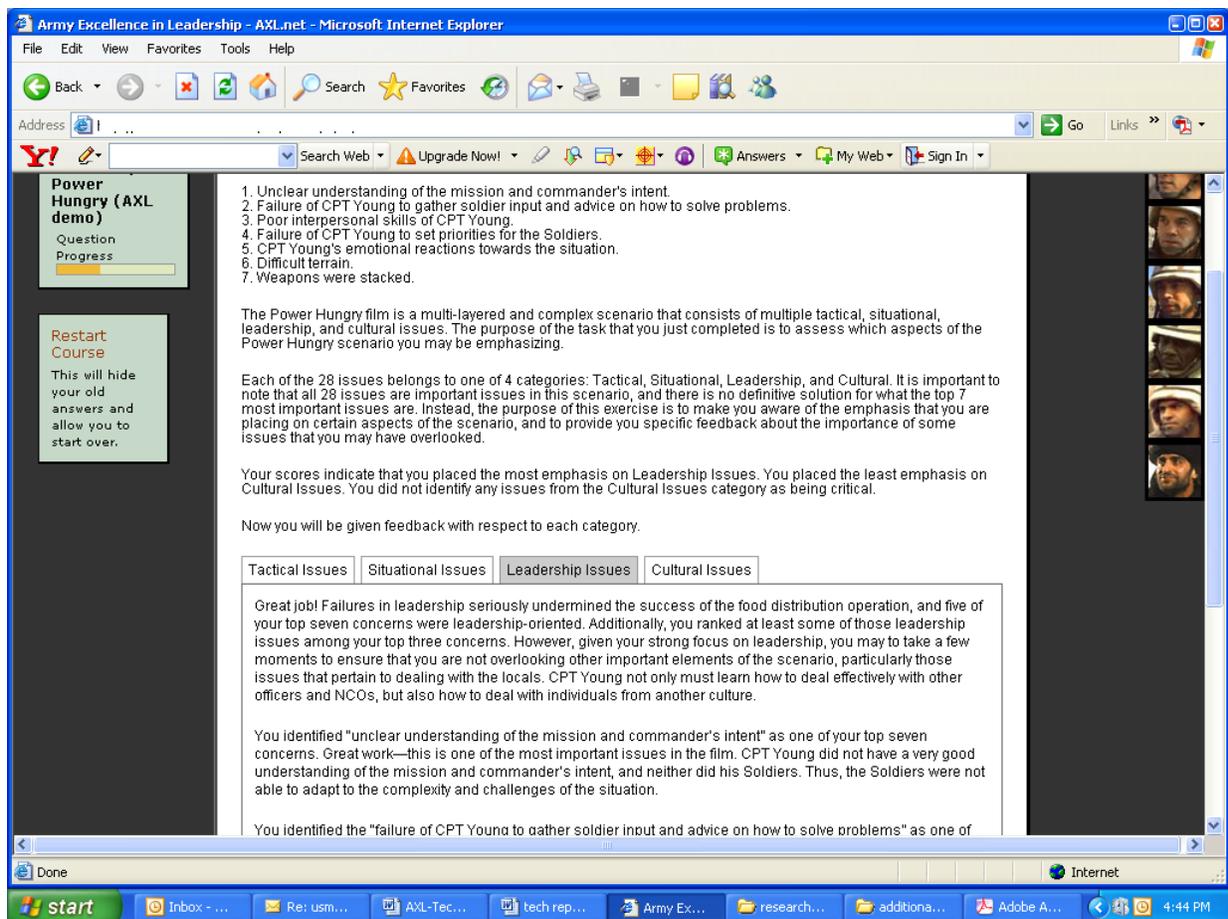


Figure 14. Screenshot of feedback delivered to the student after completing the critical issues task in *Power Hungry*. In the current screenshot, the student is receiving feedback on the leadership category. However, students can obtain feedback on the other three categories (Tactical Issues, Situational Issues, and Cultural Issues) by clicking on the tab for that category.

In addition to guidance and traditional tutoring techniques (e.g., providing feedback for answers to close-ended questions) embedded in the system, AXL.Net offers interactive tools and exercises that encourage a student to do “close-watching” of the filmed cases. Although AXL.Net is capable of supporting text-based cases, one of its strengths is handling rich media content. One tool offered within the system is the ability to “search” the filmed cases for specific information. This function is similar to the way some people skim books or use the index to find specific content within a text. With the filmed cases, this tool allows people to review interesting or noteworthy moments for them. Rather than force the student to recall specific lines from the script, the cases are annotated conceptually (e.g., the bag on the side of the road). An example of the video search tool is presented in Figure 15.

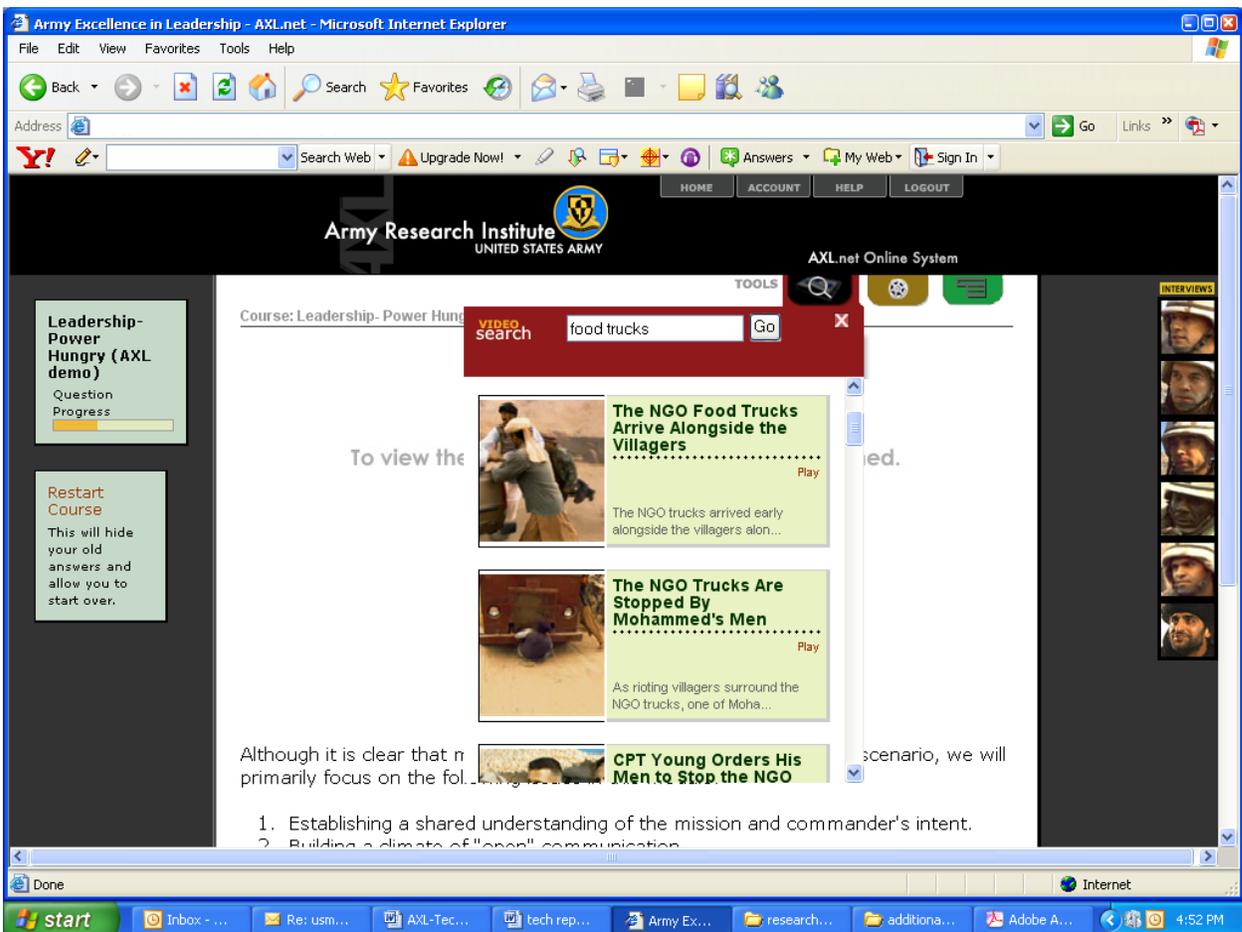


Figure 15. Screenshot of the video search tool being used to find segments of the film pertaining to the food trucks in *Power Hungry*. Students can click “play” to watch film segments of interest.

Another tool offered in AXL.Net is the ability to bookmark specific film references (See Figure 16). This tool offers similar functionality as making margin notes or highlighting the text. As an exercise, it requires the student to go back through the movie and find specific moments in the film. The video search tool previously described can also be used here so that the student does not need to watch the entire scenario again. However, even with the search capability, this exercise could be tedious. It is currently being used in remediation situations when the student is being prompted to review the movie more closely because he or she seems to lack comprehension of the essential elements of the movie – e.g., character roles, plot points.

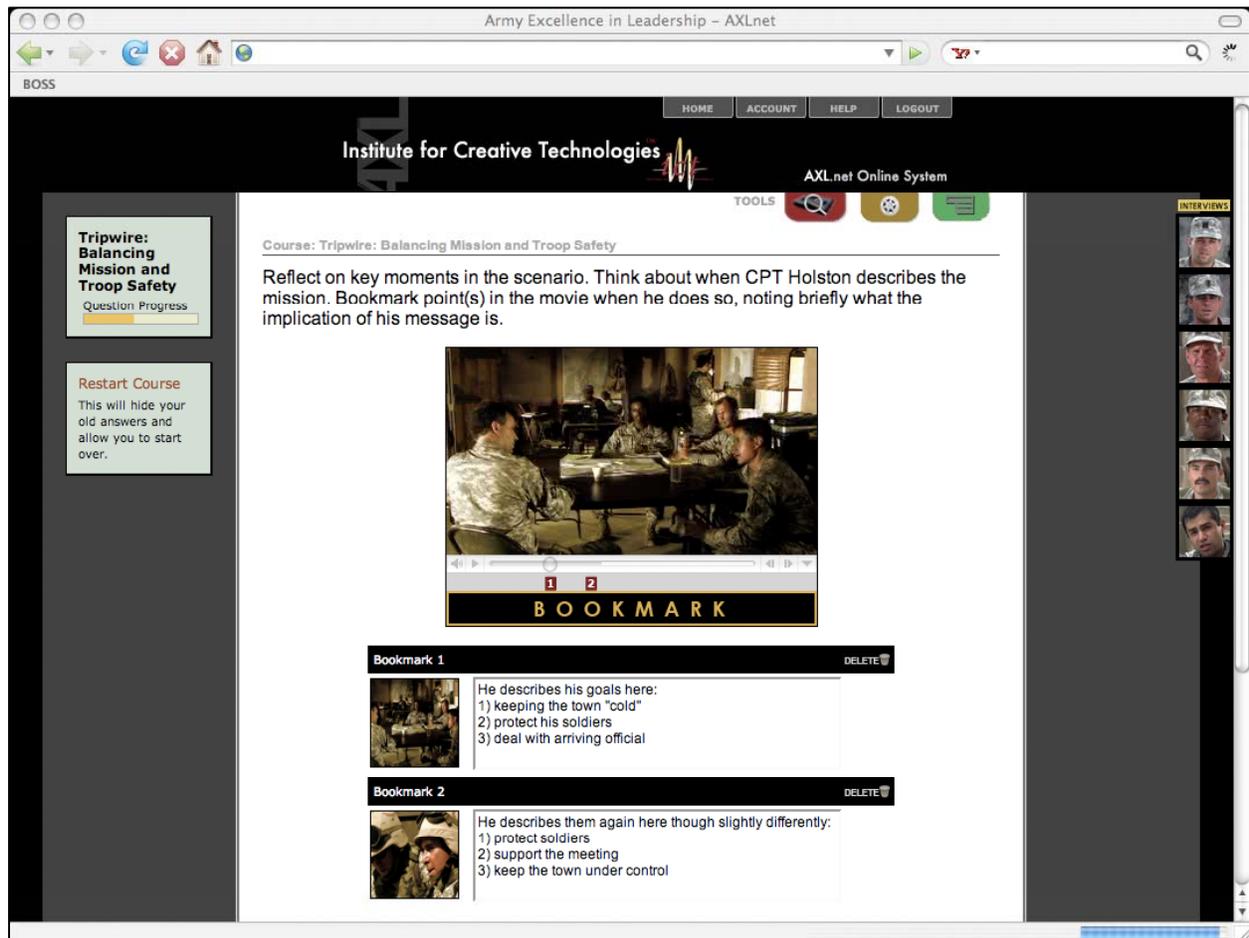


Figure 16. Screenshot with the video bookmarking tool.

A final feature of AXL.Net is the inclusion of a virtual character named “CPT Stewart.” Unlike the mentor in TLAC-XL, CPT Stewart is not a dynamic-audiovisual character, but is instead a two-dimensional static animated image that is paired with text. The purpose of CPT Stewart in the current set of AXL.Net modules is to serve more as a virtual peer who presents alternative points of view to challenge the thinking of students engaged with the system. An example of CPT Stewart is presented in Figure 17. While the CPT Stewart character is currently used in AXL.Net to portray alternative viewpoints of student peers, authorability of the AXL.Net system does permit course authors to use CPT Stewart to function in more of a “mentor-like” or “expert” capacity.

Features of the AXL system and how they relate to different aspects of case method instruction are summarized in Table 6.

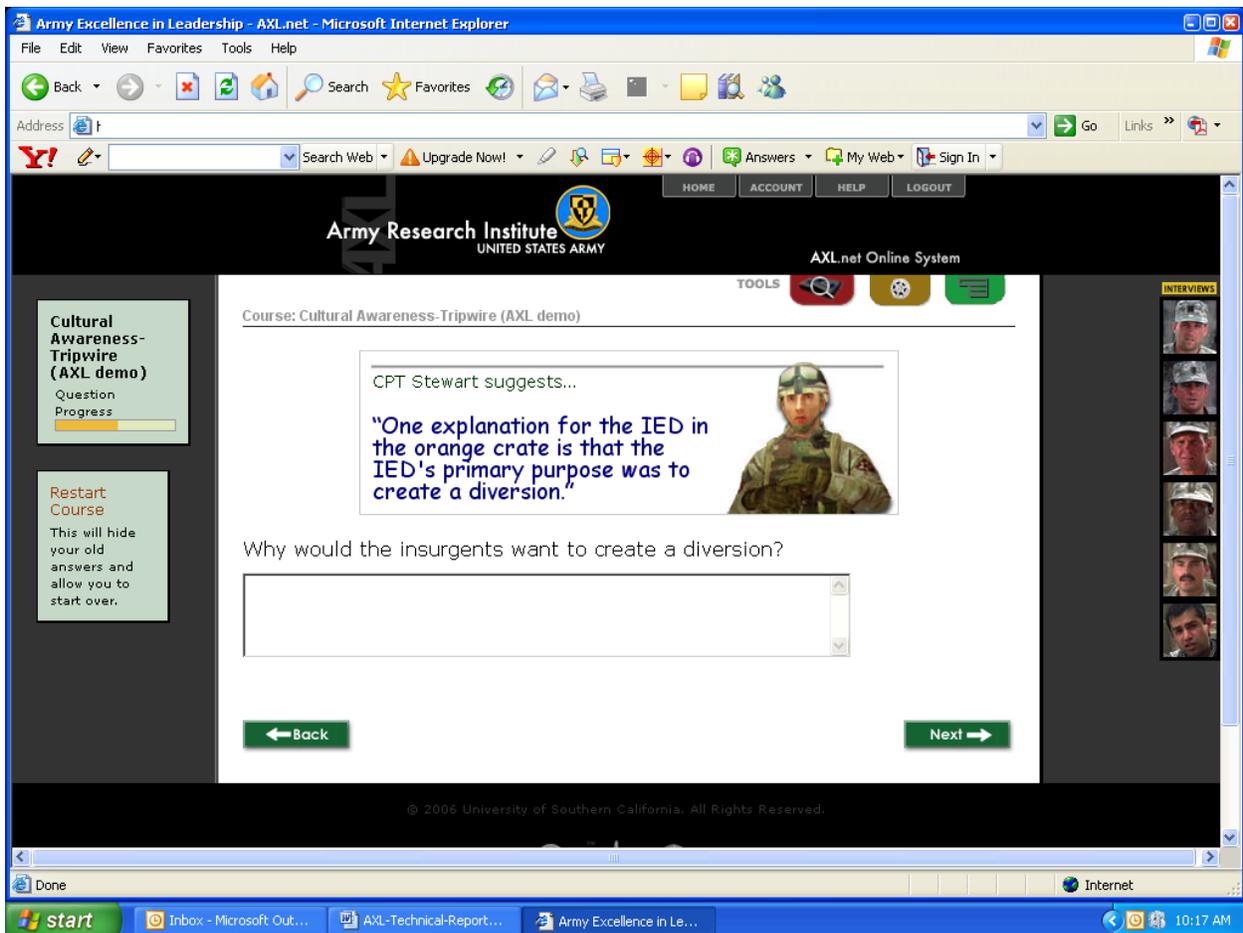


Figure 17. A screenshot from a Cultural Awareness module in *Tripwire*. CPT Stewart acts as a virtual peer during an instructional branch in which students incorrectly indicated that the IED was planted to kill an Iraqi official.

Table 6
Case Method Instruction Best Practices and Associated AXL.Net Functionality and Techniques

Phase of Case Method Instruction	Traditional Case Method Best Practice: Approach and Tactics	AXL.Net Functionality for Case Method Instruction
<p><u>View</u></p> <p><u>Description:</u> The student is exposed to the case.</p> <p><u>Purpose:</u> To communicate a realistic story that contains pedagogical value.</p>	<ul style="list-style-type: none"> • Provide case study • Provide background material and theory (e.g., textbooks, readings) 	<p>Included in modules:</p> <ul style="list-style-type: none"> • Provide filmed case study • Reference to Army Doctrine • Downloads of Doctrine and other related material. <p>Authoring capability for instructors:</p> <ul style="list-style-type: none"> • Ability to upload new cases (e.g., film, text-based documents) • Ability to upload reference materials for students (pictures, video, text) • Ability to create web links to internet sites of interest
<p><u>Familiarize</u></p> <p><u>Description:</u> The student reviews the case for comprehension.</p> <p><u>Purpose:</u> To ensure a basic understanding of essential scenario details such as characters, plot points, and critical events / experiences / decisions for discussion.</p>	<ul style="list-style-type: none"> • Ask questions to establish whether student understood the plot points of the case. • Explore specific plot points with goal of improving understanding of the case. • Identify “areas of interest” and events in the scenario that are interesting, significant, or otherwise worthy of discussion. 	<p>Included in modules:</p> <ul style="list-style-type: none"> • Close-ended questions to check for understanding (e.g., true-false, multiple choice) • Branching and remediation to improve comprehension • Bookmarking task to identify key elements in film • Provide feedback • Presentation of relevant film and character clips • Critical issues task to identify areas of interest <p>Authoring capability for instructors:</p> <ul style="list-style-type: none"> • Ability to create new close-ended questions • Ability to construct feedback based on incorrect and correct responses • Ability to create branched training better suited to different types of students

Phase of Case Method Instruction	Traditional Case Method Best Practice: Approach and Tactics	AXL.Net Functionality for Case Method Instruction
<p>Analyze</p> <p><u>Description:</u> The student investigates leadership issues related to the case.</p> <p><u>Purpose:</u> To engage in critical thinking about the case and to consider different points of view through deep analysis of the situation and the characters.</p>	<ul style="list-style-type: none"> • Begin with an area of interest identified in the previous step. • Ask exploratory questions to get students to think more about why events are significant and about the leadership issues embedded in the events. • Seek out different points of view. • Ask students to identify additional information that they need to consider in the situation. • Ask students to discuss characters' roles. • Identify root causes of issues. • Discuss theories about leadership issues involved. • Introduce and discuss other events/ issues that students did not identify but are among primary leadership issues in the case. 	<p>Included in modules:</p> <ul style="list-style-type: none"> • Use of open-ended questions to stimulate reflection and analysis • Character interview feature to explore character points of view • Small group discussion to present alternative points of view • Virtual peer, CPT Stewart, used to provide alternative perspective • Branching content to challenge student assumptions <p>Authoring capability for instructors:</p> <ul style="list-style-type: none"> • Ability to upload expert commentary or peer commentary to provide alternative points of view • Ability to create branches based on topic so that students can explore different lines of inquiry (e.g., explore the decision making aspects of the case versus explore the cultural issues of the case)
<p>Synthesize</p> <p><u>Description:</u> The student reviews the analysis of the case and demonstrates understanding.</p> <p><u>Purpose:</u> To synthesize information and codify the explicit, actionable knowledge (e.g., rules of thumb) about the leadership issues in the case.</p>	<ul style="list-style-type: none"> • Review the main points from the discussion. • Provide updates and additional knowledge acquired since the development of the case. • Reinforce the theories and its connection to the case. • Provide additional resources and materials. 	<p>Included in modules:</p> <ul style="list-style-type: none"> • Use of open-ended questions that relate scenario to experience, scenario to leadership concepts, or scenario to other hypothetical situations • Downloads of Army Doctrine and Command Climate Questionnaire • Static pages that review concepts covered during lesson • Instructor feature: aggregated student data to conduct after action reviews of content <p>Authoring capability for instructors:</p> <ul style="list-style-type: none"> • Ability to upload reference materials for students (pictures, video, text) • Ability to create web links to sites of interest • Ability to author static content

AXL.Net Pilot Modules

ICT delivered eight exemplar modules with the AXL.Net system: four for *Power Hungry* on the leadership topics of cultural awareness, communication, employing NCO expertise, and command climate, and four for *Tripwire* on the leadership topics of cultural awareness, balancing mission troop and safety, command climate and managing the self, and establishing trust. ARI created an additional 4 modules for demonstration and evaluation purposes using the authoring capabilities and the course modules designed by ICT; each film has one leadership module and one cultural awareness module. The modules were designed to be stand-alone modules that require between one and two hours to complete. The modules also were designed to be completed in small groups of students (typically between two and four) but without the need of an instructor or facilitator. However, it should be noted that these modules can be completed by a single person in a more traditional distance learning paradigm.

Each module was designed around the AXL case method approach:

1. **Review** learning objectives and be immersed in the case.
2. **Familiarize** with the basic story points – identify roles/responsibilities, story points, key events.
3. Critically **analyze** the case – consider stakeholder goals, cause/effect, alternate decisions.
4. **Synthesize** thoughts – develop rules of thumb, connect to personal experience/real situations.

As we developed modules in the AXL.Net online system, we considered three important elements: 1) learning objectives of the module; 2) how the case could be used to facilitate the acquisition of those learning objectives; 3) the learning experience for the student and the content of the module. Before AXL.Net modules were authored, learning objectives and teaching points were outlined. These learning objectives stemmed from the original interviews with deployed CPTs, recommendations from various Army instructors, the leadership literature and the tacit knowledge literature. Course content was developed with a training audience of junior officers in mind.

In the exemplar modules delivered by ICT, once the group of students enters a module, they are presented with an introductory screen that describes the overarching topic for the module as well as the sub-topics that will be discussed (typically between two and four sub-topics). After the students are oriented, they click the “Next” button to advance to the next screen. Figure 18 shows the opening screen for the *Tripwire* Cultural Awareness module with the green “Next” button in the lower right portion of the screen.

Students are then presented with the filmed case that will be the topic of their analysis. They are able to watch the entire movie online within the page. Students also can pause, rewind, or fast forward through the movie. Apart from the instructional flow of events (e.g., film, series of questions interspersed with additional character and media clips), the system does not apply many constraints on the student. As officers, students are expected to demonstrate some self-motivation and also should not require an instructor’s oversight to take the tasks seriously.

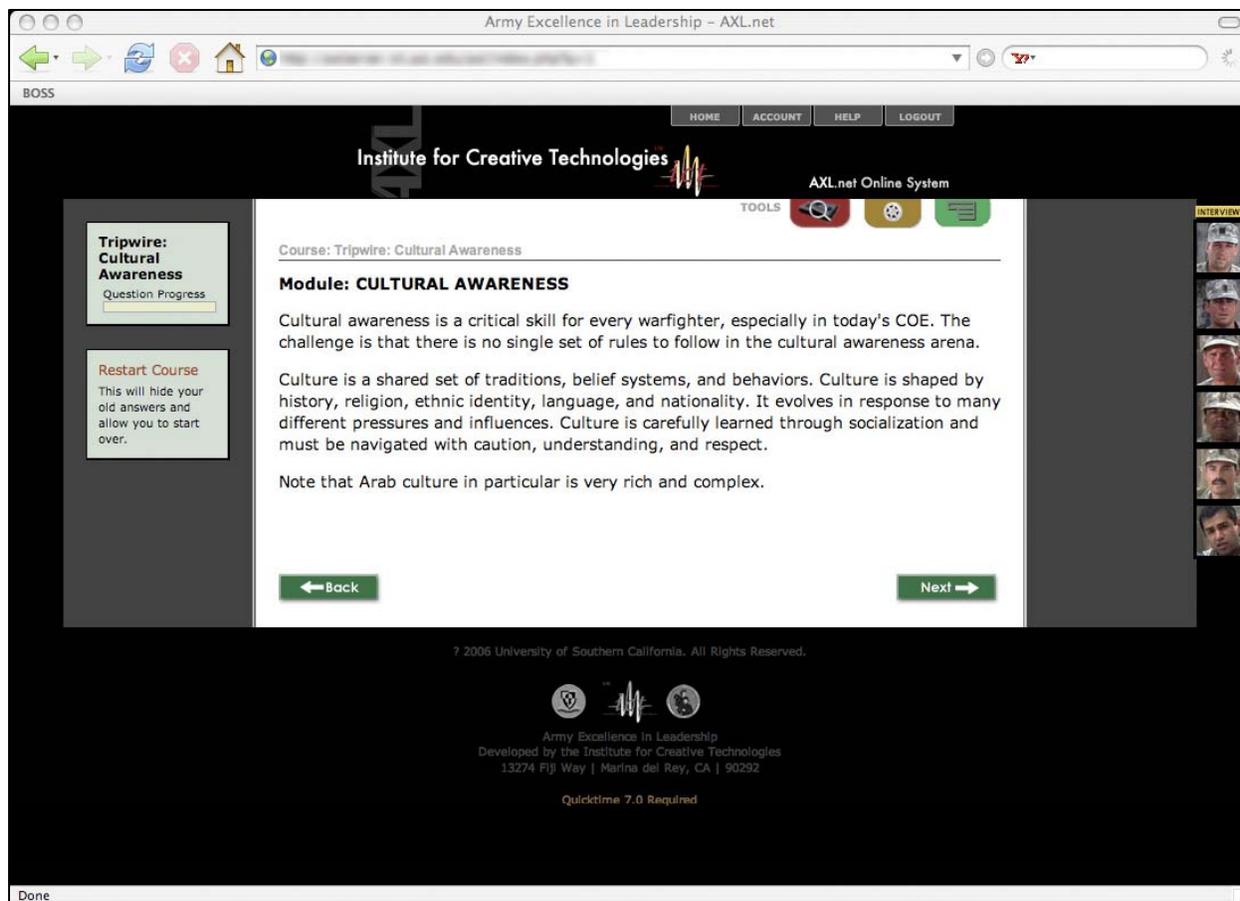


Figure 18. Screenshot of the AXL.Net *Tripwire* Cultural Awareness module.

After the students are done watching the movie, they are presented with the critical issues task described previously in this report. This will be the first opportunity for the group to discuss various events in the scenario and should help students begin the process of understanding each other’s point of view. At this early stage in the module, discussion will likely be wide-ranging because the module has not prompted students to focus their attention on a specific leadership or cultural issue. After completing the critical issues task, students will review their feedback and then move to a screen that reiterates the learning objectives for the module. Students then are introduced to the first of the module-specific questions.

Each module begins with a series of questions to ensure that students are familiar with key points of the case. In the case of the *Tripwire* “Balancing Mission and Troop Safety” module, the students are asked “To begin, what is your understanding of the battery’s mission?” Students discuss their answer to this question and then type their answer in a text box provided beneath the question. After proceeding to the next screen, they are prompted with a forced-choice question to demonstrate understanding of one of the characters in the case study: “CPT Holston felt the battery’s mission was to provide security for the upcoming arrival of an Iraqi official. Did CPT Holston have other concerns?” The students are given the option to choose yes or no. In the scenario, CPT Holston does have other concerns, and if the students confirm

that he does by choosing yes, they are asked to identify some of those other concerns. However, if the students believe he does not have other concerns and indicate so by choosing no, the system branches to a remediation path to further explore the various concerns of CPT Holston.

During remediation, students are given a bookmarking task to perform³: “Reflect on key moments in the scenario. Think about when CPT Holston describes the mission. Bookmark point(s) in the movie when he does so, noting briefly what the implication of his message is.” When the students do so, they should be reviewing at least one of two scenes: during the command brief when he describes he explains that the town they are in is “cold and settled and [he wants] to keep it that way” and “protect [the U.S. Army’s] own.” Another part of the film that students might identify is during a conversation between CPT Holston and his command team where he reiterates that he wants to keep the town under control and protect Soldiers.

After students complete the bookmarking exercise, they are once again prompted with the question “Does CPT Holston talk about anything else besides site security?” If the students still believe he is not aware, then the instructional design assumes they have not accessed the clips referenced above or else did not watch it closely enough. After the students proceed to the next screen, the system displays a page that contains an embedded clip of the second command team conversation where CPT Holston states his other interests. Students also are asked “Do you think CPT Holston is also concerned about taking care of his Soldiers?” In this way, students are directed to the information they need to understand a basic element of the story. This point is reiterated on the next page with an intervention by the virtual peer CPT Stewart who says, “In my opinion, CPT Holston indicates in the clip that he is concerned with protecting his Soldiers, in addition to providing security for the official and maintaining security in the town.” CPT Stewart is used throughout the exemplar modules as a mechanism for stimulating discussion or introducing points that students might not have generated on their own. After completing the remediation process, the remediation path rejoins with the analysis question that the non-remediated students also were asked: “CPT Holston does seem to focus on issues other than site security. Specifically, note what you think were some of CPT Holston's other interests and goals.”

The familiarization and analysis process continues throughout the module so that students gradually analyze various components of the case. Toward the end of the module, AXL.Net modules prompt students to begin synthesizing the concepts and relating them back to their own experiences. After completing questions in the module, students are presented with summary slides that review what students should have learned from the module and what key points they should remember.

Research on AXL.Net

An initial pilot test was conducted with one of the eight modules delivered, the *Tripwire* “Cultural Awareness” module. This research is discussed in greater detail in Zbylut et al. (2007), but the findings are summarized briefly here. First, results indicated that junior officers’

³ The bookmarking tasks require students to identify relevant segments from the film by scanning the film contents. However, some remediation paths do not include a bookmarking task. Instead, brief film segments (e.g., 30-60 seconds) that contain the key details missed by the student are replayed for the student to review.

reactions to both the film and overall instructional approach were positive. With respect to the *Tripwire* film, officers rated the film as emotionally engaging and realistic, the characters multifaceted, and the film as not confusing. Of particular note is that officers overwhelmingly indicated that they would prefer to watch a film rather than read a case study or listen to a PowerPoint presentation. With respect to the module and instructional approach as a whole, officers indicated that the cultural awareness module was valuable and useful. Officers also indicated that they could transfer something that they learned during instruction to their activities as a leader and indicated that the module was thought-provoking. Specifically, officers indicated that the module made them think about the *Tripwire* scenario in a way different from a way in which they would usually approach the scenario. Because one objective of case method instruction is to encourage students to broaden their thinking and challenge their perspectives (Crittenden, Crittenden, & Hawes, 1999; Jennings, 1996; Kreber, 2001; Richardson, 1994; Stewart & Dougherty, 1993), these findings are encouraging.

In addition to reaction criteria, results indicated that officers learned from the cultural awareness module. After having completed the module, officers demonstrated better judgment about particular courses of leader actions that could have been adopted during *Tripwire*. Officers also placed more emphasis on cultural issues embedded in the *Tripwire* scenario after having completed the AXL.Net module. In sum, results from the pilot investigation indicated that the AXL approach is an effective method for delivering interactive multimedia case method instruction. Moreover, these results are particularly compelling given that a majority of the officers in the sample had been deployed at least once to Iraq or Afghanistan. Despite their significant experience in Middle Eastern environments, officers still found AXL.Net useful and informative.

Web 2.0 and Authorability

AXL.Net takes advantage of the worldwide web, particularly for usability and Web 2.0 innovations. Core principles of Web 2.0 applications include dynamic user-generated content (remixability), lightweight data and service structures, and simple (but rich) user experiences (O'Reilly, 2005). By applying these core principles to both the system infrastructure design and the user interface design, the result was a system that could be easily modified or extended. The system takes advantage of Asynchronous JavaScript and XML (AJAX) techniques to reduce load time and bandwidth requirements for the media-heavy AXL.Net. AXL.Net also was implemented as a dynamic content management system, making authoring and customization of toolsets easier for both instructors and system developers. AXL.Net applies the transparent integration of media formats, such as image file formats JPG, GIF, and BMP, as well as movie file formats for QuickTime and Windows Media that are possible with the web.

AXL.Net was structured to maximize innovation opportunities by its users. AXL.Net is actually designed for two different users: (1) students and (2) instructors or course authors. It should be noted that the primary focus of the AXL project was on the student experience in a multimedia, interactive learning environment. However, because of instructor and trainer interest in the AXL case studies, it was determined that some authoring capability would be built into the AXL system while it was being created. As a result, AXL.Net is not limited to the pre-created modules or filmed cases. Instructors and instructional developers have the ability to

upload new cases into the AXL system or take *a priori* modules and adapt the content to their own instructional goals. The newly authored content can be shared and used by other instructors, if desired. The authoring tools were and continue to be used by the AXL.Net development team to create all of the module content within the system – including the exemplar modules provided with the AXL.Net system.

With the exception of the filmed cases, *Tripwire* and *Power Hungry*⁴, the critical issues task for each of those scenarios, and the character interviews, instructional content in the AXL.Net system is completely authorable. While the *Tripwire* and *Power Hungry* scenarios are not authorable, the modules associated with those films are. Additionally, instructors can upload new case studies (film or text-based) and construct new modules around those cases. Currently, instructors can author or insert text, multimedia (e.g., movies, images, documents for download), and questions (e.g., multiple choice, short answer). Instructors can author feedback given to students during the module. Instructors can define multiple paths that students can take depending on the students' responses (e.g., for remediation, to investigate an issue more deeply).⁵

SUMMARY AND CONCLUSIONS

The starting point for the Army Excellence in Leadership project was based on several observations. First, knowledge about leadership is largely tacit in nature, and as such it is both difficult to articulate and to transfer to others (Sternberg et al., 2000). Second, and consistent with the idea that leadership relies on tacit knowledge, many leaders become effective through experience (McCall et al., 1988). Third, case method instruction is a way of enabling students to learn from the experiences of others. Moreover, reflection on the stories of others can be used as a technique for accelerating the acquisition of tacit knowledge without actually having to live through the experience (Matthew et al., 2005). While case method instruction was initially used in business and law schools, it is now widely used in universities worldwide across a wide range of disciplines (Golich et al., 2000). Finally, learning in case method analysis occurs in stages. A good case is rich in detail and provides the student with a vicarious experience worthy of study and reflection. We believe that this is one of the qualities of this method of learning that make it appropriate for the acquisition of tacit knowledge, and it highlights the importance of building the case from the experiences of others. Once the student is familiar with the case, the work commences of analyzing and synthesizing a position. The role of the instructor (or computer) is to ask questions that guide the initial analytical process, but also to encourage a context in which different points of view can be heard, challenged, and integrated into an explanation and a coherent set of recommendations for a plan of action. The work described in this report indicates that these observations could be applied effectively to an online environment and are already bearing fruit in helping to accelerate the development of Army leaders.

⁴ Fort Bliss worked with ICT to develop a third filmed case study called *Red Tight*, which is an air defense scenario. *Red Tight* is available in AXL.Net, but does not have any course material associated with it.

⁵ Current work on AXL targets how to make AXL.Net SCORM-compliant. However, instructors in the AXL system are able to view the answers of individual students, as well as look at the answers of students in the aggregate by class (or by forming a group by selecting student names of past users of the system). Researchers can export data collected in AXL.Net to an Excel Spreadsheet, as well as use the instructor viewing functions.

One Case, Many Uses

The *Power Hungry* and *Tripwire* cases have been found to be memorable and engaging. That the *Power Hungry* case is powerful a tool is evidenced by its widespread use in a variety of instructional settings. These include U.S. Army classrooms across branches, in individual and combat team training situations, in U.S. Army officer pre-commission training, as well as outside the Army by Project Kaleidoscope and the National Academy of Engineering. These results indicate that a single case, when properly authored, can be used to explore many different leadership issues set in an operational context.

Broad Applicability of AXL.Net to Leader Development

The results from early pilot tests with AXL.Net are encouraging. The differences seen before and after interacting with an AXL.Net module is an important first step in establishing the efficacy of the approach. Perhaps even more encouraging, however, is the anecdotal and qualitative feedback from Soldiers with deployment experience who have found the AXL.Net learning experience to address the complexity of the situations that they are facing. Furthermore, ICT has begun additional testing with the University of Southern California's Marshall School of Business to develop AXL.Net modules for junior business leaders. Early tests indicate that the AXL.Net system and approach applies to business contexts in addition to military contexts. Thus, the online interactive approach utilized by AXL appears to have generalizability across disciplines. The authorability of AXL.Net will ensure that it remains relevant to the needs of instructors and students over time.

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APPENDIX A

TLAC QUESTIONS AND TLAC-XL LEADERSHIP ISSUES

The Think Like a Commander (TLAC) framework developed by the Army Research Institute and the faculty of the U.S. Army Command and General Staff College uses eight basic questions to frame a discussion about a tactical situation. The topics covered by these questions include mission, enemy, terrain, assets, timing, bigger picture (context), visualize the battlefield, and contingency plans. The initial TLAC-XL prototype uses the eight TLAC topics as a launching point for a deeper analysis of the leadership issues that are embedded in the Power Hungry case. This appendix summarizes the original TLAC questions related to each topic, the questions that the TLAC-XL synthetic mentor asks on the topic, and the leadership drilldown questions that lead to an opportunity to interview a character from the story. The interview gives the student an opportunity to delve more deeply into the perspective of one of the characters—the search to understand each point of view reveals more information for the leadership analysis. For each of the drilldown discussions there is a summary of the relevant leadership issues, a character whom the student may interview, and a set of questions the mentor asks before and after the interview with a character. Since this was an experimental prototype, not all of the TLAC topics have leadership issues and characters to interview.

1. Mission

Topic Area	Instructional Flow of Events in TLAC-XL
<p><i>TLAC questions on Mission:</i></p> <p>c. What is the mission? d. What is the commander’s intent?</p>	<p><i>TLAC-oriented questions asked by mentor:</i></p> <p>c. Let’s begin by talking about the mission. What is your understanding of the mission and the commander’s intent? d. What do you think was CPT Young’s understanding of the mission and the commander’s intent?</p>
<p><i>TLAC-XL issues and information embedded in scenario:</i></p> <p>Issues: Command Influence, Unity of Command</p> <p>Information: CSM Pullman gave CPT Young additional information about the commander’s intent.</p>	<p><i>Priming question asked by mentor:</i></p> <p>c. How did Command Sergeant Major Pullman’s presence influence CPT Young’s understanding of the mission and the commander’s intent?</p> <p><i>Introduction of character and issue prompt by mentor:</i></p> <p>d. Let’s talk with Command Sergeant Major Pullman directly. You can ask him questions related to the influence that he had on CPT Young.</p> <p><i>Character interview opportunity with CSM Pullman:</i></p> <p>d. Free text interface for the student to type in any question. e. CSM Pullman answers question. f. Repeat interview process until student decides to end interview.</p> <p><i>Follow-up question asked by mentor:</i></p> <p>c. What do you think of Command Sergeant Major Pullman’s comments on the influence he had on Captain Young?</p> <p><i>Feedback by mentor based on natural language understanding:</i></p> <p>d. I {agree/disagree}. Command Sergeant Major Pullman may not believe that he had an influence on CPT Young. However, his presence certainly caused CPT Young to question his understanding of the mission.</p>

TLAC-XL issues and information embedded in scenario:

Issues: Communication, Mission Clarity

Information: CPT Young doesn't have a clear understanding of the mission.

Priming question asked by mentor:

- c. How did the clarity of the mission change over time for CPT Young?

Introduction of character and issue prompt by mentor:

- d. Let's talk with CPT Young directly. You can ask him questions related to the clarity of his mission.

Character interview opportunity with CPT Young:

- d. Free text interface for the student to type in any question.
- e. CPT Young answers question.
- f. Repeat interview process until student decides to end interview.

Follow-up question asked by mentor:

- c. What do you think of CPT Young's comments on the clarity of his mission?

Feedback by mentor based on natural language understanding:

- d. I {agree/disagree}. CPT Young did not have a clear understanding of the mission throughout. He should have asked more questions when he was first briefed. He should have questioned the presence of Command Sergeant Major Pullman. He should have notified battalion headquarters that the brigade command sergeant major was present at the site.
-

2. Enemy

Topic Area	Instructional Flow of Events in TLAC-XL
<p><i>TLAC questions on Enemy:</i></p> <ul style="list-style-type: none">a. What can the enemy do?b. How will I know? (indicators)c. How is that information linked to decisions?	<p><i>TLAC-oriented questions asked by mentor:</i></p> <ul style="list-style-type: none">a. Who do you think stood in the way of accomplishing this mission? Were there competing interests to the accomplishment of this mission?b. CPT Young may have seen things differently. What was CPT Young's understanding of the local Afghan interests with respect to this mission? How was this understanding informed?
<p><i>TLAC-XL issues and information embedded in scenario:</i></p> <p>Issues: Communication, Cultural Awareness</p>	<p><i>Priming question asked by mentor:</i></p> <ul style="list-style-type: none">a. Omar, the Afghan warlord, isn't seen as opposing CPT Young's mission at first. What assumptions did CPT Young make about Omar and his men?
<p>Information: Omar the warlord isn't thought of as directly opposing CPT Young's mission initially.</p>	<p><i>Introduction of character and issue prompt by mentor:</i></p> <ul style="list-style-type: none">b. Let's talk with Omar the Afghan warlord directly. You can ask him questions related to the assumptions that CPT Young made about him.
	<p><i>Character interview opportunity with Omar:</i></p> <ul style="list-style-type: none">a. Free text interface for the student to type in any question.b. Omar answers question.c. Repeat interview process until student decides to end interview.
	<p><i>Follow-up question asked by mentor:</i></p> <ul style="list-style-type: none">a. Having heard from Omar, what should CPT Young have assumed about him?
	<p><i>Feedback by mentor based on natural language understanding:</i></p> <ul style="list-style-type: none">b. I agree (disagree). CPT Young needed to better understand Omar and his relationship with the local population. This information was needed before any cooperation began. For Omar and Mohamed, food equals power. The success of their plan depended on CPT Young's ignorance of who they were, how they were related to one another and to the local clan.

3. Consider effects of the terrain

Topic Area	Instructional Flow of Events in TLAC-XL
<p><i>TLAC questions on Terrain:</i></p> <ol style="list-style-type: none">What do you know about the terrain or the geography?How can you use it to your advantage?How can it be a disadvantage?	<p><i>TLAC-oriented questions asked by mentor:</i></p> <ol style="list-style-type: none">Let's move on to the effects of terrain. How could the terrain and the geography be viewed as an advantage or a disadvantage in this situation?Second LT Wychowski had to take terrain into consideration when preparing the food distribution site. What terrain issues did he have?
<p><i>TLAC-XL issues and information embedded in scenario:</i></p> <p>Issues: Developing Subordinates, Model of Command, Command Climate, Directing and Supervising Subordinates, Communication.</p> <p>Information: 2LT Wychowski has problems establishing a security zone for the site.</p>	<p><i>Priming question asked by mentor:</i></p> <ol style="list-style-type: none">What was the reason that Wychowski was having trouble with the food distribution site preparation? <p><i>Introduction of character and issue prompt by mentor:</i></p> <ol style="list-style-type: none">Let's talk with Second LT Wychowski directly. You can ask him questions related to his preparation of the food distribution site. <p><i>Character interview opportunity with 2LT Wychowski:</i></p> <ol style="list-style-type: none">Free text interface for the student to type in any question.2LT Wychowski answers question.Repeat interview process until student decides to end interview. <p><i>Follow-up question asked by mentor:</i></p> <ol style="list-style-type: none">Having heard from LT Wychowski, what do you think was the root cause of his problems with the food distribution site? <p><i>Feedback by mentor based on natural language understanding:</i></p> <ol style="list-style-type: none">I agree (disagree). CPT Young created a command climate that discouraged LT Wychowski from asking critical questions and from asking for clarification. However, this does relieve LT Wychowski of his responsibility to request clarification when necessary. It will be important in LT Wychowski's development as a leader that he not adopt CPT Young's model when he becomes a company commander himself.

4. Use all assets available

Topic Area	Instructional Flow of Events in TLAC-XL
<p><i>TLAC questions on Assets:</i></p> <ul style="list-style-type: none">a. What assets do you have available that you can use?b. What assets does higher HQ have?c. What are the second & third order effects of using other assets?	<p><i>TLAC-oriented questions asked by mentor:</i></p> <ul style="list-style-type: none">a. Let's move on to the topic of available assets. What were the primary assets available to this company in this mission?b. CPT Young may not have taken advantage of all of the assets available to him. How could he have better used his assets?
<p><i>TLAC-XL issues and information embedded in scenario:</i></p>	<p><i>Priming question asked by mentor:</i></p> <ul style="list-style-type: none">a. How was the experience of First Sergeant Jones used as an asset by CPT Young?
<p>Issues: Motivation, Trust, Directing and Supervising Subordinates, Communication, Respect for Experience</p>	<p><i>Introduction of character and issue prompt by mentor:</i></p> <ul style="list-style-type: none">b. Let's talk with SGT Jones directly. You can ask him questions related to his experience, and his relationship with CPT Young.
<p>Information: CPT Young does not see First Sergeant (1SG) Jones' experience is not seen as an asset.</p>	<p><i>Character interview opportunity with 1SG Jones:</i></p> <ul style="list-style-type: none">a. Free text interface for the student to type in any question.b. 1SG Jones answers question.c. Repeat interview process until student decides to end interview.
	<p><i>Follow-up question asked by mentor:</i></p> <ul style="list-style-type: none">a. Having heard from First Sergeant Jones, how do you think CPT Young should have capitalized on the experience of First Sergeant Jones?
	<p><i>Feedback by mentor based on natural language understanding:</i></p> <ul style="list-style-type: none">b. I agree (disagree). CPT Young needed to foster a command climate where the experience of his men was valued. Respect for the experience of First Sergeant Young will be critical to the success of this company.

5. Consider timing

Topic Area	Instructional Flow of Events in TLAC-XL
<i>TLAC questions on Timing:</i> <ul style="list-style-type: none">a. What is the first decision we need to make?b. How much time do we have to make a decision?c. How critical is time in this situation?	<i>TLAC-oriented questions asked by mentor:</i> <ul style="list-style-type: none">a. Let's move on to consider issues related to timing. In what ways do you see issues of timing to be critical in this scenario?b. Timing becomes particularly important as the NGO trucks are approaching. What did CPT Young and his men believe about the importance of timing with relation to these trucks?
<i>TLAC-XL issues and information embedded in scenario:</i> Issues: Communication, Shared Vision of Intent, Directing and Supervising Subordinates, Command Climate Information: 1LT Perez failed to stop the NGO trucks and left the site without informing CPT Young	<i>Priming question asked by mentor:</i> <ul style="list-style-type: none">a. The XO of this company, LT Perez, was tasked with contacting and controlling the timing of the NGO trucks. What was the main problem that made him ineffective? <i>Introduction of character and issue prompt by mentor:</i> <ul style="list-style-type: none">b. Let's talk with LT Perez directly. You can ask him questions concerning the NGO trucks. <i>Character interview opportunity with 1LT Perez:</i> <ul style="list-style-type: none">a. Free text interface for the student to type in any question.b. 1LT Perez answers question.c. Repeat interview process until student decides to end interview. <i>Follow-up question asked by mentor:</i> <ul style="list-style-type: none">a. Having heard from LT Perez, what do you see as the main problem that made him ineffective in this mission? <i>Feedback by mentor based on natural language understanding:</i> <ul style="list-style-type: none">b. I agree (disagree). LT Perez did not share the same vision of the intent of this mission as CPT Young. He did not understand that site preparation and stopping the NGO convoy were both essential aspects of the mission. LT Perez needed to increase the time available for preparing the food distribution site by delaying the NGO trucks at a safe distance. He also needed to make sure the site was adequately prepared and ready to accept the truck convoy. CPT Young's failure was in not creating a shared vision of intent with his subordinate officers.

6. See the bigger picture

Topic Area	Instructional Flow of Events in TLAC-XL
<i>TLAC questions on <u>The Bigger Picture</u>:</i> a. How does our operation support the bigger plan? b. Given this problem, what are the implications to the tactical situation? c. Are there strategic or operational implications?	<i>TLAC-oriented questions asked by mentor:</i> a. Let's move on to consider the bigger picture. In your opinion, how does a food distribution operation like this one fit into a bigger plan? b. How did the Soldiers in this company view the bigger picture, and how did this affect their operations or strategies?

7. Visualize the battlefield

Topic Area	Instructional Flow of Events in TLAC-XL
<i>TLAC questions on <u>Visualizing the Battlefield</u>:</i> a. How do we visualize the battlefield right now in terms of time, space, and forces? b. What will the battlespace look like in 30 minutes? 1 hour? Longer? c. How do you see the end state? Describe it. d. How can this situation get worse?	<i>TLAC-oriented questions asked by mentor:</i> a. Let's move on and try to visualize the battlefield. What do you think will happen next in this situation? What are the branches and sequels? b. CPT Young was certainly upset about how things turned out. How do you think he visualized the battlefield during this operation?

8. Consider contingencies and remain flexible

Topic Area	Instructional Flow of Events in TLAC-XL
<i>TLAC questions on <u>Contingencies</u>:</i> a. What can we do in our planning and preparation to avoid or mitigate this situation? b. What branches or sequels should we consider? c. What information requirements do we have for those branches?	<i>TLAC-oriented questions asked by mentor:</i> a. Let's conclude by talking about contingencies and flexibility. If you were the company commander in this mission, what contingencies would you have planned for? b. How would you characterize the flexibility of CPT Young? Did flexibility play a role in how this mission turned out?

APPENDIX B

RESEARCH ON SCENARIO DIFFERENCES WITH RESPECT TO AFFECTIVE, COGNITIVE, AND PERSONALITY INDICES⁶

Overview

Research was conducted to examine how effective different types of media (film, PowerPoint, and text) were for presenting a scenario/case study. A variety of criteria were used, including memory of scenario details, memory of character dialog, emotional reactions to the materials, and personality profile of the protagonist. Eighty-eight undergraduate participants from a Midwestern university participated in the study for general psychology course credit. Participants ranged in age from 18 to 31, with an average age of 19.48 years ($SD = 2.09$). Approximately 53% of the participants were female, and approximately 47% were male.

Design and Procedure

Participants were randomly assigned to one of three scenario conditions: film, PowerPoint, or text. Each scenario condition presented the *Power Hungry* story delivered in a different form of media. The film condition ($n = 31$) represented the highest level of media-richness of the *Power Hungry* story, with full audio and moving images of characters and story activities. The PowerPoint condition represented a lower level of media-richness and fidelity than the film. In the PowerPoint condition ($n = 28$), over 100 still images from the *Power Hungry* film were used in conjunction with the complete audio soundtrack from the *Power Hungry* film. Rather than appearing like a standard PowerPoint presentation found in lectures and briefings, the PowerPoint version of *Power Hungry* is closer in presentation to a historical documentary that uses still photos and art work in conjunction with narration and recreated character dialog. The PowerPoint version of *Power Hungry* represents technology that is readily accessible to PowerPoint savvy instructors who wish to use something other than a paper-based case study in their classrooms. An image from the PowerPoint version of the scenario is presented in Figure B-1.

Lastly, the text condition ($n = 29$) represented the least media-rich scenario condition. In this condition, students read a paper-based version of the story depicted in the film. The paper-based version of *Power Hungry* is written as a six-page short story, with character dialog from the film replicated verbatim as text. An excerpt from the scenario is presented in Figure B-2, and the complete text-based version can be found in Zbylut and Ward (2004b). After viewing or reading the scenario, students then completed a series of measures designed to gather their reactions to the scenario.

⁶ This research was conducted primarily by Jason N. Ward and Michelle L. Zbylut.



Figure B-1. Screenshot from the PowerPoint version of *Power Hungry*.

CPT Young walked toward the command center, which was located on a relatively flat area near one of the ridges. Six armed Soldiers stood guard over two camouflage tents. The second tent was CPT Young's tent and contained a table and some chairs. A cautious-looking Lieutenant Perez in his late twenties stood near the tent and held a map. Next to LT Perez stood a powerfully built African-American in his late forties. He was a seasoned non-commissioned officer (NCO) named First Sergeant Jones.

CPT Young approached the lieutenant and first sergeant and saluted. LT Perez and 1SG Jones returned the salute. CPT Young looked at LT Perez pointedly and asked, "How's it going, lieutenant? What's your thinking here?"

LT Perez, pointing to the map replied, "It's going very well, sir. Villagers enter along this road below us. Road Alpha One. They exit ninety degrees to the East."

CPT Young then asked, "And the NGO trucks come in...?"

Perez pointed to the left and said, "...Road Bravo Three. We'll stage them off the road, close to us. That'll leave a path for the villagers' departure."

CPT Young, continuing his questioning, asked, "Aren't the trucks due at 1500 hours?"

"Affirmative, sir," replied LT Perez.

CPT Young looked across the landscape at the filming crew. "Sergeant Major Pullman's crew?" he asked LT Perez.

LT Perez replied, "Yes, sir. Brigade's been filming for about an hour."

"How many food distribution ops have you done, Perez?" CPT Young inquired.

"First time, sir," LT Perez replied matter of factly.

CPT Young, looking out over the food distribution site, stated, "Gentlemen, we are responsible for the lives of one-hundred-twenty-two United States Soldiers. We do this thing right! I've done two of these ops. Not a lot, but enough to know that this one could go south on us." CPT Young paused for dramatic effect before continuing. "The site stinks. Soft sand, a wide perimeter that's going to spring more leaks than the Titanic, and only half the time we need to turn it into the world's largest McDonald's."

Figure B-2. Excerpt from the text-based version of *Power Hungry*.

Measures

Self-Reported Arousal. After exposure to the scenario, participants completed five self-report items from Mehrabian and Russell's (1974) arousal scale. Items were anchored with bipolar adjectives (relaxed/stimulated, calm/excited, sluggish/neutral, dull/jittery, and sleepy/wide awake) on a nine-point scale ranging from -4 to +4. Arousal scores were computed as the mean of the five items ($\alpha = .86$). Positive and high scores indicate high energy, while negative scores indicate low energy.

Positive and Negative Affect Schedule (PANAS). After completing the arousal instrument, participants completed Watson, Clark, and Tellegen's (1988) Positive and Negative Affect Schedule (PANAS). The PANAS consists of 20 adjectives, each anchored on a 5-point scale ranging from 1 (*very slightly or not at all*) to 5 (*extremely*). Participants were asked to indicate to what extent they experienced each emotion during the survey. Ten items on the PANAS reflected positive affect, and included emotions such as enthusiastic, proud, and alert. The remaining 10 items reflected negative affect, and included items such as distressed, upset, hostile, and nervous. Positive affect ($\alpha = .90$) was operationalized as the mean across the 10 positive items and negative affect ($\alpha = .89$) was operationalized as the mean across the 10 negative items.

Memory of Character Dialogue. Participants completed five multiple-choice items that asked them to select the character responsible for uttering a specific phrase in the story. An example is provided below. Memory of character dialogue was operationalized as the percent of items answered correctly.

- Which character said, "Sir, I heard him say he wants to rethink the fencing?"
- a) Captain Young
 - b) First Lieutenant Perez
 - c) Second Lieutenant Wychowski
 - d) Sergeant Finn

Memory of Scenario Details. Eight multiple-choice items assessed the extent to which participants recalled specific details from the scenario. Two examples of questions are provided below. Memory of scenario details was operationalized as the percent of items answered correctly.

- Captain Young took over command of the food distribution site because the prior commander
- a) was reassigned elsewhere.
 - b) was notified of a death in the family.
 - c) was critically wounded.
 - d) needed his appendix removed.

The primary reason that Command Sergeant Major Pullman was on location was to

- a) help manage the food distribution to the villagers.
- b) direct people who were videotaping the food distribution.
- c) assume command in the event that Captain Young failed.
- d) assist Captain Young in dealing with the local population.

Personality Ratings of CPT Young. One of the original research questions early in the AXL project was the question of whether or not characters had more “personality” when depicted in story-based films. In order to assess whether CPT Young character’s was being depicted similarly across the three types of presentation, participants were asked to provide ratings of CPT Young’s personality on the “Big Five” factors of personality. These five factors were extraversion, openness to experience, agreeableness, conscientiousness, and emotional stability. The five factor model was selected as a basis for measurement because personality research suggests that human personality can be broadly described using five factors of personality (e.g., Judge & Ilies, 2002; Paunonen, Jackson, Trzebinski, & Fostreling, 1992). Participants were provided definitions of each personality trait, and these definitions were provided below in Figure B-3. After reading the definitions, participants were told to evaluate CPT Young on each of the five factors. Ratings were anchored on a five-point scale ranging such that 1 represented the opposite of the trait (e.g., extremely introverted as opposed to extremely extraverted) and 5 represented embodiment of the trait (e.g., extremely introverted). A rating of 3 represented a neutral rating for the trait (e.g., neither introverted not extraverted).

EXTRAVERSION: Individuals who are extraverted enjoy social situations. They are outgoing, sociable, talkative, assertive, and active. Conversely, introverted individuals tend to be shy and apprehensive in social situations.

OPENNESS TO EXPERIENCE: Individuals who are open to experience are broad-minded and like to try new things. They tend to be curious, cultured, creative, and imaginative. Conversely, individuals who are closed to experience do not like to try new things or be exposed to different experiences. They tend to be narrow-minded and unimaginative.

AGREEABLENESS: Agreeable individuals tend to be cooperative, good-natured, easy to get along with, and trusting of others. They also tend to be forgiving and softhearted. Conversely, disagreeable individuals tend to be uncooperative, difficult to get along with, untrusting, and insensitive to others.

CONSCIENTIOUSNESS: Conscientious individuals tend to be dependable, responsible, organized, thorough, and hardworking. They also tend to strive for achievement. Conversely, unconscientious individuals tend to be unreliable, irresponsible, careless, and disorganized. They do not exert effort toward achieving goals.

EMOTIONAL STABILITY: Individuals who are emotionally stable tend to be calm, composed, and relaxed. They also tend to be upbeat and confident and do not allow negative emotions to control their behavior. Conversely, individuals who are emotionally unstable experience a wide variety of negative emotions in their daily lives. They are prone to negative emotions such as anxiety, anger, sadness, embarrassment, worry, and insecurity.

Figure B-3. Personality Factor Definitions provided to participants.

Results

Time to Complete Scenario

One indicator of efficiency of content delivery is how long it took individuals to complete the scenario. In the instance of the film and PowerPoint conditions, the time allocated to complete the scenario was pre-established; both the film and the PowerPoint presentation take approximately 13 minutes to run. In the text condition, however, the time to read the scenario was within control of the participant. The data collector recorded the time it took to complete the scenario for 25 of the 29 participants in the text condition. On average, it took participants 22.40 minutes to read the scenario ($SD = 3.5$ minutes, Minimum = 18 minutes, Maximum = 29 minutes). Thus, it appears that both film and PowerPoint can deliver case study content more quickly than can a text-based scenario.

Self-reported Arousal

A one-way analysis of variance (ANOVA) was conducted to examine the impact of scenario condition on arousal levels. The ANOVA was statistically significant, $F(2, 85) = 3.95$, $p < .05$. Post hoc analyses with Bonferroni corrections indicated that the film ($M = 1.23$, $SD = 1.46$) was more arousing than the PowerPoint presentation ($M = .26$, $SD = 1.09$, $p < .05$), but not significantly more arousing than the text condition ($M = .51$, $SD = 1.54$). The PowerPoint presentation did not differ significantly from text with respect to self-reported arousal levels. Thus, film appears to result in higher levels of reported arousal than the PowerPoint presentation, but does not result in substantially greater levels of arousal than text. Figure B-4 graphs the mean arousal level across scenario condition.

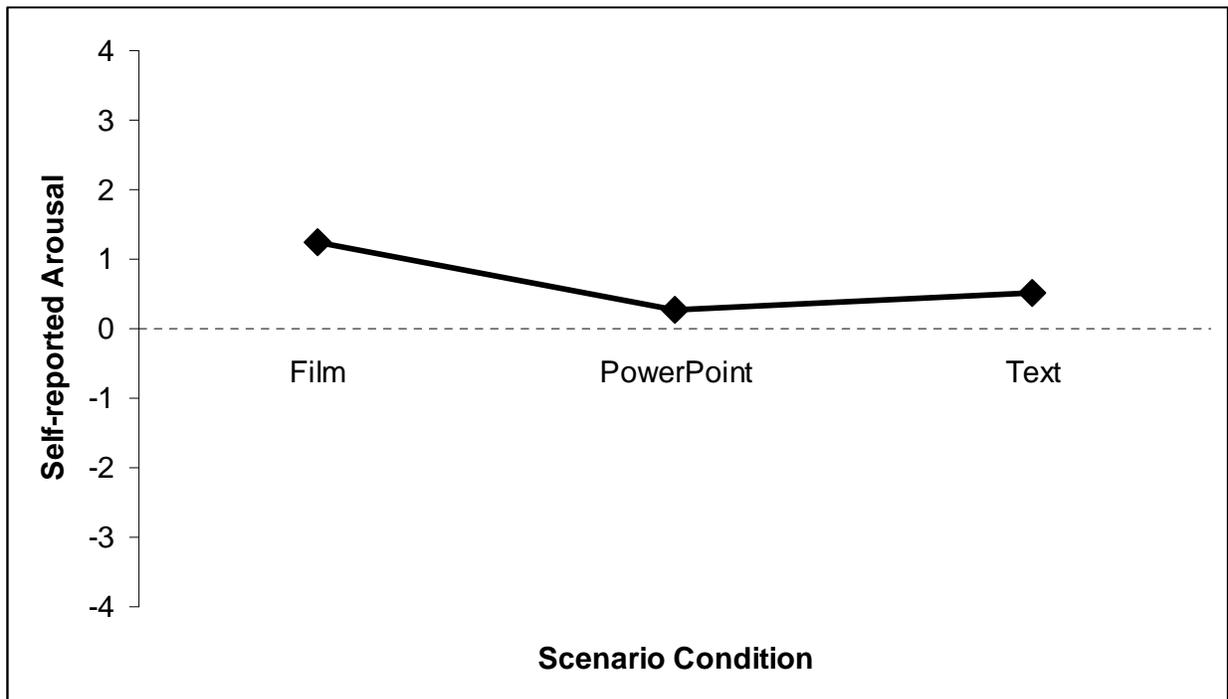


Figure B-4. Self-reported arousal across scenario condition.

Positive and Negative Affect

A one-way ANOVA was conducted to examine the impact of scenario condition on positive affect. The ANOVA was not statistically significant, $F(2, 85) = .91, p = ns$. Regardless of condition, participants tended to report that they experienced moderately high levels of positive affect. However, a one-way ANOVA that examined the impact of scenario condition on negative affect was significant, $F(2, 85) = 9.63, p < .001$. Post hoc analyses with Bonferroni corrections indicated that the film ($M = 2.32, SD = .68$) was associated with stronger negative affect than either the PowerPoint ($M = 1.66, SD = .62, p < .001$) or text conditions ($M = 1.69, SD = .65, p < .001$). PowerPoint and text conditions did not differ significantly from one another with respect to negative affect. The means and standard deviations for both types of affect are reported in Table B-1.

Table B-1
Means and Standard Deviations for Positive and Negative Affect in Different Scenario Conditions

Scenario	<u>Positive Affect</u>		<u>Negative Affect</u>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Film	2.97	.77	2.32	.68
PowerPoint	2.69	.76	1.67	.62
Text	2.87	.91	1.69	.65

Memory of Character Dialogue

A one-way ANOVA was conducted to examine the impact of scenario condition on participant ability to correctly recognize which characters were responsible for saying different things in the *Power Hungry* story. The ANOVA indicated that memory of character dialog was significantly different between conditions, $F(2, 85) = 5.62, p < .01$. Moreover, post hoc analyses with Bonferroni corrections indicated that memory of character dialogue was significantly higher in the film condition ($M = 81\%$ correct, $SD = 22$) than in the text condition ($M = 61\%$ correct, $SD = 24$). Although memory of character dialogue appeared higher in the film condition than in the PowerPoint condition ($M = 71\%$ correct, $SD = 23, p < .01$), this difference was not significant.

Memory of Scenario Details

A one-way ANOVA indicated that the number of details recalled from the *Power Hungry* scenario differed between conditions, $F(2, 85) = 19.45, p < .001$. Post hoc analyses with Bonferroni corrections indicated that fewest details were recalled in the PowerPoint condition ($M = 49\%$ correct, $SD = 19$), with significantly more details remembered in the film ($M = 70\%$ correct, $SD = 17, p < .001$) and text conditions ($M = 78\%$ correct, $SD = 17, p < .001$). Although text appeared to provide a slight advantage over film with respect to memory of scenario details, this difference was not significant.

Character Personality

One of the original research interests in creating a filmed case study was the idea that film would be more likely to convey character personality than other forms of media. To examine the question of whether film is more likely to produce characters with “personality” than other types of media, a profile analysis was conducted to examine if (1) participants were able to differentiate between different personality traits for CPT Young and (2) different personality profiles for CPT Young emerged as a result of scenario condition.

A profile analysis essentially is a repeated-measures ANOVA conducted in a multivariate framework. Profile analysis allows for different dependent variables that are based on the same measurement scale (in this case, ratings of personality for each of the five traits of personality) to be treated as a within-subjects variable. In this research, personality ratings were the dependent variable in a 3X5 multivariate analysis of variance (MANOVA), with scenario condition serving as a between-subjects factor (film, PowerPoint, and text) and personality traits serving as a within-subjects factor (openness to experience, conscientiousness, extraversion, agreeableness, and emotional stability).

One of the advantages of conducting a profile analysis using MANOVA is that MANOVA provides statistical tests of interaction and main effects (Tabachnick & Fidell, 1996). This particular research was most interested in the main effects in the profile analysis. Specifically, a main effect for personality trait would indicate that individuals were able to discern that CPT Young had different levels of different personality traits (i.e., CPT Young’s personality was not “flat”). To the extent that CPT Young has different levels of personality attributes, this might provide one indicator that CPT Young has a complex personality that can be conveyed through story form. Additionally, a main effect for scenario would indicate that mean differences on average ratings exist with respect to the personality profiles generated for each scenario.

The average personality profile for CPT Young in each scenario condition is depicted in Figure B-5. Using Wilks’ lambda as a criterion, results indicated an interaction effect was not present, $F(8, 164) = .74, p = ns$. However, both personality trait and scenario main effects were present. First, a main effect for trait was present, $F(4, 82) = 20.36, p < .001$. This finding indicates that across conditions, CPT Young received different ratings on different personality traits. Such a finding indicates that CPT Young’s personality was not “flat” and that CPT Young was rated differently on the five different factors of personality. Thus, this finding provides evidence that case studies that are told as stories have characters that have human-like personalities. Table B-2 provides t-tests comparing the different ratings for the interested reader.

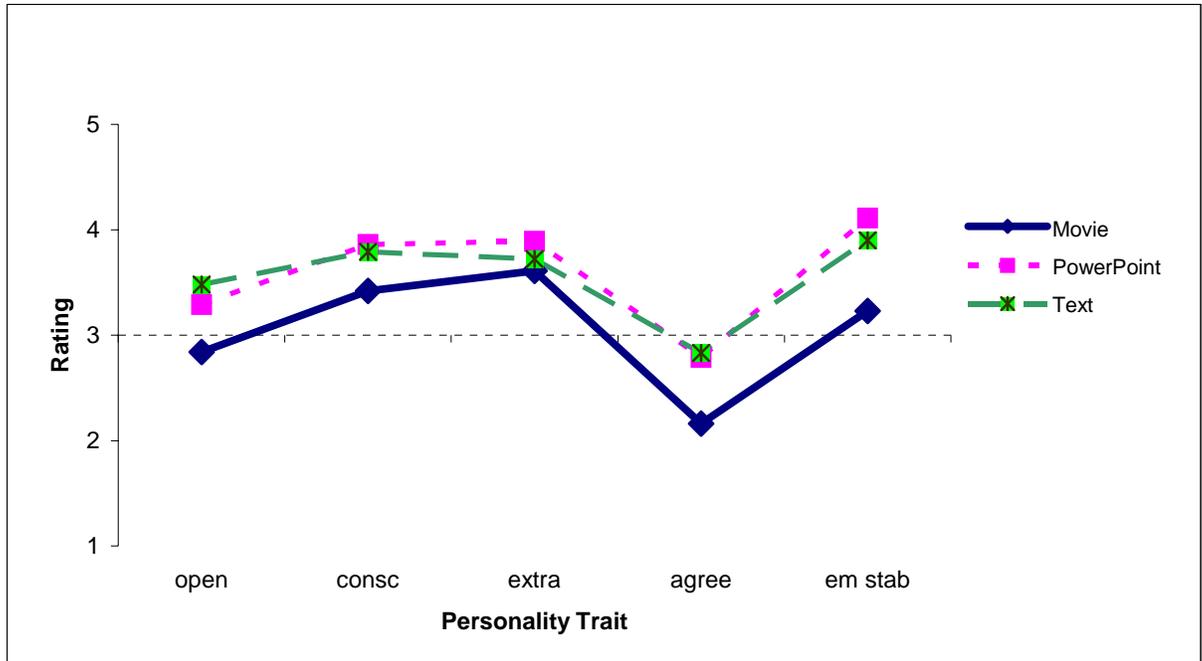


Figure B-5. CPT Young's Personality Profile by Scenario Condition

Table B-2
Paired-samples *T*-tests Comparing Personality Ratings by Personality Trait
(Across Scenario Conditions)

Personality Factor Pair Tested	<i>t</i>	<i>df</i>	<i>p</i>
Agreeableness—Conscientiousness	-8.09	87	.000*
Agreeableness—Emotional Stability	-7.72	87	.000*
Agreeableness—Extraversion	6.94	87	.000*
Agreeableness—Openness to Experience	4.52	87	.000*
Openness to Experience—Emotional Stability	-3.70	87	.000*
Openness to Experience—Conscientiousness	-3.56	87	.001*
Openness to Experience—Extraversion	3.41	87	.001*
Conscientiousness—Emotional Stability	-.38	87	.705
Extraversion—Conscientiousness	.35	87	.729
Extraversion—Emotional Stability	.07	87	.944

Note: * Bonferroni correction sets $p < .005$ for significance.

In addition to a main effect for personality trait, a main effect for scenario condition also was present, $F(2, 85) = 7.51, p < .001$. Such findings indicate that, in general, some conditions yielded a higher average personality rating than other conditions. In looking at the personality profiles depicted in Figure B-5, the main effect for scenario condition becomes more evident. Specifically, a similar personality profile is generated in each scenario condition, with CPT Young being rated much lower with respect to agreeableness than on the other personality traits. However, while the personality ratings generated from the PowerPoint and text conditions are virtually identical, the ratings generated from the film condition tend to be lower (see Table B-3). Of particular note, in the film condition CPT Young came across as disagreeable, while CPT Young was rated as neither agreeable nor disagreeable in the PowerPoint and text conditions. Similarly, CPT Young received much lower ratings on the emotional stability and openness to experience factors in the film as opposed to text and PowerPoint conditions. Since CPT Young was created to represent a disagreeable, hotheaded, rigid, and abrasive leader, these findings suggest that the film may have presented a more accurate representation of CPT Young's personality.

Table B-3
Mean Personality Ratings by Personality Factor and Scenario Condition

Personality Factor	Scenario Condition		
	Film <i>(n = 31)</i>	PowerPoint <i>(n = 28)</i>	Text <i>(n = 29)</i>
Openness to Experience	2.84	3.29	3.48
Conscientiousness	3.42	3.86	3.79
Extraversion	3.61	3.89	3.72
Agreeableness	2.16	2.79	2.83
Emotional Stability	3.23	4.11	3.90

Summary of Results

In general, film consistently performed better than or as good as alternative media formats for delivering case study material. Film also was a more expedient way to deliver case study content, requiring only 13-minutes to present the film as opposed to an average of 22 minutes to read the text-based version of the story.

With respect to affective variables, film was reported to be more arousing than PowerPoint and about as arousing as text. While all scenario formats appeared to result in moderate levels of positive affect, the film resulted in reports of higher negative affect than the PowerPoint and text versions of the scenario. In sum, these findings indicate that the film

version is an effective delivery format for impacting both emotional activation (i.e., arousal) and emotional valence (i.e., positive and negative affect).

With respect to memory of scenario details, film outperformed PowerPoint and yielded statistically similar results to text. With respect to memory of character dialogue, film outperformed text and yielded statistically similar results to PowerPoint. The film also appeared to do a better job at conveying the personality of CPT Young, with CPT Young coming across as more disagreeable, less emotionally stable, and less open to experience in the film format than in the text and PowerPoint format. Taken together, these results suggest that film is superior in conveying specific types of information, particularly information about characters. While character information may not be important to the learning objectives of all case studies (e.g., case studies used to examine decision making), case studies that are used to understand the phenomenon of leadership require a good depiction of people (i.e., character). Consequently, filmed case studies might be better than other less-media rich case studies for use in leadership instruction.