THE APPLICATION OF THINK LIKE A COMMANDER IN THE ARMOR CAPTAINS CAREER COURSE

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ABSTRACT

The need for focused, deliberate practice in the area of battlefield thinking is not new. The need for such training activity will be even greater in the future as our tactical leaders face a dynamic battlefield environment that places high demands on their mental agility. U.S. Army planning documents for the Future Combat System of Systems (FCS) specifically call out the requirement to develop, through training and experience, the thinking, confident, versatile, adaptive, and seasoned leaders at the tactical level required for the digitized, rapidly deployable objective force. To adequately prepare leaders, we must use every opportunity to improve the skills associated with decision-making performance.

The term adaptive thinking has been used to describe the cognitive behavior of an officer who is confronted by unanticipated circumstances during the execution of a planned military operation (Lussier et al., 2000). The Think Like A Commander (TLAC) — Adaptive Thinking Training Methodology has been used to address the need for focused deliberate practice of battlefield thinking skills. This training methodology uses cognitive battle drills to apply deliberate practice training concepts to commander s battlefield thinking skills and allows officers to model their battlefield understandings, plans, visualizations and decisions after expert tactician s thinking patterns.

The research described in this paper expands on earlier work by providing a fully functional computer-based application for instructional delivery that provides a number of tools and features used by the students (e.g., automated self-scoring and feedback). Furthermore, this research outlines the use of TLAC with Armor Captain Career Courses (ACCC) at Fort Knox, KY to develop thinking habits in U.S. Army Captains, and documents the initial results of an attempt to reduce the amount of time it might take to achieve a certain competency level as a commander of battlefield thinking.

Preliminary data supports the notion the ATTM and TLAC can accelerate the development of battlefield thinking habits. Furthermore, user testing and feedback from both students and instructors has been very supportive. This paper will also introduces ongoing complementary efforts including two Phase II Small usines Inovatve Research contracts that will develop prototype Intelligent Tutor Systems (ITS) to train battle command conceptual skills by September 2003.

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[It is] essential that all leaders — from subaltern to commanding general — familiarize themselves with the art of clear, logical thinking. It is more valuable to be able to analyze one battle situation correctly, recognize its decisive elements and devise a simple, workable solution for it, than to memorize all the erudition ever written of war. — Infantry in Battle, 1939.

The need for focused, deliberate practice in the area of battlefield thinking is not new, as the previous excerpt indicates. The need for such training activity will be even greater in the future as our tactical leaders face a dynamic battlefield environment that places high demands on their mental agility. U.S. Army planning documents for the Future Combat System of Systems (FCS) specifically call out the requirement to develop, through training and experience, the thinking, confident, versatile, adaptive, and seasoned leaders at the tactical level required for the digitized, rapidly deployable objective force (U.S. Army Training and Doctrine Command, 2001). To adequately prepare leaders, we must use every opportunity to improve the skills associated with decision-making performance.

The term Adaptive Thinking has been used to describe the cognitive behavior of an officer who is confronted by unanticipated circumstances during the execution of a planned military operation (Lussier, Ross, & Mayes, 2000). Through years of study and reading soldiers develop an understanding of the elements of tactical decision-making. However, that knowledge alone, no matter how extensive, is not sufficient to produce good adaptive thinking. Thinking is an active process; it is a behavior one does with his or her knowledge. The thinking that underlies battlefield decisions does not occur in isolation or in a calm reflective environment, it occurs in a very challenging environment. Commanders must think while performing: assessing the situation, scanning for new information, dealing with individuals under stress, monitoring progress of multiple activities of a complex plan. Multitudes of events compete for their attention. Knowing more information does not by itself make a leaders thinking more advanced. Expert adaptive thinking requires considerable training and extensive practice in realistic tactical situations until thinking processes becomes largely automatic.

The U.S. Army Research Institute (ARI) developed the Adaptive Thinking Training Methodology (ATTM). It uses cognitive battle drills to apply deliberate practice training concepts to commander s battlefield thinking skills and allows officers to model their battlefield understandings, plans, visualizations and decisions after expert tactician s thinking patterns. The research described in this paper expands on that earlier work by providing a fully functional computer-based application for instructional delivery that provides a number of tools and features used by the students (e.g., automated self-scoring and feedback). Furthermore, this research outlines the use of Think Like A Commander (TLAC) with Armor Captain Career Courses (ACCC) at Fort Knox, KY to develop thinking habits in U.S. Army Captains, and documents the initial results of an attempt to reduce the amount of time it takes to achieve higher competency levels of battlefield thinking.

Preliminary data supports the notion the ATTM and TLAC can accelerate the development of battlefield thinking habits. Furthermore, user testing and feedback from both students and instructors has been very supportive. This paper will also introduces ongoing complementary efforts including two Phase II Small Business Inovative Reseach (SBIR) contracts that will develop prototype Intelligent Tutor Systems (ITS) to train battle command conceptual skills by September 2003.

ADAPTIVE THINKING TRAINING METHODOLOGY AND DELIBRATE PRACTICE

The ATTM was originally developed as a solution to an Army initiative to develop adaptive thinking (Ross & Lussier, 1999). ATTM is a combination of behaviorist and constructivist methods. On the behaviorist side, deliberate practice exercises are used to develop battlefield thinking habits characteristic of experts, for example, to model a thinking enemy, to see the battlefield from a larger perspective, and to visualize accurately, dynamically, and proactively. Thus the ATTM does not train adaptive thinking per se but focuses on creating the automatic habits that enable

adaptive thinking during execution of military operations to flourish.

The value of the methodology can be seen from the follow progression:

1. After years of study, reading, and consideration of tactical problems military officers typically develop a good understanding of the basic elements of the domain. But knowledge alone is not sufficient for expert-level performance.

2. Repetitive performance causes thinking processes to become automatic so that they can be performed quickly and accurately with less mental effort.

3. As more and more basic elements become automatic, more complex models can be manipulated without a proportionate increase in mental effort. This enables experts to use their knowledge flexibly and creatively in complex situations.

4. The concomitant rise in automaticity and cognitive flexibility is characteristic of expert performance.

An important point about automaticity is that it does not mean mindlessness. When more functions can be performed automatically, the soldier has time to think at a higher level. In a complex activity like battle command, expert performance levels cannot be attained without relying on the automaticity resulting from past performance.

Repetitive performance causes behavior to become automatic. But it is more important that the behaviors that become ingrained conform to those of an expert - that they are the right behaviors. It is a well-known phenomenon that novices, through play alone, will improve rapidly for a short time but then may continue performing for decades without further improvement. Practice does not make perfect. To become an expert it takes perfect practice.

The cornerstone of developing expertise is the use of deliberate practice. A main tenant of the deliberate practice framework is that expert performance reflects extended periods of intense training and preparation (Ericsson, Krampe, & Tesch-Roemer, 1993). The ATTM follows the pattern of deliberate practice exercises. The student performs the task under the observation of a coach or mentor. The coach is ready to note the occurrence or an element of expert form during student performance and mentors the student.

According to Ericsson, the principle characteristics of deliberate practice are

> subjects ideally should be given explicit instructions about the best method and be supervised by a teacher to allow individualized diagnosis of errors, informative feedback, and remedial training .Deliberate practice is a highly structured aim; the specific goal of which is to improve performance. Specific tasks are invented to overcome weaknesses, and performance is carefully monitored to provide cues for ways to improve it further .Individuals are motivated to practice because practice improves performance. In addition, engaging in deliberate practice generates no immediate monetary rewards and generates costs associated with access to teachers and training environments.

As can be seen by the above description, a key component of ATTM is coaching, as subject matter experts (SMEs) observe and guide the students with regard to the expert habits. In this arena, the constructivist influence is felt strongly; coaching techniques are guided by the concept of scaffolding. Not unlike the scaffolding used to support construction workers, learning scaffolding is a temporary support system which enables a student to achieve a level of understanding that would not be possible without the support. The support facilitates the student learning and, as student performance improves, is gradually removed. In this way performance can rise to a higher level.

Since its development, ATTM has been widely used at Fort Leavenworth: in 1999 in the Advanced Tactics course, in 2000 in the Medium Brigade course, in the Senior Leader s Course for the Initial Brigade Combat Team, and in the TLAC program at the Brigade and Battalion Tactical Commanders Development Course. The TLAC training was adapted to the ACCC at Fort Knox starting in 2001.

THINK LIKE A COMMANDER AND THE ARMOR CAPTAINS CAREER COURSE

The ACCC at Fort Knox, KY is responsible for training and professionally developing adaptive, self-confident combined arms leaders to command and perform battle command tasks in a full spectrum environment in an Army transforming to an Interim and Objective Force.

As part of the training, students receive adaptive thinking instructions in the form of TLAC. Think Like A Commander was developed to support the ATTM and is grounded in sound learning practices designed to

support the use of deliberate practice principles. The aim of TLAC is to maximize the development of commanding officers thinking skills, teaching officers how to think instead of what to think. It will enable the officer to make sound decisions when the situation deviates from the expected, particularly when limited time is available to make a decision and when under extreme pressure and/or stress.

Successful expert tactical thinkers apply thinking patterns or models to analyze a given situation. The TLAC training program is designed to allow officers the opportunity to adopt a proven thinking or problem-solving model. The model consist of a series of eight themes that have been determined to be common elements in number of successful tactical thinkers thinking framework.

It is not sufficient to simply memorize the eight common themes and learn the questions that commanders must ask. In fact, the eight themes are already well known to officers at the tactical level. The themes and behaviors, however, associated with elements of expert tactical thinking are not always exhibited during tactical field exercises. Thus, it is a performance problem, not a knowledge problem. The themes are not intended to be a checklist, rather they are the point at which many of our thinking models and patterns overlap. The eight themes and a brief description are:

- **Keep a Focus on the Mission and Higher's Intent --** Commanders must never lose sight of the purpose and results they are directed to achieve-- even when unusual and critical events may draw them in a different direction.
- **Model a Thinking Enemy --** Commanders must not forget that the adversaries are reasoning human beings intent on defeating them. It's tempting to simplify the battlefield by treating the enemy as static or simply reactive.
- **Consider Effects of Terrain --** Commanders must not lose sight of the operational effects of the terrain on which they must fight. Every combination of terrain and weather has a significant effect on what can and should be done to accomplish the mission.
- **Use All Assets Available --** Commanders must not lose sight of the synergistic effects of fighting their command as a combined arms team. They consider not only assets under their command, but also those which higher headquarters might bring to bear to assist them.
- **Consider Timing --** Commanders must not lose sight of the time they have available to get things done. Experts have a good sense of how much time it takes to accomplish various battlefield tasks. The proper use of that sense is a vital combat multiplier.
- **See the Big Picture --** Commanders must remain aware of what is happening around them, how it might affect their operations, and how they can affect others' operations. A narrow focus on your own fight can get you or your higher head-quarters blind-sided.
- **Visualize the Battlefield --** Commanders must be able to visualize a fluid and dynamic battlefield with some accuracy and use the visualization to their advantage. A commander who develops this difficult skill can reason proactively like no other. "Seeing the battlefield" allows the commander to anticipate and adapt quickly to changing situations.
- **Consider Contingencies and Remain Flexible --** Commanders must never lose sight of the old maxim that "no plan survives the first shot." Flexible plans and well thought out contingencies result in rapid, effective responses under fire.

DEVELOPMENT OF THINK LIKE A COMMANDER FOR THE ARMOR CAPTAINS CAREER COURSE

The development of TLAC for ACCC began with an analysis of vignettes initially developed for Battalion and Brigade Commanders at the School for Command Preparation. The analysis focused on determining the tactical situations that were appropriate for the captain level and determining what, if any, revisions were needed to make the vignettes appropriate. The focus was not only on company command, but also on all positions that a captain would be expected to hold. Small Group Instructors (SGI) at the U.S. Armor Center, ACCC, performed the analysis and revisions resulted in eight vignettes that encompass offensive, defensive, and Stability and Support Operations.

An important component of the vignette development process was a determination of the important considerations a student should comprehend. These are the critical components that expert battle commanders determine are important in making an effective decision in the situation portrayed by the vignette. For each vignette, 10 to 16 indicators were determined. These indicators are key teaching points that should cue student thinking process. This is consistent with the goal of TLAC, to teach officers how to think instead of what to think.

In conjunction with the modifications of the tactical vignettes, an analysis of the ATTM was conducted to develop a mechanism for developing an automated system to deliver the training content, collect student

responses, and provide feedback on student performance. The focus of this analysis was on improving the pedagogical effectiveness of the training methodology while increasing the ease of use for both students and instructors.

A computer-based training program delivers the training material and collects data during the use of the training. The application was developed in Microsoft Visual Basic 6.0 and provided direct links to audio-video files that provided the tactical vignette. The application provided for automated data collection of student responses to the vignettes, determined the amount of time student spent on tasks, and included a mechanism for student feedback. The program was developed using sound instructional design practices and included current students and instructors in the development process. All materials were developed with SGIs from the ACCC and included a user jury with students from those classes. The user jury provided valuable feedback and suggested a number of revisions to the application, both in style of presentation and function.

The following figures are screen captures for the training application and are provided to give the reader a better understanding of the actual flow of the training.

Figure 1 contains a screen shot of the main screen. The user is provided with several options. First, the student can watch the Road to War, a short audio-video file that provides an overview of the current state of affairs. There are two other audio-video files available to the user. The first provides an overview of Adaptive Thinking and gives the student with a better understanding of the importance of the training methodology (U.S. Army Training Initiatives Office, TRADOC DCST, 1999). The second provides a replay of an interview with BG (ret.) Wass de Czege (U.S. Army Training Initiatives Office, TRADOC DCST, 2000), and outlines the adaptive thinking methodology.
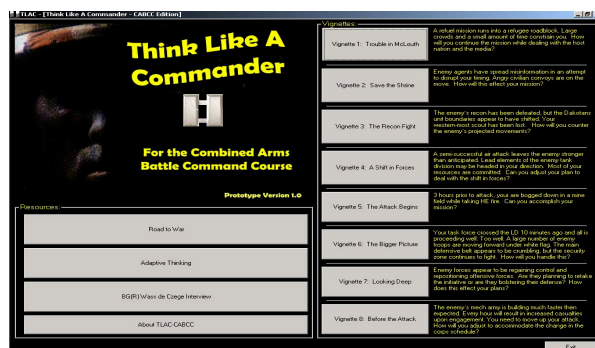

Figure 1. Think Like A Commander Main Screen

On the right hand side of the Main screen, the student is provided with a description of the eight vignettes. By selecting a vignette, the student is taken to the next step in the training program.
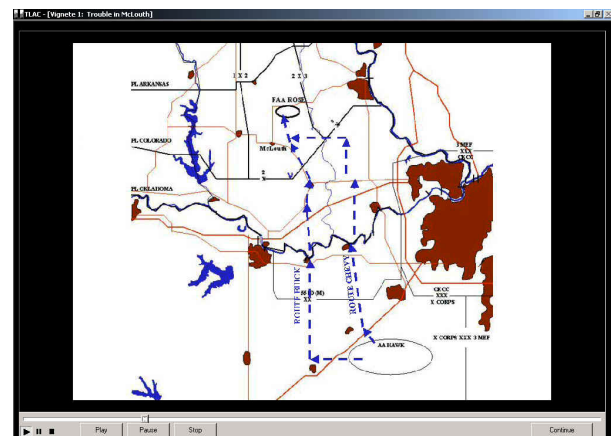

Figure 2. Think Like A Commander — Vignette Screen

Figure 2 provides a representation of a vignette. Here the student is provided with the audio-video file that presents a tactical situation. Typically, a presentation of the vignette is two to four minutes in duration.

Once the presentation is completed, the student is automatically transferred to the Notes section (see Figure 3). Here, the student is asked to think about the situation presented in the video and to note items that should be considered before making a decision. The student is given the opportunity to formulate a process or model to use for tactical problem solving. This process is expedited by the use of the TLAC Themes previously mentioned.
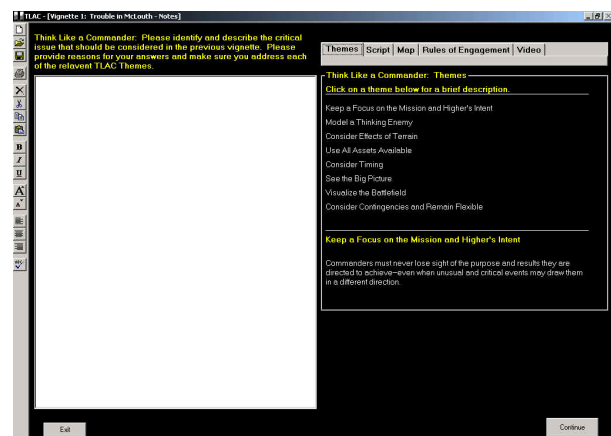

Figure 3. Think Like A Commander — Notes Screen

The student is given several tools (located on the right hand side) to assist the process. First, the students are

given links to information about each of the eight themes. These links are used to reinforce the meaning and utility of the themes and helps to integrate them into the students thinking framework or model. Second, the student is provided with a text copy of the script. The script is used to allow the student to review the content of the vignette. More importantly, it allows students to get a better understanding for the need for active listening when confronted with a problem. Typically, students will consider several variables or issues concerning the vignette, and then using the tools provided will consider several other issues. In a real world setting, these tools may not be available; therefore, they try harder to think about important elements as they are confronted with them. Active listening, therefore, also helps to expedite the thinking process by forcing officers to consider and assimilate considerations rapidly.

The Notes page also contains links the important maps required for the vignette, a link to the Rules of Engagement for the scenario, and a link to allow the student to replay the tactical situation.

Interaction the student makes with the Notes page are recorded for analysis. They include the free text input, the tools the student utilizes, and the order in which the tools are used. Furthermore, the system creates a record of the themes the student request assistance with. This data is used to determine the amount of time it takes the student to assimilate the themes. Furthermore, the amount of time the student spends on each task is recorded allowing researchers to calculate the rate of improvement throughout the use of the vignettes. Related to this, the SGIs decrease the amount of time students are given for each vignette, forcing students to adapt to increased time pressures.

After completing the Notes section of the program, the student is taken to the class discussion section of the program (see Figure 4). Here the student and SGI are provided with the tools needed to facilitate the discussion or after-action-review. These tools include the required maps, vignette script, Rules of Engagement, and the list of considerations the student provided for the vignette.

A key component of the ATTM and TLAC is the coaching a subject matter expert provides by observing and guiding the students with regard to the expert habits. During the class discussion students are encouraged/required to discuss and/or defend considerations relevant to the vignette. Class members

discuss the second and third-order effects related to actions students suggest.
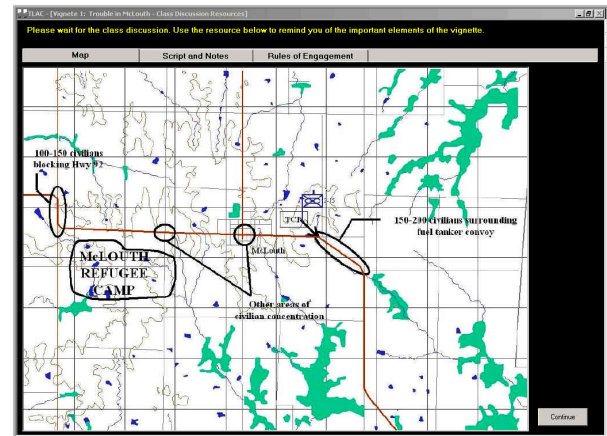

Figure 4. Think Like A Commander — Discussion

The final phase of the training methodology is the Student Feedback section of the program (see Figure 5). Here, the officer is shown a list of the considerations that expert battle captains also felt were important.

Typically, there are 10 to 16 key considerations for each vignette with 1 to 4 for each theme. These considerations are unique to each vignette and represent the important information a soldier should attend to in making a decision. The student is provided with the notes they made earlier in the program allowing for a quick comparison of their thoughts to those of the expert battle captains. The student them marks the indicators they have in common with the expert battle captins.

Students are also asked to make the same evaluation on the class as a whole. The purpose in this step is to allow the student to get a true representation of their individual performance. For example, a student may only get fifty percent of the important considerations for a given vignette. During the class discussion, however, ninety to one hundred percent of the key considerations may be discussed. Students may inappropriately believe that their performance was directly linked to the performance of the class as a whole. This individual feedback supplements and complements the feedback given by the SGI mentor during the class discussion phase of the training.

Figure 5. Think Like A Commander — Feedback

Once the student rates his performance, he is given direct feedback for each individual theme. For example, a student may be told that he got 1 out of 4 correct for the Model a Thinking Enemy theme. The student is then able to focus his future thinking process.

IMPLEMENTATION AND EVALUATION

This section will outline the implementation and evaluation methods for the TLAC Application.

Overview

Captains in the ACCC at Fort Knox, KY received the adaptive thinking training utilizing seven of the TLAC vignettes. Vignettes included probes used to cue participants to critical pieces of information causing the participant to think about or consider the information before making a decision. The intent was not just to develop a correct solution or decision, however, it was to focus on the thinking and decision making process (i.e., how to think). Performance data was collected to determine: 1) if the amount of information considered improved over repeated trials and 2) to determine if the amount of information considered continued to increase as time decreased over repeated trials. Thus, the goal was to determine if the amount of information considered increases while the time needed to consider the information decreased.

Instructor Training

Each instructor received a 6-hour block of instruction on using the TLAC program of instruction. A senior instructor at the Command and General Staff College and the training program developer provided the instruction. The instruction included and involved discussion on adaptive thinking, information on how to use the TLAC materials, and techniques for facilitating an adaptive thinking discussion.

Instructors also received lesson plans that included specific information on each vignette for each individual TLAC theme. The lesson plans included

links to doctrine to facilitate the class discussion. Furthermore, the plans included specific probes instructors could use to elicit additional information from students, thus, forcing the students to think. Additionally, notes concerning the vignette were included. These included feedback information that could be provided to participants based on the probes instructors used.

Participants

Participants included 24 Officers, from two small groups, enrolled in the ACCC at Fort Knox, KY between January and May 2002.

Procedures

Implementation procedures were similar to those discussed earlier. The TLAC program was installed on every student laptop, as well as on the instructors classroom workstation. The instructor presented the audio/video vignette to the class using a Proxima display unit. After reviewing the vignette, students were asked to list all the important considerations that should be noticed from the vignette. Next, the instructor led a discussion of the vignette to further highlight the relevant teaching points from the vignette. Finally, students were required to complete the self-assessment section of the program. The procedures were similar for all seven vignettes. All student input was automatically saved for analysis.

Data Collection

A number of performance measures were used to evaluate the success of the training. These measures addressed both the critical thinking process (e.g., the number of critical indicators identified) and the ability to make rapid decisions (e.g., the amount of time spend determining indicators).

Results

Two major questions guided the analyses: 1) Did the amount of information considered increase over repeated trials? 2) Did the amount of information considered continue to increase as time decreased?

Information Considered. A trend analysis was computed to determine trend effects through repeated use of the TLAC application. The results revealed a significant effect, $F(1, 23) = 19.62$, $p < .05$, indicating that participants identified significantly more critical information as they continued training indicating that students improved in their performance throughout the training. A within-subjects trend analysis yielded

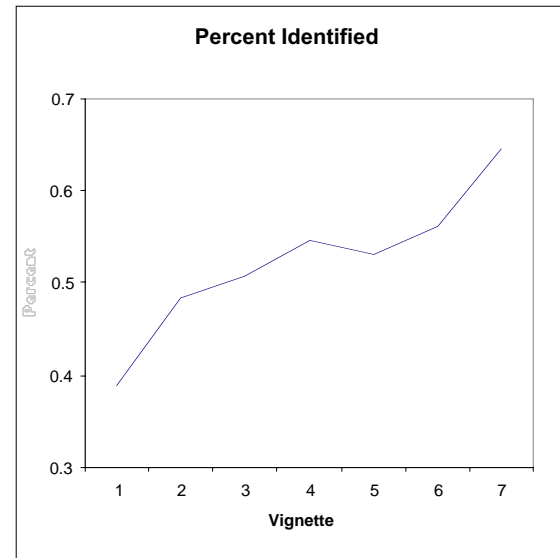a significant linear trend, $F(1, 23) = 34.21$, $p < .05$.

Figure 6. Percentage of Indicators Identified for Each Vignette

Figure 6 depicts the linear pattern for the percent of critical information identified for each vignette. As the figure indicates, the tendency was for participants to increase in the number of critical information items considered as they progressed through the seven TLAC vignettes. A post-hoc comparison was calculated between vignette one and seven. The resulting comparison, $F(1, 48) = 48.59$, $p < .05$, revealed a significant increase in information considered from the start of training to the end.

Time. For this study time was manipulated by the SGIs, thus, student could not spend as much time as they wanted to complete each vignette. Figure 7 illustrates the amount of information considered per minute for each vignette.

For example, for vignette one, participants were allowed 15 minutes to complete the exercise and they considered an average of 6 considerations for the whole exercise, or a total of .41 considerations per minute. For vignette seven, participants were allotted 3 minutes to complete the exercise and participants considered just over 10 pieces of information. This corresponds to 3.4 considerations per minute. Finally, it is important to note that fatigue was not a problem for the training since students were given ample time between vignettes. Furthermore, students were motivated by their interest in the training and were actively involved in the training.
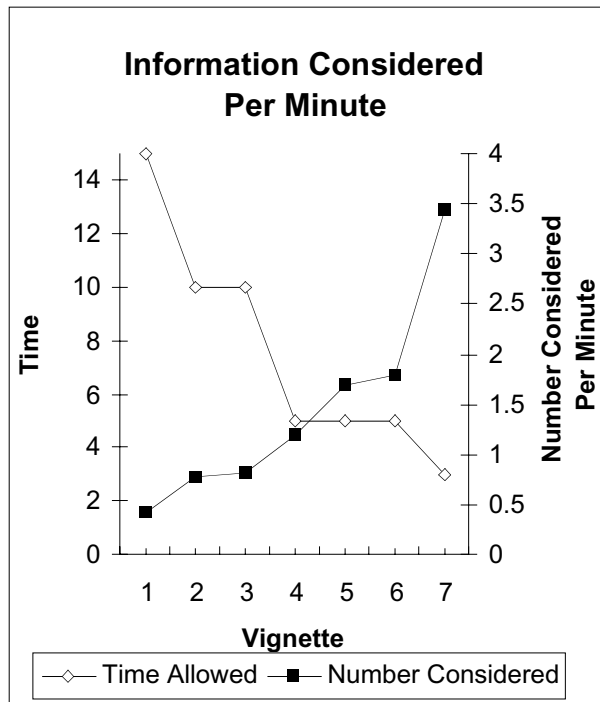
**Information Considered
Per Minute**

Figure 7. Percent of Information Considered per Minute

Participant Feedback. From a qualitative standpoint, both participants and instructors indicted that they enjoyed completing the TLAC training. Not surprisingly, the vignettes were able to generate lively discussion and kept the interest of the participants. Comments indicated that the student perceived the training as being valuable and many requested the software to take with them after completing the course.

DISCUSSION

The data analysis suggests that the TLAC training application can accelerate tactical leader development in U.S. Army Captains. Participants in the study were able to increase the percentage of information considered even though there were increasing time constraints. The ATTM and TLAC required little training for the instructors. Furthermore, the training was seen as a valuable addition to the course.

As the Army moves closer to the Objective Force, the need for adaptive officers becomes even more critical. As information processing needs increase and available time decreases, officers need training to meet the dynamic demands of the future battlefield. One approach for workload reduction and automaticity is based on the premise that practicing some skills may free cognitive resources for higher level decision making (Cohen, Freeman, Thompson, 1998, p. 155). Think Like A Commander attempts to address this issue using a deliberate practice methodology.

In this paper we describe a model of adaptive thinking skills under time stress, a training strategy based on that model, and experimental test of the training strategy. While the results of this study suggest that the ATTM and TLAC provide a suitable environment for training adaptive leaders, more work needs to be done. Specifically, there is a need to make this type of training available to officers anytime and anyplace. To that end, the ARI is monitoring two SBIR projects examining the utility of, and methods for the implementation of intelligent tutoring systems that would be needed to adequately mentor officers using the ATTM and TLAC type programs over a distributed network. Further, the ARI is working with the U.S. Armor Center to determine other methods for distributed TLAC training for use with the Reserve Component Armor Captains Career Course.

Additionally, research is being conducted that may lead to method for multi-level TLAC training. Specifically, methods for vertical team adaptive thinking are currently underway. This research will lead to a prototype training system for distributed multi-echelon team training.

CONCLUSION

Experience implementing the ATTM at the School for Command Preparation and Armor Captains Career Course into course curriculum suggest that adaptive thinking training (i.e., TLAC) is feasible and can provide a valuable learning environment for students. Additional work is needed to introduce the training to a wider audience and to insure maximum training value using various delivery methods (i.e., face-to-face, distance, etc.).

The 10-year rule suggest suggests that it takes about 10 years of intense training and practice to reach a level of expertise in any field (Simon & Chase, 1973; Ericsson et al., 1993). This research showed that adaptive battlefield thinking can be trained using deliberate practice techniques and that the methods employed may accelerate development expertise in tactical thinking.

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