

Transforming the Operational Mindset: Self-Regulating Cognitive Performance Enhancement Strategies

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ABSTRACT

Lead Agents at The Transportation Security Administration (TSA) provide key support for the day-to-day operational security environment in major transportation infrastructures throughout the country. They are highly dedicated to the agency's Mission and work under tremendous pressure, having to make the right decisions at the right time to ensure maximum security for the traveling public. Frontline leadership personnel must uphold high standards of accountability and possess high levels of self-awareness, self-knowledge, and situational awareness to effectively manage work flows and personnel. Understanding themselves, the thinking process for building good leadership habits, and the skills for critical thinking are just a few of the many competencies needed to balance leadership principles and standard operating procedures in an operational security environment. For this reason, a new curriculum was designed to allow frontline leadership personnel to delve deeper into the cognitive elements of self-awareness, mindfulness, and the thinking processes that go beyond just a training event, but actually provides a self-directed competency roadmap for career progression.

This paper discusses the specific cognitive and metacognitive strategies that were used in the TSA Essentials curriculum to enhance lead officers' thinking processes with the goal of improving cognitive performance in an operational security environment as they attain higher levels of responsibility. Cognitive performance encompasses a change in the leadership mindset to better anticipate challenges and make the right decision to resolve critical situations quickly. The paper also discusses results and findings from evaluation procedures and how these results indicate improvements in cognitive performance outcomes.

ABOUT THE AUTHORS

Dr. Denise R. Stevens is the Director of the Learning Center of Excellence for General Dynamics Information Technology. She has over 29 years of experience in the application of all aspects of the instructional systems design process and human performance technology in applied research and development for government and education. Dr. Stevens has extensive experience in the design of training and performance support systems and job performance measures. Dr. Stevens has been involved in large-scale training design and development efforts resulting in over 14 national awards. She has been involved with conducting cognitive and behavioral job-task analysis, learning objective development, instructional and performance-centered design for various training platforms (such as web-based, classroom-based, or blended deliveries), conducting test reliability and validity procedures, and conducting courseware evaluations. Dr. Stevens has over 10 years of experience as an Adjunct Professor of Foreign Languages and is currently an Adjunct Professor at the Department of Instructional Design and Technology Master's Program at the University of Central Florida.

Dr. Heather Seiser is a Human Performance Technologist at General Dynamics Information Technology. She has a Ph.D. in Industrial/Organizational (I/O) Psychology and over 20 years of experience in several areas of I/O Psychology and Human Performance Technology. Dr. Seiser has obtained a wealth of experience in the development of both online and instructor-led training programs and evaluation materials. She has also designed and conducted a multitude of evaluations of both training and performance support systems, including test reliability and validity, individual and small-group trials, and sequential validation. In addition, Dr. Seiser has several years of experience in front-end analysis, including needs assessment, training situation analysis, job and task analysis, and has used multiple methodologies for conducting such assessment and analyses, including job shadow, focus groups, interview, and questionnaire techniques. For the Essentials curriculum, Dr. Seiser developed lesson content for topics such as change management, team building, and conflict management.

Karen Tovar, M.S., is an Instructional Developer Advisor at General Dynamics Information Technology. She has over 20 years' experience in developing training solutions for a variety of information technology organizations, as well as government agencies including the Veterans Benefits Administration and the Department of Homeland Security. Her experience spans instructor-led, performance-based, and web-based training, as well as classroom and online facilitation. For the Essentials curriculum, she developed lesson content for topics such as operations readiness, planning and resource management, and resilience. Ms. Tovar earned her Master of Science degrees in Instructional Technology and English from Utah State University, where she was awarded Outstanding Scholar in Instructional Development. She obtained her Bachelor of Science degrees in English and Journalism from Wayne State. She is a certified Project Management Professional and SCRUM Master. Ms. Tovar discovered her love for training while serving as a Peace Corps Volunteer in Thailand.

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Christa Bohannon, M.A., is a Senior Instructional Systems Designer at General Dynamics Information Technology. As a former teacher, she has over 15 years of combined education and instructional design experience. She has developed a variety of instructor-led training solutions and products for government agencies, including course design guides, instructional lessons, whiteboard animation concepts, and video scripts. For the Essentials curriculum, Ms. Bohannon developed lesson content for topics such as critical thinking, prioritization, and the process for building habits. Ms. Bohannon earned a Master of Arts degree in English from Bob Jones University.

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The Transportation Security Administration was created in the wake of the September 11, 2001 attacks. Its singular mission is to prevent another large-scale act of terrorism. Lead transportation security agents play a key role in ensuring the safety of the traveling public, because they are the first line of management overseeing screening operations performed by transportation security agents. While many aspects of the job that Lead agents oversee are procedural in nature, a Lead agent's job is cognitively demanding. Success relies heavily on his or her ability to self-regulate behaviors—especially in the areas of decision making, critical thinking, and communication—to mitigate potential and actual threats to the Nation's transportation security system. The fast-paced, high-volume screening process requires that Lead agents are able to act quickly in a stable and predictable manner at any time.

Lead agents are not considered supervisors or management, and their main leadership focus is supporting individual employees and the team as a whole to ensure the mission is accomplished. To prepare them for their leadership role, Lead agents were given one week of Leadership Essentials training. However, the organization continually experienced performance issues and recognized a need to hold its Lead agents to a higher standard. Upon conducting a front-end analysis in 2017, it was determined that the Leadership Essentials curriculum needed to be revised to better reinforce specific core leadership competencies—the knowledge, skills, and abilities (KSAs) the Lead agents need to possess to successfully perform their job duties. Furthermore, TSA was looking for a more robust approach to teaching agents the competencies related to their jobs.

The Leadership Essentials curriculum consists of a series of three courses designed to prepare TSA's frontline leadership team members—depending on their specific roles—to meet the organization's operational needs and expectations as their level of responsibility increases. Recent job performance metrics revealed that the curriculum needed to be revised to better reinforce key cognitive concepts to ultimately increase performance. The goal in revising the curriculum was two-fold: first, to teach the Lead agents to be more aware of their behaviors, emotions, and skills and to provide a safe environment in which they could practice and plan their responses to typical situations, helping them to better control the outcome of challenging situations or to adapt when situations escalate; second, to move the training beyond a singular event by helping Lead agents to evaluate the relevant Lead competencies; recognize their strengths and growth opportunities; develop communication, critical thinking, and leadership skills that align with their competencies; and form a strategy for practicing and applying these concepts and new skills on the job. To accomplish the above goals for the curriculum revision, the course design required using self-regulating cognitive performance enhancement strategies.

DESIGNING THE SOLUTION

Self-Regulating Cognitive Performance Enhancement Strategies

Self-regulating cognitive performance enhancement strategies focus on specific performance outcomes that meet the needs of the learner from several domains of knowledge: the cognitive, the behavioral, and the affective domains. In the past, most curricula tended to first focus on knowledge acquisition, then move to application, without considering motivation, attitudes, perceptions, and values and how these can affect performance. Design has to take more of a center stage and address knowledge and performance simultaneously to facilitate the expansion of critical thinking skills, memory, attention, and perception in achieving the intended performance. This holistic human performance paradigm rests on several considerations. Firstly, learning and training need to incorporate realistic contexts (contextualization) that are relatable enough to build habits that teach learners to “think ahead” and “anticipate” situations in the changing operational environment; secondly, instruction needs to include opportunities to gain more awareness of learning (thinking about thinking) from an individual and group standpoint, and thirdly, instruction has to be adaptable to the skill levels and scaffold the activities to increase both cognition and performance.

These considerations sprang from the domain of educational psychology that has a long and rich history of theories and practices that are still true today. The concept of contextualization is based on the learning theory of Teaching in Context and the Cognitive Flexibility Theory, by Dr. Rand J. Spiro. These theories are concerned with retention of knowledge and skills beyond the initial learning situation. It stipulates that emphasis is placed upon the presentation of information from multiple perspectives and use of many case studies that present diverse examples because it asserts that effective learning is context-dependent and knowledge should be highly interconnected rather than compartmentalized.

Learning awareness, or thinking about thinking, is based on the psychological concepts of metacognition. Metacognition is defined as a construct distinct from cognition. Cognition is the state and process of knowing and in the context of learning, cognition often refers to the manner in which information is processed. On the other hand, metacognition refers to the awareness and knowledge of one’s own cognitive states and processes and the ability to control these processes in any cognitive activity (Paris & Winograd, 1990). In other words, metacognition includes two groupings of processes: (1) Self-awareness or knowledge of cognitive states and processes and (2) Self-regulation over the cognition. Lev Vygotsky’s concept, “zone of proximal development” led the way for the idea that learning should be scaffolded to provide enough support to allow the learner to perform at a higher, or more advanced, level than what he/she is capable of accomplishing on their own (Vygotsky, 1978).

Self-regulating cognitive performance enhancement strategies reinforce the competencies associated with the job’s skills. This is especially important for supervisory-types of positions where a good portion of the duties lie in the affective domain, meaning enhancing the leadership mindset to perform in an operational environment. To ensure that the courses would not only focus on behavioral tasks, but also on the cognitive processes associated with these tasks so that the Lead agent can perform the job, a systematic development approach was applied beginning with analysis. During this phase, working group sessions were conducted to identify the progression of leadership skills and proficiency levels for the agents in the job roles of Lead, Supervisory, and Management positions. Figure 1 illustrates an excerpt of the outcome of the working group sessions, which identified progression of skills and proficiency levels for the three operational positions:

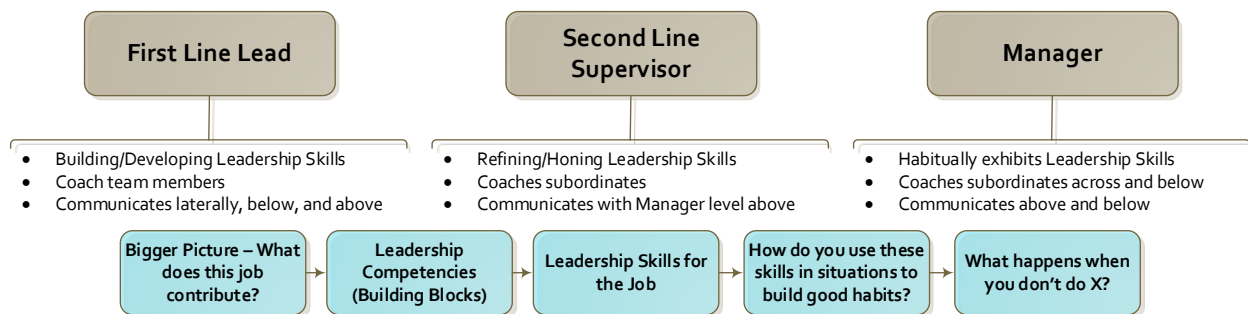


Figure 1. Supervisory Skill Progression Sequence

Using focused questioning techniques, the working group also confirmed the applicable competencies and behavioral indicators and confirmed the course sequence for all three offerings, thus ensuring no gaps or redundancies of content.

Objective Component	Objective Component Description
TLO 1.0	Describe the competencies, roles, and responsibilities of a first level lead.
Conditions	Given: <ul style="list-style-type: none"> • Sample case scenarios • Practice activities in which participants can apply and/or role-play what they learned. • Applicable job and learning aids
Core Competencies	<ul style="list-style-type: none"> • Attention to Detail, Command Presence, Conscientiousness, Critical Thinking, Flexibility, Integrity/Honesty, Interpersonal Skills, Leadership, Oral Communication, Teamwork, Visual Observation
Performance Standards	On the end-of-course assessment, with a minimum of 70% accuracy, participants will demonstrate the primary competencies required for first level leads by: <ul style="list-style-type: none"> • Recognizing how the first level lead supports the TSA mission • Identifying the Leadership Core Competencies for an first level lead • Recognizing the competencies required for first level leads • Identifying steps to take to develop good leadership habits • Describing the components of the first level lead mindset • Identifying appropriate behaviors for first level leads to engage in as part of their new role • Defining the scope of duties, roles, and responsibilities to lead the screening operations and checked baggage screening locations. • Recognizing how the Collective Bargaining Agreement affects the first level leads and the team
Bloom's Levels of Learning	Cognitive Domain: 2—Understanding Affective Domain: 2—Responding

Figure 2. Matrixed Competencies to Objectives

During the learning analysis phase of the project, the revised model of Bloom's taxonomy of the cognitive and affective domains by cognitive psychologist Lorin Anderson (Overbaugh & Schultz, 2012) was used to determine the intended level of learning for each terminal and enabling learning objective. In addition, performance indicators associated with the core competencies that were identified for each learning objective were used to create performance standards. These linkages enabled the development team to ensure that both the cognitive and affective aspects of the tasks were considered. Figure 2 illustrates an excerpt of the learning analysis information provided to TSA that incorporates all the essential elements of an objective.

The learning objectives then were analyzed to determine what strategies would best support the goal of the course. As part of the strategies development process, it was determined that the design needed to go beyond just the training event. Participants needed support before and after the training to keep increasing their leadership skills with the ultimate goal of attaining the next level up as part of the roadmap for career progression. With this consideration in mind, several self-regulating instructional strategies were put in place to include contextualization and mentoring, as

well as thinking out loud techniques. In addition, the completion of a Competency Self-Assessment and a Competency Action Plan were incorporated at key juncture of the curriculum as described below.

Competency Self-Assessment

To encourage self-awareness and mindfulness, participants completed a Competency Self-Assessment prior to commencing the course. The Competency Self-Assessment was used as a baseline to assess the extent to which participants exhibited each job competency on the job prior to the training. Each competency was represented by a statement that asked participants how regularly they accomplished each statement. Participants responded to each on a five-point scale ranging from Never to Always. Examples of the statements included: *I ask clarifying questions when talking with team members, supervisors, and passengers* and *I evaluate information from all aspects of the situation around me in order to draw logical conclusions and take action*.

This Competency Self-Assessment was important in that it provided participants with insight, prior to taking the course, on which competencies could benefit from further development. It was also the first step in a self-directed competency roadmap for career progression. Furthermore, completion of the Competency Self-Assessment supported the habit formation process, as it allowed participants to identify which competencies they demonstrated most often and which they demonstrated less frequently. Reflecting on this frequency allowed participants to better assess their current habits and to identify which competencies needed new habit formation.

As part of the plan for continuous growth, participants would complete the Competency Self-Assessment again 120–150 days after the conclusion of the course. Participants would meet with their supervisor to compare results of the assessment that was taken at the beginning of the course and the follow-up assessment to determine whether there were any changes in the participant's perceptions and frequency of executing the competencies. The assumption is that participants would demonstrate a positive ratings change in their perception and frequency in the follow-up assessment.

Competency Action Plan

Next, to build upon the self-awareness that participants gained from completing the Competency Self-Assessment, the purpose of the Competency Action Plan was to enhance Lead agents' ability to transfer what they learned in training back to the job by making the course more than just an isolated training event, thus supporting the Teaching in Context and the Cognitive Flexibility Theory (R.J. Spiro, 2012). The Competency Action Plan provided participants with the opportunity to develop strategies for practicing and applying the important concepts they learned in the course while on the job. In doing so, participants were able to engage in the planning stage of the habit building process.

The Competency Action Plan included a list of important concepts that were included in the training, as well as the relevant competencies, broken down by lesson. Participants received the action plan at the beginning of the course. At the end of each lesson, when the content was still fresh, they were instructed to reflect on the specific job-related actions they would take to implement each concept, obstacles that would prevent them from taking actions, plan for turning action into habits, and resources they would need to take action. They were also told that they should note ideas for their Competency Action Plan at any time during the lesson when they learned about and identified a new skill they could improve upon.

The TSA Essentials instructors encouraged participants to meet with their supervisors following training to obtain feedback on their Competency Action Plan. This would allow them to get support for their strategies as well as brainstorm ideas for overcoming any obstacles to implementing their plan. The intent was that participants would use self-reflection at some point in the future to assess how their ability to demonstrate competencies had improved and whether they had successfully built good leadership and job habits.

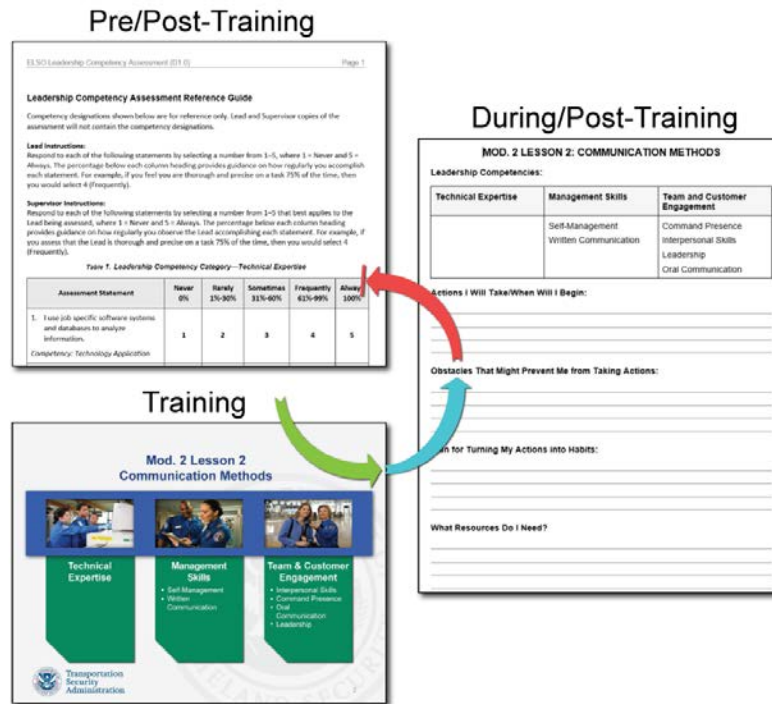


Figure 3. Lead Agents Competency Strategies for Career Progression

Additional Self-Regulating Cognitive Performance Enhancement Strategies

In addition to the Competency Self-Assessment and the Competency Action Plan, other self-regulating cognitive performance enhancement strategies were incorporated to focus on fostering resilience. For example, Lead agents are under constant pressure to perform complex jobs in a fluid, unpredictable environment with accuracy and speed, so providing them with concrete ways to manage stress is critical to prevent burnout and help ensure that performance is not impaired. To encourage Lead agents to care for themselves, an activity was built upon the concept of teaching the agents to visualize their uniform badge as a “shield” of protection from negativity.

The activity included a description of the SHIELD acronym commonly used for stress management (stop, honor, inhale, exhale, listen, decide), as well as a practice activity that gave participants an opportunity to practice the SHIELD technique based on a personal, relevant experience. To carry the concept back to their jobs, Lead agents were given job aids to carry in a pocket or affix to their badge as a just-in-time reference when pressure is mounting. To support the TSA Leadership Principle “*Care for our people*,” the Lead agents were also provided with a sheet of cards to share with their team members after returning to their airports.



Figure 4. Mentor Character in Action

A primary element of instructional scaffolding used in the Essentials courses was the 5-Step Process of Building Habits. Once familiar with the process, the Competency Self-Assessment and Competency Action Plan provided additional opportunities and reinforcement within the training for the learners to implement the process for steps 1 and 2 during the training. This process allowed learners to assess their current job habits and make a plan to improve their skills in a collaborative and safe environment while also preparing them to complete the process of asking for feedback, practicing, and using self-reflection once they returned to their airports, to be able to continue using this process independently in the future.

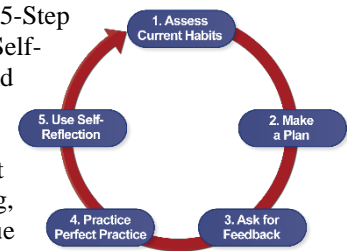


Figure 5. 5-Steps Model for Building Good Habits

Capstone Exercise

To reinforce the self-regulating cognitive performance enhancement strategies, each of the courses culminated with a capstone exercise. The capstone exercises varied between the Essentials courses but had the same primary goal of transferring learning back to the job site. For one of the courses, through a collaborative strategy, participants worked together in groups to complete activities that reinforced the concepts learned in the course. A metacognitive learning strategy was employed via a “Six Thinking Hats” approach based on Dr. Edward de Bono, creator of the Lateral Thinking technique, which encouraged participants to consider a problem from different perspectives (feelings, creativity, cautions, processes, facts, and benefits) and work together to come up with a resolution. During the debrief sessions of the exercise, participants were required to think through various aspects of their participation in the exercise and its applicability to their group’s challenge and their position, and then present their approach to their peers. Key to the Six Thinking Hats approach was the use of specific challenges appropriate for the first-line Lead position, such as changes to standard operating procedures, or cultural shifts.

Another portion of the capstone exercise was related to managing change where participants were required in each team to pair up and use the tools and competencies from the course to work through a given situation to lead change associated with implementation of the resolution that their team developed for their assigned challenge. This part included role-play and the use of situation cards to represent specific scenarios, with each team member role-playing a different situation card. An example of a situation card was “*A team member who openly and emphatically disagrees with the resolution.*” Within each pair, one participant played the role of a first-line Lead resistant to the change described on the situation card, with the goal to apply effectively a TSA-specific model learned in the course that helps in providing feedback.

The second course in the Essentials curriculum provided an experience-based exercise that allowed participants (second-line supervisors) to work collaboratively to frame and solve a specific situation. Participants read an initiating scenario and begin identifying the correct course of action to address the scenario. While working on solving the initiating scenario, participants receive another situation to address concurrently, increasing the complexity of the original scenario. This pattern continues to include three additional situations the group must resolve along with the original initiating scenario. Participants also have the opportunity to discuss with their group the best way to handle some tasks they routinely face on the job.

This capstone exercise is more pressurized than the one in the first course in that participants are given a series of multiple situations to process in a short (10-minute) timeframe. This aspect of the capstone exercise was designed to promote improvements in cognitive performance related to the second-line supervisor leadership mindset by honing skills in anticipating and quickly resolving challenges during critical situations. Similar to the first course's capstone exercise, participants work in groups to resolve each situation assigned to them.

Each group provides a debrief to the class at the conclusion of their situation resolution, while the rest of the class provides written feedback on the group's approach, including what they would have done differently. A second debrief is then developed and presented for senior leadership to promote the different communication styles required for the two different audiences. The combination of multiple pressurized crisis situation resolution and formalized reporting to both peers and senior leadership addresses real-world competency issues that Lead agents face every day.

The capstone exercises were important because they integrated coursework, knowledge, skills, abilities, and experience to enable the participants to reflect, apply, analyze, and demonstrate a broad mastery of the course learning outcomes. The approach and decisions made reflected attitudes, values, feelings, and beliefs characteristic of the environment, leadership, and supervisory skills of the position.

RESULTS

Individuals who completed the Essentials Curriculum and the subsequent evaluations consisted of 18 Lead agents from airports throughout the United States. These Lead agents were selected by their supervisors to participate in the training and were representative of the population of Lead agents. The Essentials Curriculum was evaluated during a Course Pilot using Kirkpatrick's Model of Training Effectiveness (Kirkpatrick, 1959). Specifically, data were collected on Level 1 (Reaction) and Level 2 (Learning). At the end of the training, participants completed TSA's Level 1 End-of-Course Evaluation for Instructor-Led Training. This survey solicited participants' opinions of the course, the training benefit, the instructors, the tests, and the training facilities. Participants were required to indicate their level of agreement to several positively worded statements (e.g., I understood the learning objectives) using a scale ranging from 5 (Strongly Agree) to 1 (Strongly Disagree).

Level 1

For each question on the Level 1 survey, the mean, standard deviation (SD) and range of the scores were computed. Because the survey statements were positively worded, a higher number, indicating a higher level of agreement, indicates a favorable opinion. Overall, the Lead agent's course was well-received by the participants. Specifically, participants responded positively to the majority of the survey items, with participants agreeing (based on mean level of agreement rating of at least 4.0) with 15 of the 23 survey items. Only two items had mean ratings lower than 3.5. One statement that received one of the highest ratings was *"I would recommend this developmental activity to a colleague"* ($M = 4.33$, $SD = 0.89$).

Participants were also asked to indicate what they liked most about the course. Some of the comments included: *"I love that I am able to take just about everything I've learned from this course and apply it at my home airport and in my personal life."* Another participant commented that the course allowed Lead agents to build the skills and mentality needed to be a leader in the screening environment.

Level 2

Level 2 data were collected using an end-of-course assessment. The assessment consisted of 22 multiple-choice and true/false items designed to assess the performance standards identified during the design phase. The items ranged from knowledge recall to situational case scenarios. For the situational case scenario items, participants were presented with a scenario they would typically encounter on the job and were required to identify the most appropriate way to respond.

Prior to using this assessment in the Pilot, it was reviewed by project subject matter experts as well as individuals within TSA, to include the TSA project manager. These individuals provided revisions to ensure the questions were clear and accurate and that only one answer could be considered correct. Two parallel versions of the assessment were developed.

After completing the course, all participants took the end-of-course assessment, with half the participants taking one version and half taking the other. Seventy-four percent of the participants passed the end-of-course assessment with a passing criterion of 70%. Although this number was lower than expected, these results should be interpreted with caution as there are a couple of reasons the scores for this instance were not higher. First, the test was administered late in the day on the last day of the course. Participants may have been tired or anxious to finish the day and may not have taken their time responding to test questions. Second, feedback from the first pilots revealed issues with the test questions themselves, such as confusing questions or response options. To determine whether this was the case, an Item Analysis was conducted on the items that at least one-third of the participants responded to incorrectly. As a result of this analysis, seven items in one variant of the test were revised and six items in the other variant were revised.

DISCUSSION AND CONCLUSION

Lead agents at TSA are challenged with the critical task of ensuring the safety of the traveling public. On a daily basis they must act quickly in a cognitively-demanding and often stressful environment. Thus, it was crucial to development training to enhance Lead agents' ability to exhibit the appropriate leadership behaviors when faced with demanding situations. The Essentials course used self-regulating cognitive performance enhancement strategies to ensure the Lead agents could achieve specific performance outcomes. Also, the use of components such as the Competency Self-Assessment and Competency Action Plan allowed the Essentials course to move beyond an isolated training event. Participants responded favorably to the course, as indicated by the Level 1 surveys and anecdotal information provided during the course.

Based on these results, it is anticipated that the Lead agents who participated in the training will be able to apply what they have learned on the job; therefore, this project has demonstrated that effectively designing instruction that balances knowledge and performance simultaneously yields improvements in the effective application of critical thinking skills, memory, attention, and perception for TSA lead and supervisory positions within the operational security environment. The self-regulating cognitive performance enhancement strategies that were incorporated into the TSA Essentials curriculum met the goals of ensuring that Lead agents are more aware of their behaviors, emotions, and skills to better address challenging situations that could potentially affect the security of our airports and transportation infrastructure. The Essentials curriculum is currently being implemented at one the TSA's academies. Level 3 information is currently being captured to assess participants' performance on the job.

As a future step, analysis of Level 3 data will be useful to determine if the current training has had a positive impact on Lead agents' job performance over time. This will allow for a more definitive conclusion about the effectiveness of the course. Level 3 data could include interviewing the target population to determine how effective the Competency Action Plan has been for their career growth. Specifically, participants could provide insight into ways they have successfully practiced the items on their Competency Action Plan and how this practice has turned into subsequent leadership skill enhancement. Participants could also indicate any unforeseen barriers they had to implementing the items on their Competency Action Plan. This information would be helpful to supervisors who could in turn use it to identify ways to remove these barriers.

Another step would be to administer the Competency Self-Assessment to participants' supervisors so that at the end of the 120–150 days, participants would be able to not only cross compare the results between pre- and post-training, but also have a comparison of their supervisor's perception of their performance versus their own. This could provide a more holistic perspective of their current performance. As these results become available, this paper will be updated to reflect the findings.

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