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The Impact of Critical Thinking Strategies on Curriculum and Instruction for USAF Operations Intelligence

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THE IMPACT OF CRITICAL THINKING STRATEGIES ON CURRICULUM AND INSTRUCTION FOR USAF OPERATIONS INTELLIGENCE

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DEDICATION

To my wonderful daughters, Lexi and Audrey, who are the definition of "purpose" in my life.

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Perhaps the greatest lesson I have learned from this academic endeavor is that it has never been a solitary journey. In my case, it has spanned a 20-year USAF career, and my views have been transformed by interactions with mentors, leaders, colleagues, family members, friends, and by regular encounters with extraordinarily-capable people. All of these interactions have shaped my approach to research, communication, and authorship, but there have been a few individuals who have been remarkable guides along the way. Of those, I thank Technical Sergeant (USAF Retired) Jerri Kruse who, as my first USAF supervisor, set me on a clear path and empowered me to pursue my passions. I also thank Colonel (USAF Retired) Michael Phillips who, as my commanding officer and one of the most transformative leaders I have met, challenged me to test my limits. Additionally, I thank Colonel Adam Stone, DM, for entrusting me to integrate critical thinking into the intelligence curriculum and for continuing to shape my views through his own research and authorship. And for providing me the opportunity to experience the most rewarding assignment of my USAF career, I thank Colonel Thomas Hensley. That single year in Iraq resulted in an apperception of "critical thinking" that will forever shape my views. Then, there are my committee members and educators who selflessly mentored and guided me through this game-changing action research process, especially Dr. Susan Schramm-Pate, who went to great lengths to understand the vast differences between USAF intelligence training and higher education so she could help me contextualize my research. To each of you, thank you for carrying me thus far!

ABSTRACT

The goals of the present action research study were to understand intelligence analysts' perceptions of weapon systems visual recognition (*vis-recce*) training and to determine the impact of a Critical Thinking Training (CTT) Seminar and Formative Assessments on unit-level intelligence analysts' *vis-recce* performance at a mid-western United States Air Force (USAF) base where the participant-researcher is the USAF unit's senior intelligence officer which is congruent with action research methods. The identified problem of practice is based on the fact that after decades of viewing *vis-recce* training as a rote requirement and watching intelligence analysts struggle on the summative assessment, the USAF had no plans to refocus its curriculum and pedagogy until the present study where a CTT Seminar was developed from critical educational theories of metacognition, learner motivation, differentiated learning, and alternative assessment strategies. The student-participants' attitudes toward this new approach is the focus of the present study which was guided by the research question: *What are USAF intelligence analysts' perceptions of the efficacy of weapon systems vis-recce training in the operations intelligence profession?* The qualitative data collected during the first of two action research cycles consisted of a survey of 15 intelligence analysts, and the second cycle included semi-structured interviews, field notes, observations, informal conversations, a participant-researcher-developed *vis-recce* pretest, and *vis-recce* posttest from three of the 15 student-participants (i.e., "Sally," "Joe," and "Bill") who were

selected to participate in semi-structured interviews and subsequent participation in a CTT Seminar with Formative Assessments that were aligned to Anderson's et al. (2001) Revised Bloom's Taxonomy and measured by intellectual standards at all cognitive dimensions. Data analysis revealed that after participating in the CTT Seminar that was guided by Formative Assessments (rather than a single summative assessment at the end of the typical lesson), intelligence analysts' *vis-recce* performance increased, they were motivated by the approach, and they ultimately demonstrated metacognition in a content area that was formally aligned by USAF behaviorist curriculum developers to the basic knowledge level of an antiquated Bloom's Taxonomy (1956). Two major themes were discovered during the present study: 1. *Attitudes of Intelligence Analysts Towards Vis-recce*; and 2. *Attitudes of Intelligence Analysts Towards CTT and Formative Assessments*. A two phase Action Plan is recommended to further address the stated problem of practice. After the participant-researcher conducts professional development with the unit's intelligence instructors on the CTT Seminar, Formative Assessments, and action research methods, the instructors will, themselves, conduct several cycles of research over 12 months to capture and analyze data from mission qualified intelligence analysts. A quantitative second phase of research may then be conducted to measure the intelligence analysts' achievement on the USAF-required summative assessment after participating in a CTT Seminar with Formative Assessments that are aligned with the Revised Bloom's Taxonomy (Anderson et al., 2001) and guided by intellectual standards.

Keywords: action research, critical thinking, intellectual standards, intelligence analysis, military weapon systems visual recognition

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LIST OF ABBREVIATIONS

AFB ..... Air Force Base

AFI ..... Air Force Instruction

AOR ..... Area of Responsibility

BMC ..... Basic Mission Capable

CCT ..... Critical Thinking Training

CMR ..... Combat Mission Ready

CT ..... Continuation Training

DIP ..... Dissertation in Practice

DOD ..... Department of Defense

EIT ..... External Intelligence Training

HHQ ..... Higher Headquarters

MAJCOM ..... Major Command

MQT ..... Mission Qualification Training

NATO ..... North Atlantic Treaty Organization

RIP ..... Ready Intelligence Program

SIO ..... Senior Intelligence Officer

USAF ..... United States Air Force

VR ..... Visual Recognition

CHAPTER 1

RESEARCH OVERVIEW

Introduction

There are various purposes that intelligence analysts, aircrew members, ground forces, and other military members are required to develop military weapon systems visual recognition (*vis-recce)* skills, but the fundamental idea of learning to identify friend from foe has been a requirement for combatants since the dawn of civilization. In 1994, during Operation PROVIDE COMFORT, the United States established and defended a no-fly zone to protect the Kurdish people from Iraqi government persecution. On April 14, 1994, while on a mission to deliver supplies to the Kurdish people, two US Army Blackhawk helicopters and 26 aircrew members were shot down after the aircrew members of two USAF F-15 fighter jets misidentified the helicopters as Iraqi Hinds and subsequently fired upon the US helicopters. This event allegedly occurred as a result of malfunctioning Identification Friend or Foe (IFF) systems and because of an aircrew member's inability to positively identify the target aircraft before engaging with lethal force (Cheung, 2012). Although it is likely the most important purpose for *vis-recce*, the life-preserving effect of positively identifying friend from foe is only one of many key reasons aircrew members and their supporting intelligence analysts are required to have a near-flawless ability to rapidly visually recognize aircraft, ground, and naval weapon systems from around the globe.

This Dissertation in Practice (DiP) followed a qualitative action research design that is more specifically defined as an observational study. The primary aim of the study was to understand intelligence analysts' perceptions of *vis-recce* training and to determine the impact of a Critical Thinking Training (CTT) Seminar and Formative Assessments on unit-level intelligence analysts' *vis-recce* performance at a mid-western United States Air Force (USAF) base where the problem of practice exists that the majority of intelligence analysts fail their Microsoft PowerPoint-based *vis-recce* summative assessment (i.e., *vis-recce* test) that is developed to meet initial and recurring USAF intelligence training standards. Data collected during the first cycle of action research consisted of a survey of 15 intelligence analysts from across the intelligence community, and the second cycle included semi-structured interviews, field notes, observations, informal conversations, a participant-researcher-developed *vis-recce* pretest, and a *vis-recce* posttest from three of the 15 student-participants (i.e., "Sally," "Joe," and "Bill") who were selected to participate in semi-structured interviews and a subsequent CTT Seminar.

The standard *vis-recce* test is aligned to the basic knowledge level of Benjamin Bloom's original Taxonomy (1956); thus, it is historically viewed and presented by intelligence instructors and leaders in the field as a rote memorization requirement. After decades of viewing *vis-recce* training as a rote requirement and watching intelligence analysts struggle on the *vis-recce* test, the AF had no plans to refocus its standard curriculum and pedagogy until the present study where the CTT Seminar was developed from critical educational theories of metacognition, learner motivation, differentiated

learning and alternative assessment strategies. The student-participants' attitudes toward this new approach is the focus of the present study.

To address the problem of practice, this study implemented two cycles of action research to, first, understand intelligence analysts' perceptions of *vis-recce* and critical thinking training and, second, to examine the impact of a CTT Seminar that was guided by intellectual standards-based Formative Assessments on operations intelligence analysts' *vis-recce* performance. The goals of this research included interests in helping students increase their performance on the standard USAF *vis-recce* test, achieve higher levels of cognition during their pursuit of one of the most fundamental learning goals, and to aid their development of a substantive view of education in the intelligence discipline. Connecting Paul and Elder's (2007) framework for critical thinking and Anderson's et al. (2001) Revised Bloom's Taxonomy were crucial to bringing an antiquated *vis-recce* curriculum pedagogy into the 21st-Century.

Chapter 1 of this DiP describes the topic of *vis-recce* from the USAF's military service perspective. Chapter 1 also defines and describes the focus of the current unit-level intelligence mission at the study site to support a deeper understanding of the environment that executes the current curriculum pedagogy for intelligence analysts. Furthermore, in Chapter 1, I present my identified problem of practice and provide a discussion on the significance and purpose of the present action research study with regards to operations intelligence analysts' responsibilities in context of the broader missions of both the USAF and Department of Defense (DoD). Finally, I explain the cyclical nature of this study and its impact on my leadership capabilities in curriculum and instruction as I work in reciprocity with a diverse population of learners in the USAF.

Background of the Problem

As the USAF base Senior Intelligence Officer (SIO) at my study site, I am required to educate and evaluate each intelligence analyst on an initial and recurring basis (i.e., a minimum of every 24 months). After three flying unit assignments, however, I have informally observed that more than 50% of analysts struggle with their core *vis-recce* training requirements—often failing multiple consecutive assessments.

I have recognized throughout more than 19 years of USAF experience that this anomaly seems to occur even when the number of weapon systems on the *vis-recce* test are reduced dramatically to mere fractions of the intended USAF's standard for testing. In spite of this problem of practice, there are significant gaps in the literature available on *vis-recce* training; the majority of which are general military guidance manuals with instructions that are limited to how *vis-recce* instruction and assessments should be conducted. Additionally, the USAF intelligence community has yet to define a substantive view of education in the operations intelligence discipline. However, the USAF has identified a need and consistently struggled to integrate critical thinking into the intelligence analysis curriculum. This need opens access to a broad range of literature on curriculum theory, curriculum design, and assessment strategies that seem to converge in andragogy, especially in the field of intelligence analysis education.

The current unit intelligence curriculum associated with a USAF flying mission is tailored to the specific unit's mission and aircraft role. For example, the unit level intelligence curriculum for an air-to-ground bomber mission could include a targeting and weaponeering requirement, but an air mobility unit, like the one at the study site, focuses on the intelligence skills required to support Air Mobility Command's (AMC)

airdrop and transport missions. However, *vis-recce* is a shared core requirement across most, if not all, unit level intelligence missions, and although there are several topics that could pique an intelligence educator's interest, few seem so simple, yet so confoundedly complex, as the problem with poor student achievement on a *vis-recce* test that is believed by the majority of intelligence instructors to be achieved through simple repeated exposure and rote memorization. USAF guidance, which serves as the preponderance of available literature on the topic, requires strict adherence to certain assessment practices that further complicate a seemingly simple requirement with its dedicated focus on an analyst's ability to memorize content with no acknowledgement of the purpose of the content or of the thinking an analyst can conduct within it. The following subsections of this background provide a broader definition of the unit intelligence mission, and they identify USAF *vis-recce* training guidance and the present intelligence analysis curriculum pedagogy employed at the USAF base that was subject to the present research study

Unit Intelligence and Training Terms Defined

According to Air Force Instruction (AFI) 14-202 (2008), "an intelligence unit is a level of organization under HHQ [Higher Headquarters] (MAJCOM) [Major Command] required to establish an intelligence function. Unit Intelligence encompasses Intelligence Wings, Intelligence Groups, Intelligence Squadrons, and Intelligence support to flying operations" (p. 16). An installation-level intelligence unit can range from approximately 10 to 60 personnel, to include commissioned officers and enlisted members who are all required to accomplish the same qualification training. Each intelligence unit is required to establish a unit intelligence training program that includes Initial Qualification

Training (IQT), Mission Qualification Training (MQT), and Continuation Training (CT) as part of a Ready Intelligence Program (RIP) requirement (US Department of the Air Force, AFI 14-2C-130V1, 2013). I initially planned to delimit this study to only focus on the research site's CT function so it would not impede initial mission qualification progress for those enrolled in the basic standardized MQT; however, due to unforeseen deployment commitments and mission constraints, I had to adjust the study to focus on intelligence analysts who were recent graduates of the USAF Basic Intelligence Course and who had not yet entered MQT.

"MQT is training necessary to qualify intelligence personnel in an assigned position to perform the unit mission" (US Department of the Air Force, AFI 14-2C-130V1, 2013, p. 9, para. 3.1). Airlift unit MQT includes six knowledge blocks of instruction and 11 task blocks that will be discussed in greater detail in the following subsections (US Department of the Air Force, AFI 14-2C-130V1, 2013). CT includes the Internal Intelligence Training Program and the RIP. "The intent of RIP is to ensure intelligence personnel perform specific mission essential tasks with sufficient frequency to maintain proficiency in their duty positions" (US Department of the Air Force, AFI 14-2C-130V1, 2013, p. 15, para. 4.3). A key component to each of these unit intelligence training requirements is the focus of this action research study—*vis-recce*.

USAF Visual Recognition Training Guidance

The USAF *vis-recce* training requirement for an air mobility unit is directive. According to AFI 14-2C-130V1 (2013), "The trainee will identify enemy/blue/gray weapon systems . . . This includes air, ground, and naval systems. Specific tasks: Demonstrate ability to visually identify aircraft . . . by North Atlantic Treaty

Organization [NATO] designation, name or numerical designator and determine whether the aircraft is a threat or non-threat" (US Department of the Air Force, p. 10, para. 3.3.1.3). The USAF also mandates that the only acceptable assessment is a "timed VR [visual recognition] test via visual presentation system" (US Department of the Air Force, AFI 14-2C-130V1, 2013, p. 10, para. 3.3.1.3).

A central enabler for conducting this research in an operational intelligence unit is that USAF regulations do allow some flexibility for instructors to develop their own teaching styles, and they provide instructors some latitude to address instances of analysts' substandard performance. The USAF approaches *vis-recce* as a core requirement for aircrew members and intelligence analysts, and the summative assessment method is presently unquestionably fixed. According to AFI 14-2C130V1 (2013), "the trainer will introduce instruction techniques for VR [visual recognition] of enemy/blue/gray weapon systems mandated by unit training programs and will train to the same standard required of aircrew" (US Department of the Air Force, p. 18, para. 5.2.2.2.3). On one hand, this statement requires strict adherence to the standard, but on the other hand, it leaves room for the instructor to experiment with delivery, content, and technique. AFI 14-202V2 (2008) dictates, "The minimum passing grade for examinations is 85 percent-corrected to 100 percent" (US Department of the Air Force, p. 19, para. 6.4.6), but it places the onus on the instructor for substandard performance. According to AFI 14-202V2 (2008), "Poor testing performance on examinations indicates areas requiring increased training emphasis" (US Department of the Air Force, p. 19, para. 6.1). This guidance became problematic during the course of this research because failed attempts of the final *vis-recce* test were rarely documented, requiring me to rely on

my own community knowledge, interviews, and the administered pretest to gauge student performance. Undoubtedly, the USAF guidance clearly establishes the *vis-recce* assessment standard, and it provides ample flexibility in the guidance that enabled this action research study.

Current Unit Intelligence Training Pedagogy

The current pedagogy used in the USAF for intelligence training includes MQT and CT. MQT at my research site is organized according to AFI guidance. The portions of MQT that require knowledge-based assessments include: C-130 weapon systems academics, area of responsibility (AOR) threat training, AOR *vis-recce* training, personnel recovery academics, intelligence integration in force protection academics, and research, analysis, and dissemination. The performance-evaluated portions of MQT include: manual order of battle, automated order of battle, changeover briefings, pre-deployment briefings, situation briefings, air tasking order breakout, landing zone/drop zone considerations, intelligence integration in mission planning, pre-mission briefings, debriefings, and intelligence report writing.

CT at the research site includes recurring training on C-130 capabilities, threat knowledge, *vis-recce*, intelligence systems, order of battle, briefing, mission planning, debriefing, reporting, personnel recovery, geospatial information and services, and force protection. CT also includes RIP currency requirements that must be accomplished every six months or every year, depending on the analysts' designated readiness status. RIP includes the following tasks: manual order of battle, automated order of battle, changeover briefing, pre-deployment briefing, situation briefing, air tasking order breakout, intelligence integration in mission planning, pre-mission briefing, debriefing,

and intelligence report writing (US Department of the Air Force, AFI 14-2C-130V1, 2013). Clearly, the intelligence training curriculum at the site of the present study covers the content areas that represent the intelligence analysts' duties, but as a the unit's senior intelligence officer, I can attest that students are not assessed or trained to think within the content or discipline with the aid of intellectual standards. This research, then, focused on *vis-recce*, the most fundamental yet problematic content area, as the target for modification and foundation for researching the impact of integrating intellectual standards into the curriculum.

The *vis-recce* training requirement is presented to intelligence analysts at the research site in standard-format during MQT, periodic evaluations, and as a prerequisite to their instructor upgrade qualification. For MQT and periodic training, "VR training includes airframes likely to be encountered in the unit-tasked Area of Responsibility including rotary and fixed-wing, as well as joint/allied assets. Training should also cover major categories of ground equipment and naval vessels" (US Department of the Air Force, AFI 14-2C130V3, 2013, p. 10, para. 3.3.2.1). At the unclassified level, this general guidance could legitimately span 1,400 weapon systems for an air mobility mission that must be prepared to support contingencies or humanitarian efforts across the globe; however, the actual number was reduced to approximately 100 weapon systems that were based on the intelligence training section's assessment of those which were most likely to be encountered by aircrew members or those which posed the greatest threat or intelligence value (Worldwide-Military.com, 2014). Instructors at the research site display and discuss Microsoft PowerPoint images that "incorporate all aspects/angles, theater specific paint schemes, fin flashes, and various configurations" (US Department

of the Air Force, AFI 14-2C130V3, 2013, p. 10, para 3.3.2.2). Analysts are then allowed to self-study before attempting a Microsoft PowerPoint exam that offers a 10-second glimpse of each image or fin-flash before an analyst is required to provide a response. According to the unit's training system, students are allowed 30 days to complete this block of training, but in practice this portion of training is expected to be completed within one-to-five days.

Vis-recce training advances as intelligence analysts progress, or upgrade, to instructor duties. As they advance, intelligence analysts become subject matter experts who learn to teach *vis-recce* methods to aircrew. This progression mostly applies to intelligence analysts who are assigned to flying squadrons. According to AFI 14-2C130V1 (2013), "All personnel assigned/attached to a flying squadron must be EIT [External Intelligence Trainer] qualified for . . . Aircrew Visual Recognition" (US Department of the Air Force, p. 17, para. 5.2.2.2). This "training should teach aircrew how to describe threats they encounter to assist intelligence personnel in positive identification" (US Department of the Air Force, AFI 14-2C130V3, 2013, p. 10, para 3.3.2.2). According to AFI 14-2C130V3 (2013), it will also "include examples of weapons employment training to illustrate to aircrew how threats might appear when employed (e.g., air bursts, muzzle flashes, etc.)" (US Department of the Air Force, p. 10, para 3.3.2.3). Although strict, these standards are directly related to the life-saving and intelligence-gathering benefits of *vis-recce* skills, but there is some unidentified problem that is causing the majority of intelligence analysts at the research site to fall short of the standard.

Problem Statement

In the USAF intelligence profession, intelligence analysts who are assigned to flying missions are required to be the subject matter experts regarding their ability to visually identify and describe military weapon systems. This requirement is born of defensive forward observer roles and an anti-fratricide necessity of differentiating combatants between friend and foe. The life-preserving effect of this *vis-recce* activity is one of several reasons all operations intelligence analysts are required to demonstrate a near-infallible military *vis-recce* ability on a standardized military *vis-recce* test.

Intelligence analysts could be expected to visually identify over 1,400 air, land, and naval weapon systems at multiple angles and distances in a broadly-focused unit intelligence mission, but in practice this is typically reduced to those systems that pose the greatest concern to the mission. Despite this typical reduction in required *vis-recce* skills, the problem of practice identified for this study was that the majority of intelligence analysts assigned to a USAF base in the mid-Western US failed their timed Microsoft PowerPoint-based assessments that were designed to meet the USAF standard, and that USAF standard, itself, did little to enable knowledge retention and the development of critical thinking skills that are essential to quality intelligence analysis.

Nearly 100 years ago, famed educator Franklin Bobbitt (1918) stated, "The new age is more in need of facts than the old; and of more facts; and it must find more effective methods of teaching them" (p. 11). In the present research, I argue in favor of Bobbitt's thoughts, adding that teaching students to learn within each discipline they study is equally, if not more, important. Developing the necessary skills to rapidly identify military weapon systems, and to understand and articulate capabilities of those

weapon systems, is a challenging endeavor that requires intelligence instructors and analyst students to develop and nurture their critical thinking skills. Action Research is cyclical and iterative in nature and has reciprocity at its core. Working in unison with the intelligence analysts enabled me to address this problem and work to impact the scholarly productivity of the unit.

Significance of the Problem

The present action research study is not designed to be generalized to units outside of the research site, but with approximately 66 units and the widely diverse nature of over 2,000 supporting intelligence analysts, it is possible that other units have or will experience the same training phenomenon, and most certainly, they will experience a need for understanding how they might introduce standards by which to measure thinking within the intelligence analysis discipline ("Structure of the United States Air Force," 2014). A review of the literature returned no evidence that the USAF has acknowledged a problem, addressed a problem, or experimented with integrating an intellectual standards-based pedagogy into the *vis-recce* curriculum. This reality resulted in the discovery of very little literature outside of military "For Official Use Only" channels that supports this action research study.

Presumably, one reason for this lack of literature is the institutional reliance on the unrevised Bloom's Taxonomy (1956) that has been used to define *vis-recce* skills as a rote knowledge-level requirement. There is an existential view in the USAF intelligence training community that *vis-recce* should be easy because the standard assessment only requires analysts to see a system and name the system. This could be interpreted as somewhat analogous to a child learning the name of a color or an object. Taking into

account a more substantive view of cognition that occurs at the basic knowledge level, an examination of the USAF requirements, the current curriculum pedagogy, and the sheer number of air, ground, and navy weapon systems, however, there is a clearer indication that the problem with poor student *vis-recce* performance is not so simple. Additionally, the present pedagogy fails to account for the many diversities within the intelligence analysis learning community. For the purpose of understanding the nature of the problem, the available instructions suffice; however, this qualitative action research study contributes to a subject that is nearly devoid of applicable academically-focused literature, and it expands on the efficacy of using a critical thinking framework and intellectual standards with a Revised Bloom's Taxonomy (Anderson et al., 2001) to affect achievement at all cognitive levels amongst a diverse intelligence analyst student body.

Purpose of the Study

Understanding intelligence analysts' perceptions of *vis-recce* training leads to an understanding of the level of thought intelligence analysts apply towards the subject, and it lends clues to how a CTT Seminar and Formative Assessments might be used to in a traditional behaviorist curriculum.

The following purposes, representing separate iterations of the action research cycle, guided the present qualitative action research study:

1. Understand intelligence analysts' perceptions of weapon systems visual recognition training requirements and curriculum pedagogy; and, 2. Determine the impact of Formative Assessments on the critical thinking skills of intelligence analysts regarding weapon systems visual recognition after a CTT Seminar.

Ultimately, the study aimed to increase vocational performance by helping intelligence analysts develop critical thinking skills, even during the most fundamental of unit-level intelligence tasks. The study's goal of helping intelligence analysts overcome the stated problem of practice was fundamental to the study, and it was fueled by additional objectives that were purposed to encourage continual intellectual growth and that would help the intelligence analysts further develop their abilities throughout their USAF missions and careers.

Implications for the Unit-Level Intelligence Educator

Reflection is a key phase of action research, and although modeled as the final phase of Mertler's (2014) action research process, it continually informed this action research study and my own practice as an improvement-minded intelligence educator and proponent of providing student-centered opportunities for critical thinking at every level of education. Continual reflection occurred throughout every phase of the present action research study, and it aided my deeper understanding of the problem of practice and contributed to my apperception of the educational theory that served as the basis of this research. Furthermore, this research aided my understanding of USAF-mandated training requirements, and it also helped me develop into a more thought-provoking educator and advocate for social justice within the intelligence community who will continually strive to improve upon my own practice and cognitive abilities for the sake of developing a cadre of professional intelligence analysts.

Conducting this action research study also had a significant impact on my ability to observe relationships between content areas that I had not previously observed. For example, aside from the macabre reasons for aircrew members and intelligence analysts

to be proficient at *vis-recce*, I also realized that this study presented an opportunity for intelligence teams to engage in mission-focused team-building and social development activities within the research. According to AFI 14-202V3 (2008):

> Intelligence personnel participate in the planning and execution of Air Force operations. Through close, continuing interface, intelligence personnel ensure commanders, their staffs, combat crews, weapon system developers and other customers are provided the best available information and materials to enhance readiness, facilitate planning, execute assigned missions and build warfighting capability. Intelligence supports strategic, operational, and tactical operations by providing information and services to a divergent set of customers, ranging from national to unit-level decision makers. (US Department of the Air Force, p. 4, para. 1.1)

The description above implies that intelligence analysts must use all available resources to gather information to support a wide range of missions. Intelligence analysts depend on aviators to positively identify air, ground, and naval activities that could represent a wide range of friendly or hostile, legal or illicit, and civil or military activity. These visual cues provide intelligence analysts with physical evidence to bolster their assessments that support commanders at all levels. A common complaint heard from unit-level intelligence analysts is that the USAF writ-large refers to all intelligence analysts as intelligence, surveillance, and reconnaissance (ISR) operators, a term more commonly directed towards those with a more blatant collection mission. In reality, however, unit-level intelligence analysts can gain great operational insight from *vis-recce* information reported by their supported aircrew members, thus becoming ISR operators.

From my perspective as an intelligence education leader, this study brought me towards my goal of leading and implementing changes in intelligence analysis training and curriculum design that are sensitive to the learning needs of a diverse cadre. Whether at the University level or within the Department of Defense (DoD), I believe major changes need to occur within the intelligence analysis pedagogy to address the deficiencies that exist in developing high-ability and high-performing intelligence analysts. The flexibility of the action research paradigm and the present study had a direct and immediate impact on my practice as an intelligence instructor, and it placed me in a position to be a leader at the forefront of intelligence analysis curriculum transformation.

My personal life, career experiences, and academic experiences provided me insight to significant problems within the USAF intelligence analysis curricula. The problem I identified with poor student performance on *vis-recce* is one example that I believe is largely due to poorly qualified curriculum leaders and instructors within the USAF intelligence training community, curriculum leaders who are constrained by their focus on Industrial Age pedagogies and instructional practices. As a USAF intelligence educator and course developer, I consider my own experience and background as support for my assertion. My goal for the present action research study and DiP was to address the stated problem of practice by increasing intelligence analysts' cognitive abilities through intellectual-standards-based Formative Assessments and to produce an action plan that would address the research findings. The methodology that is briefly overviewed in the following section and in more detail in Chapter 3 of this DiP describes the plan that guided this research toward that goal.

Methodology

This action research study follows a qualitative design that is guided by the following research question: 1) What are USAF intelligence analysts' perceptions of the efficacy of weapon systems visual recognition training in the operations intelligence profession? This study uses two iterations of the action research cycle to understand intelligence analysts' perceptions of the *vis-recce* curriculum and to determine the impact of a CTT Seminar and Formative Assessments on intelligence analysts' *vis-recce* performance and critical thinking abilities. Informal survey data is captured from 15 intelligence analysts during the first action research cycle, and after an inferential analysis of the data, an action plan informs the second action research cycle where three of the 15 intelligence analysts (i.e., "Sally," "Joe," and "Bill") are selected for semi-structured interviews and participation in a CTT Seminar that is guided by Formative Assessments. In addition to the semi-structured interviews, data collection during the second cycle include a participant-researcher-develop *vis-recce* pre-and-posttest, field observations, and informal interview data. The methodology will be discussed in greater detail in Chapter 3 of this DiP.

Research Site and Participants

The intelligence analysts under my leadership at a USAF base in the mid-Western US participated in the study. I initially planned to delimit the study to the same 10 analysts for the duration of the study with the idea that this delimitation would allow me to reduce the chance of a mortality error on my sample if the research developed into a quantitative study. I also planned a second delimitation that required participants to be selected from the population of CT status intelligence analysts versus those in MQT

status since the USAF requires strict adherence to training timelines for those in MQT status. Due to USAF mission factors outside of my control, however, the study had to be modified prior to the data collection phase to survey a diverse body of mission qualified, previously-mission qualified, or non-mission qualified intelligence analysts who ranged in rank from Senior Airman to Brigadier General. Of those, three intelligence analysts were selected for participation in a second cycle of research that included semi-structured interviews and participation in a CTT Seminar. The participants were selected to maximize diversity in socio-economic status, race, gender, and educational background.

The larger of the populations of research participants, the 15 intelligence analysts who were surveyed during the first cycle of action research, were primarily assigned to one of three intelligence units at the research site, but some were geographically separated. "Sally," "Joe," and "Bill," who were selected for participation in the CTT Seminar, were permanently assigned to the research site. The CTT Seminar took place in the study site's traditionally-oriented auditorium that served as the venue for the unit's regularly-scheduled internal intelligence training and briefing activities which was a slight deviation from the unit's standard *vis-recce* training where analysts commonly learned *vis-recce* skills from their respective workstations. Although they represented a small sample, the participants of the second cycle of action research were diversified by race, education, experience, and gender.

Three Participants. The first participant, "Sally," is a 28-year-old white female commissioned officer with a bachelor's degree who was born in the USA and who is a recent graduate of the USAF's basic intelligence course. The second participant, "Joe," is a 23-year-old Filipino-American male who immigrated to America when he was in

high-school. He is also a commissioned officer who holds a bachelor's degree, and he is also a recent graduate of the USAF's basic intelligence course. The third participant, "Bill," is a 43-year-old African-American male senior commissioned officer who was born in the USA. Bill is an experienced intelligence and *vis-recce* instructor who holds a master's degree. These three participants were chosen to participate in the present study to maximize participant-diversity along race, gender, experience, and education lines and due to their availability to participate in the study without interruption.

Conclusion

To properly frame the problem and focus the research, Chapter 1 of this DiP has provided a broad overview of my research interest. Chapter 2 details the challenges posed by the gaps in available *vis-recce* literature, but it also describes the current intelligence analysis curriculum pedagogy used at the USAF base's intelligence unit and the diverse theoretical basis of my research, drawing heavily from Paul and Elder's (2007) internationally-recognized critical thinking framework and the Revised Bloom's Taxonomy (Anderson et al., 2001).

Chapter 3 outlines my methodology for conducting a qualitative action research study that aimed to discover viable solutions for my identified problem of practice, solutions that could potentially result in life and USAF mission-altering implications, intellectual growth for intelligence analysts, a beginning to the research regarding the practical use of intellectual standards and differentiated curriculum pedagogy in the USAF operations intelligence profession, and support for the flexible action research paradigm. Chapter 4 is dedicated to the findings and results of this action-research-based DiP. Chapter 5 summarizes the entirety of the study, paying particular attention to the

potential efficacy of the results and the limitations of the action research methodology with regards to transferability.

CHAPTER 2

LITERATURE REVIEW

Introduction

Although weapon systems visual recognition (*vis-recce)* skills are basic skills for intelligence analysts because of the proven danger of fallible knowledge in combat, unit-level United States Air Force (USAF) intelligence training requirements have changed very little over the past several decades to attempt a more effective alignment of the curriculum pedagogy with learner needs. Intelligence analysts at the site of the present study, an air force base (AFB) in the mid-Western United States (US), support tactical airlift and airdrop missions that are almost identical to the missions flown during the Korean and Vietnam wars, and little has changed in the curriculum to answer the Nation's calls for increased critical thinking training in the intelligence community, especially with regards to unit-level *vis-recce* training. In fact, the present curriculum pedagogy at the research site does not even establish a substantive baseline for critical thinking before or after the *vis-recce* course. The *vis-recce* course is a one-size-fits-all model where analyst students are simply required to hear basic weapon systems design instruction, memorize images, and know the associated North Atlantic Treaty Organization (NATO) designators. The *vis-recce* curriculum is the decades-old work of behaviorist approaches that have repeatedly produced high failure rates and poor knowledge and skill retention while attempting to adhere to Bloom's Taxonomy (1956)

to develop intelligence analysts, primarily at the more easily quantified lower levels of Bloom's cognitive dimension. *Vis-recce* trainers need to cultivate intelligence analysts' *vis-recce* skills and maximize opportunities for metacognition, but intelligence analysts' learning has been restrained by a poorly-executed curriculum pedagogy. Heretofore, USAF intelligence analysis curricula and objectives have been guided by a strict adherence to scientific curriculum-making methodologies and Bloom's Taxonomy (1956), which has produced inconsistent outcomes, a systemic organizational misunderstanding of cognition, and rarely-observed metacognition amongst operations intelligence analysts. I think this reliance on traditional scientific curriculum theory is due for a change of focus, a focus that maximizes attainment of learning goals through a convergence of theories and methodologies, a focus that takes learner needs into account while teaching analysts to construct meaning and to solve problems and learn in the context of their own lives.

According to Noddings (1983), John Dewey often advised, "Any subject freely undertaken as an occupation—as a set of tasks requiring goal-setting, means-ends analysis, choice of appropriate tools and materials, exercise of skills, living through the consequences, and evaluating the results—is educative" (p. 193). As members of an all-volunteer force, USAF intelligence analysts freely accept the demands of their occupation; however, many analysts are slighted a complete education when they are required to follow a one-sized-fits-all curriculum that is designed by strict traditionalists and that does not take into account the nature of the analysts' past experiences, learning preferences, environment, or personal background. The result of this curriculum and instruction mismatch is my identified problem of practice for my DiP at the mid-Western

USAF base. Here, the majority of intelligence analysts fail their USAF-mandated timed summative *vis-recce* assessments (*vis-recce* test). My qualitative action research study seeks to understand intelligence analysts' perceptions of *vis-recce* training requirements, and it determines the impact of student-centered Formative Assessments on analysts' critical thinking and *vis-recce* skills after a Critical Thinking Training (CTT) Seminar.

The research site's rote methods and single high-stakes *vis-recce* test has proven to be ineffective, but Formative Assessments for *vis-recce* provide an opportunity to evaluate the effectiveness of a marriage between theories of metacognition and constructivism, with intellectual standards being the rubric for measuring the quality of an analyst's constructed knowledge. John Dewey (1929) believed rote memorization to be ineffective and that educators should devote their time "training the child's power of imagery and in seeing to it that he was continually forming definite vivid, and growing images of the various subjects with which he comes in contact in his experience" (p. 38). My view that guides the present research is that Dewey's constructivist theory is just as important to adult learners as it is to children, but knowledge construction, left to itself, risks creating poor habits of mind or reinforcing erroneous data. For these reasons, my action research study aims to improve active duty intelligence analysts' education in terms of curriculum, pedagogy, and assessment through a thought-infused and guided constructivism. This idea is present in Dr. Richard Paul and A. J. A Binker's (Socratic Questioning, n.d.) teachings:

> What we need to do, in contrast, is to stimulate student's thinking right from the start, especially about the most basic ideas in a subject so that they are motivated from the beginning to use their thinking in trying to understand things, and so that

they base their thinking on foundational ideas that make sense to them. (p. 372)

To ground the literature that supports the present action research study, this Chapter 2 reviews this DiP's research problem statement, purpose statement, and research questions. What follows is a statement of importance for this literature review and an examination of the supporting educational theory and critical thinking literature. Chapter 2 also provides an overview of the formative assessment methods and closes with an brief summary of the key elements of Bloom's Taxonomy (1956) and the Revised Bloom's Taxonomy (Anderson et al., 2001) that were used to inform this research.

Problem Statement

In the USAF intelligence profession, intelligence analysts who are assigned to flying missions are required to be the subject matter experts regarding their ability to visually identify and describe military weapon systems. This requirement is born of defensive forward observer roles and an anti-fratricide necessity of differentiating combatants between friend and foe. The life-preserving effect of this *vis-recce* activity is one of several reasons all operations intelligence analysts are required to demonstrate a near-infallible military *vis-recce* ability on a standardized military *vis-recce* test.

Intelligence analysts could be expected to visually identify over 1,400 air, land, and naval weapon systems at multiple angles and distances in a broadly-focused unit intelligence mission, but in practice this is typically reduced to those systems that pose the greatest concern to the mission. Despite this typical reduction in required *vis-recce* skills, the problem of practice identified for this study was that the majority of intelligence analysts assigned to a USAF base in the mid-Western US failed their timed

Microsoft PowerPoint-based assessments that were designed to meet the USAF standard, and that USAF standard, itself, did little to enable knowledge retention and the development of critical thinking skills that are essential to quality intelligence analysis. Nearly 100 years ago, famed educator Franklin Bobbitt (1918) stated, "The new age is more in need of facts than the old; and of more facts; and it must find more effective methods of teaching them" (p. 11). Traditional approaches have not achieved this need, so I suggest the new age requires a new perspective to the problem that requires curriculum leaders to provide guided opportunities for intelligence analysts to learn to develop and nurture their own critical thinking skills.

Purpose Statement

Understanding intelligence analysts' perceptions of *vis-recce* training leads to an understanding of the level of thought intelligence analysts apply towards the subject, and it lends clues to how a CTT Seminar and Formative Assessments might be used to in a traditional behaviorist curriculum.

The following purposes, representing separate iterations of the action research cycle, guided the present qualitative action research study:

1. Understand intelligence analysts' perceptions of weapon systems visual recognition training requirements and curriculum pedagogy; and, 2. Determine the impact of Formative Assessments on the critical thinking skills of intelligence analysts regarding weapon systems visual recognition after a CTT Seminar.

Ultimately, the study aimed to increase vocational performance by helping intelligence analysts develop critical thinking skills, even during the most fundamental of unit-level intelligence tasks. The study's goal of helping intelligence analysts overcome

the stated problem of practice was fundamental to the study, and it was fueled by additional objectives that were purposed to encourage continual intellectual growth and that would help the intelligence analysts further develop their abilities throughout their USAF missions and careers.

Research Question

The present study is guided by the following qualitative research question:

1) What are USAF intelligence analysts' perceptions of the efficacy of weapon systems visual recognition training in the operations intelligence profession?

Importance of the Literature Review

The present action research study is not expected to be generalized to units outside of the research site, but with approximately 66 units across the USAF and the widely diverse nature of over 2,000 supporting intelligence analysts, it is possible that other units have or will experience the same training phenomenon, and most certainly, they will experience a need for understanding how they might introduce standards by which to measure thinking within the intelligence analysis discipline ("Structure of the United States Air Force," 2014). A review of the literature returned no evidence that the USAF has acknowledged a problem, addressed a problem, or experimented with integrating CTT into the *vis-recce* curriculum. This reality resulted in the discovery of very little literature outside of military "For Official Use Only" channels that supported the present action research study. In the face of limited institutional literature, however, a thorough review of history, USAF guidance, and educational theory reveals a rich source of information to support a thorough action research study into the problem of practice.

Presumably, one reason for this lack of literature is the institutional reliance on the unrevised Bloom's Taxonomy (1956) that has been used to define *vis-recce* skills as a rote knowledge-level requirement. Prior to conducting the present action research study, I believed there to be an existential view across the USAF intelligence training community that *vis-recce* should be easy because the standard assessment only requires analysts to see a system and name the system—basic memorization. I believed, however, the problem with poor intelligence analyst performance to be more complex, and more directly related to an institutional misunderstanding of how students think and come to acquire knowledge and skills.

Through decades of empirical studies and observations, Paul and Elder (2007) have found that teachers and institutions of higher learning fail to substantively define critical thinking. The USAF has continually acknowledged the need for increased critical thinking, as I understand from a past experience integrating critical thinking instruction into the USAF's Analysis, Correlation, and Fusion Course in 2006. Drawing from research and prior experience, I believed critical thinking instruction would provide students, specifically the intelligence analysts assigned to the research site, an intellectual foundation that would positively affect their thinking across all levels of cognition in even the most fundamental of the unit-level intelligence analysis curricula despite the behaviorist views that are steeped in an antiquated Bloom's Taxonomy (1956).

Theoretical Perspective

The ultimate goal of the present action research study is to provide substance to the notion that USAF intelligence training can be improved by synthesizing multiple sources of educational wisdom—even in the face of firm standards and widespread

diversity. Realization of this goal, however, is no easy task in a military structure that places great focus on standards-based instruction and educational objectives that ignore or devalue discourse and thinking for certain training requirements that have been aligned to the basic knowledge level of an outdated Bloom's Taxonomy (1956) that essentially expects students to absorb transmitted knowledge. This so-called, 'transmit and receive' style of pedagogy that pervades the USAF is challenged by the present action research study. Famed educator Paulo Freire (1970) believed teachers to be cultural workers and that curriculum and pedagogy should not consist of "bits of information to be deposited in the students—but rather the organized, systematized, and a developed 're-presentation' to individuals of the things about which they want to know more" (p. 160). Like John Dewey (1929) before him, Freire (1970) argued that students needed to make meaning for themselves in order for any real learning to take place. Following this constructivist model, the research will aim to generate such intellectual curiosity through modeling critical thinking as Paul (n.d.) suggests:

> They [the students] must see our minds at work. Our minds must stimulate theirs with questions and yet further questions, questions that probe information and experiences, questions that call for reasons and evidence, questions that lead students to examine interpretations and conclusions, pursuing their basis in fact and experience questions that help students to discover their assumptions, questions that stimulate students to follow out the implications of their thought, to test their ideas, to take their ideas apart, to challenge their ideas, to take their ideas seriously. (Critical Thinking, pp. 12-13)

Bobbitt (1918) stated that, for curriculum-discoverers, the "first task rather, in ascertaining the education appropriate for any special class, is to discover the total range of habits, skills, abilities, forms of thought, valuations, ambitions, etc., that its members need for the effective performance of their vocational labors" (p. 13). In reality, every intelligence analyst is an individual—an individual who is unique in learning preferences and in interests. Some intelligence analysts have no desire to memorize what weapon systems look like, even though it is important to visualize a system's design as a precursor to developing a deeper understanding of how that system might be employed in combat. Some students may have entered the USAF from an educationally-strained or socially-obstructed background. In fact, the diversity factors present in the USAF intelligence community are innumerable, but constructivist views provide fundamental ideas that may enable educators to reach a diverse audience. Dewey (1929) believed, "To humor the interests is to substitute the transient for the permanent. The interest is always the sign of some power below; the important thing is to discover this power" (p. 38). To achieve Bobbitt's vision of student understanding, Paul's intellectual stimulation, and Dewey's connection with the students' interest, true instructor-student dialogue is a priority throughout the present study.

Knowledge and Learning

The literature on knowledge and learning is vast, but there are key elements of human thinking and the learning process that are critical to deep learning in every field and that are fundamental to the methods used in the present study. Although not all-inclusive, these elements include theoretical views of how the mind functions, the role of dialogue and student motivation in the learning process, the ways in which students

construct knowledge, and the key roles that students and teachers play in this learning process. These elements, along with examples of how they may be considered for active and cooperative learning methods, are presented in this section.

Functions of the mind. According to Elder and Paul (2015), "thoughts, feelings and desires continually interact, and produce behavior as a result of that interaction" (p. 8). In the absence of some control mechanism, emotions and desires often guide individual behavior. That control mechanism or command function, according to Elder and Paul (2015) is the human's ability to think.

Thinking. Every human thinks, but all thinking is not created equally. Left to their own devices, and driven by desires and feelings, human thinking is biased and flawed. Thinking well requires motivation to make sense, to be reasonable, and to overcome the fundamental human penchant for pursuing individual wants and for using information to validate individual views (Elder & Paul, 2015). Although the human mind thinks, feels, and desires, and each function is, "in principle, equally important, it is only through thinking that we take command of our minds (Elder & Paul, 2015, p. 4).

Feelings. Feelings are the emotional products of thinking. They are the results of our assessment if life events are positive or negative. Feelings are help humans connect experiences and learning with a determination that life is going well or, otherwise, poorly (Elder & Paul, 2015).

Desires. Desires and motivations are the products of thinking and feelings, the decisions humans make to "allocate energy to action, in keeping with what we define as desirable and possible. It continually tells us: 'this is worth getting. Go for it!' or, conversely, 'this is not worth getting. Don't bother'" (Elder & Paul, 2015, p. 5). "Only

when they see the value in learning the content will they be internally motivated to do so" (Paul and Elder, 2014, p. 4).

Role of dialogue. Without dialogue, learning is self-serving and, perhaps, limited to a reliance on rote behaviorist methodologies that have produced sub-optimal *vis-recce* results in the intelligence community. Freire (1970) believed education could not exist without critical dialogue, which he defined as "the encounter between men, mediated by the world, in order to name the world" (p. 157). Freire (1970) also explained that dialogue was dependent upon critical thinking when he wrote, "true dialogue cannot exist unless the dialoguers engage in critical thinking" (p. 159). In consideration of Freire's and other renowned critical pedagogues' views, the role of dialogue cannot be overlooked when considering how the CTT Seminar and Formative Assessments are implemented in the present action research study. Dialogue should also serve as a cornerstone of intellectual growth for both the participant-researcher and the intelligence analyst student-participants.

Making meaning. An important concept to the present action research study is the intelligence analysts' ability to construct meaning during *vis-recce* training and to guide their thinking within the discipline. Constructing meaning and developing schema are important elements of committing knowledge to long-term memory, a weakness in the current *vis-recce* curriculum and a focus of the present study. When students are expected to understand ideas or things without making connections to existing structures, the ideas do not make permanent and meaningful connections in the mind. There are, however, several student-centric and teacher-centric methods that support the development of systems of meaning and for assessing the quality and relevance of

knowledge (Paul & Elder, 2012). Paul and Elder (2011) offer the following suggestions for improving thinking within any discipline:

How to study and learn a discipline. It is essential for students to think within the context of the discipline or subject in order to learn any specific subject, and that content should be fully integrated with thinking.

> To teach content separate from thinking is to ensure that students never learn to think within the discipline (that defines and creates the content). It is to substitute the mere illusion of knowledge for genuine knowledge. (Paul & Elder, 2007, p. 8).

Paul and Elder (2011) offer several learner-centric aims or goals of learning that indicate thinking within any given discipline, and these goals are precisely guided by the elements of reasoning and intellectual standards that will be presented later in this chapter. One goal educators should have for students is for them to learn to raise vital questions and communicate them clearly and precisely within the discipline they are learning (Paul and Elder, 2011, p. 7). Paul and Elder (2011) also posit that educators should coach students to gather information relating to the problems they aim to solve and to "adopt the point of view of the discipline, recognizing and assessing, as need be, its assumptions, implications, and practical consequences" (p. 7). These aims should enable students to come to well-reasoned conclusions that they should be able to relate to other subjects and communicate effectively using the language that is central to the discipline they are learning (Paul and Elder, 2011, p. 7).

How to improve student learning. In addition to the student-centric ideas for learning within the discipline, Paul and Elder (2014) offer several suggestions for how

educators can improve student learning outcomes. Their ideas include creating assignments that provide students opportunities to actively learn and think within the concepts of the discipline, and the authors reinforce the importance of guiding students' application of learning to real-life situations, helping the students assign purpose to the subjects they are learning (Paul & Elder, 2014). For teachers to integrate thinking into a discipline, however, there's a simple truth "that teachers are able to foster critical thinking only to the extent that they themselves think critically. This may be the single most significant barrier to student achievement of critical thinking competencies" (Paul and Elder, 2007, p. 5).

Many of the problems within the classroom are related to expectation management and the students' understanding of the purpose of education. In the current *vis-recce* course, the work does not seem intensive, and most students cram before the *vis-recce* test. Within the intelligence training community, this rush to cram knowledge is a product of the mission desire to expedite the mission qualification process for intelligence analysts, but a substantive education in any discipline requires deep learning and time. The Foundation for Critical Thinking offers a wealth of knowledge and suggestions for improving thinking in education.

Paul and Elder believe a student's success in the classroom is dependent upon some fundamental changes in how educators approach the learning environment. For one, educators should get the students started by providing them with a thorough introduction to the course that clearly articulates how thinking and measurement will be conducted during the course, and explain that the class is a time for them to openly practice thinking within the discipline that they will be learning (Paul & Elder, 2014).

Another fundamental difference in Paul and Elder's (2014) approach from traditional classroom instruction is for educators to position themselves as a coach, thought leader, or learning facilitator in the classroom, spending most time guiding student thoughts on the sidelines while making the "course 'work-intensive' for the students, but not for you" (Paul & Elder, 2014, p. 12). In this coaching role, educators should demonstrate or model to students the type of thinking that they expect of them, and the classroom should be a place where thinking permeates all planning and activities.

Paul and Elder (2014) suggest cultivating intellectual traits throughout an entire curriculum, and Hiler and Paul (2006) proposed the solution for this cultivation was to integrate critical thinking instruction into the subject matter of the discipline being taught (p. 2). Following these principles, the critical thinking classroom "encourage[s] . . . students to think – quite explicitly – about their thinking" (Paul & Elder, 2014, p. 33), and it is guided by formative assessments and activities that "both generate and assess thinking" (Paul & Elder, 2014, p. 29). Before students attempt an assignment, educators should "have students explain their current assignment and purpose" (Paul & Elder, 2014, p. 12) so they can establish a clear understanding of their role in the learning process. This critical thinking classroom should espouse constructivist views and relate thinking and content to students' personal lives to the problems they deal with and the situations they have lived through (Paul & Elder, 2014).

The conception of knowledge and learning that is presented in this section draws from constructivist views and the "Paulian" critical thinking framework. Modifying traditional behaviorist approaches, such as the *vis-recce* curriculum that is the focus of the present study, requires the broader and deeper theoretical understanding of how the

mind works and makes meaning across disciplines. Admittedly, "there are no 'magic bullets' for the schools. The only reasonable solution to raising the quality of education is in-depth thinking based on a substantive concept of education" (Paul & Elder, 2007, p. 12), and to produce this result, they posit:

> Students must understand and use the elements of thought that underlie human thinking, they must understand and apply intellectual standards to evaluate their reasoning, and they must embody intellectual traits that are essential to learning across the curriculum. (p. 14)

The current *vis-recce* curriculum focuses completely on content and not on learning how to learn the discipline. Paul and Elder (2007) caution that this focus on content has caused schools to fail to take charge of their learning, to evaluate new ideas, and to develop an understanding of the interconnectedness between disciplines, but their disciplined approach to critical thinking offers a framework that seems to offer promise for *vis-recce* training.

Critical Thinking

In simple constitutive form, "Critical thinking is the art of analyzing and evaluating thinking with a view to improving it" (Paul & Elder, 2007, p. 4). The concept of "thinking about your thinking while you're thinking in order to make your thinking better" ("*Critical Thinking*," n.d., p. 7) seems simple enough, but many still fail in their pursuit of critical thinking skills due to a lack of understanding of the interplay between fundamental elements of reasoning and intellectual standards. The elements of reasoning, intellectual standards, and intellectual traits that comprise the "Paulian" framework seem straight forward, and even having a general idea of some method to

evaluate reasoning and thinking quality does not seem far-fetched; however, intelligence instructors generally receive no formal critical thinking instruction and rarely demonstrate metacognition in the classroom.

Paul ("*Critical Thinking*," n.d.) believed the idea of intellectual standards to be the least understood because "Most teachers were not taught how to assess thinking through standards; indeed, often the thinking of teachers themselves is very "undisciplined" and reflects a lack of internalized intellectual standards" (p. 7). This reality poses a significant challenge to the present study because there is no quick fix—only an opportunity for intelligence instructors to grow intellectually alongside their intelligence analyst trainees. According to Paul (Critical Thinking, n.d.), this instructor deficiency can only be addressed through "quality long-term staff development that helps the teachers, over an extended period of time . . . To work on their own thinking and come to terms with what intellectual standards are, why they are essential, and how to teach them" (p. 9). This will require intelligence instructors to make a substantial investment into their own intellectual self-improvement in order to properly model, guide, and assess student learning through methods that will differentiate from the USAF standard.

Critical thinking defined. Paul and Elder (2011) formally define critical thinking as, "the kind of thinking—about any subject, content, or domain—that improves itself through disciplined analysis and assessment. Analysis requires knowledge of standards for thought" (p. 6). And, they explain that "Critical thinkers routinely apply the intellectual standards to the elements of reasoning in order to develop intellectual traits" (Paul and Elder, 2007, p. 51).

Types of thinkers (Elder and Paul, 2009, p. 4). Elder and Paul (2009) understood that there are three primary types of thinkers.

Fair-minded critical thinker. According to Elder and Paul (2009), educators should aim to develop fair-minded critical thinkers who unselfishly strive to improve the quality of their thinking. The thinking that is represented in this view is not the level of knowledge that a learner develops. It is not how many weapon systems an intelligence analyst can recognize. Fair-minded critical thinkers are the thinkers who continually strive to improve the quality of their reasoning with the goal of improving the human condition for everyone.

Selfish critical thinkers. Elder and Paul (2009) identify selfish critical thinkers as those who are savvy, but selfish, thinkers. They evaluate their reasoning and continually improve upon it, but they do so to achieve selfish goals.

Naïve thinker. Naïve thinkers, according to Elder and Paul (2009) are those who do not see a reason to improve their thinking. They remain content with the quality of their thinking as it is, and they resist any efforts to develop their minds.

Elements of reasoning. The "Paulian" critical thinking framework, that is a fundamental construct for the present study, identifies "eight basic structures are present in all thinking" (Elder & Paul, 2012, p. 5): 1) Purposes, 2) Questions, 3) Information, 4) Concepts, 5) Points of view, 6) Assumptions, and 7) Implications (Elder & Paul, 2012). According to Elder & Paul (2012), all thinking, good or bad, "generates purposes, raises questions, uses information, utilizes concepts, makes inferences, makes assumptions, generates implications, and embodies a point of view" (p. 5).

Intellectual standards. Elder and Paul (2008) posit that while people all think, they do not often know how to judge the quality of their thinking through adherence to standards for reasoning. "We use the term 'intellectual standards' to mean standards that further good judgment and rational understanding. They are essential for our mind's on-going awareness and assessment of the strengths and weaknesses in our thinking, and in the thinking of others" (Elder and Paul, 2008, p. 16). By their method, elements of reasoning are judged by the standards that are applied to them. From that aspect, the intellectual standards serve as a sort of rubric for intellectual work. Elder and Paul (2012) have narrowed the list of common standards to the following, but they are not an all-inclusive list of acceptable standards: clarity, accuracy, precision, relevance, depth, breadth, logic, significance, and fairness (p. 8).

With regards to the present study that aims to evaluate the impact of a CTT Seminar on intelligence analysts learning, and for study within any discipline, "relevant intellectual standards are determined by the context and question at issue" (Elder and Paul, 2008, p. 32). According to Elder and Paul (2008), "every field of study presupposes and strives to meet basic and essential intellectual standards such as accuracy, relevance, and logicalness" (p. 37), but it is up to the professionals within each discipline to decide which standards are required to reason through the problems and issues within that discipline. This idea indicates that the intellectual standards may be completely accepted as presented or modified to support integration into existing curricula and assessments.

Intellectual traits. Intellectual traits are the human products of critical thinking. Within the "Paulian" framework, "the ultimate goal of critical thinking is to foster the

development of intellectual traits or dispositions. They include: fairmindedness, intellectual humility, intellectual courage, intellectual autonomy, intellectual empathy, intellectual perseverance, intellectual integrity, and confidence in reason" (Paul and Elder, 2007, p. 46). These intellectual traits are not expected to occur over night, but students who take their thinking seriously are expected to demonstrate some evidence of these traits over the course of the present study.

Assessments

A curriculum is not complete without well-developed assessments that "assess well, reasonably, logically, accurately (Paul & Elder, 2007, p. 21), and courses that do not assess well are often those that create students who learn "to dislike school (as a result of instruction in general)" (Paul & Elder, 2007, p. 21). The standard approach to *vis-recce* training is to simply prepare intelligence analysts for a *vis-recce* test that seems to simply evaluate an analysts' ability to recognize a weapon system for the sake of meeting the standard. This *vis-recce* test that is aligned to the basic knowledge level of Bloom's Taxonomy (1956) neither measures the analysts' critical thinking skills nor creates opportunities for their learning to be placed into context within their understanding of the world.

A crucial component for developing critical thinkers within any discipline are the formative assessments that guide student learning. Formative assessments are believed to help students develop critical thinking skills because they are expected to evaluate their own work in the context of the objectives educators provide them. "Formative assessment by its nature requires metacognitive skills of developing awareness of and monitoring steps in problem solving or creation, offering estimates of whether the

answers make sense, deciding what else one needs to know, and developing judgment skills" (Green & Johnson, 2010, p. 96). According to Green and Johnson (2010), teachers should implement formative assessments with six key elements: 1) Students should be aware of learning goals and evaluation standards; 2) Formative assessments should be focus on higher cognitive skills than rote memorization; 3) Students should receive feedback on how to close the gaps between their formative assessment and summative expectations; 4) Grading should be avoided; 5) Students should have an opportunity to close the gap between the formative assessment and the summative assessment; and, 6) The assessments should complement the curriculum and instruction.

For decades, the USAF has used an antiquated Bloom's Taxonomy (1956) to develop learning objectives that ultimately drive assessments of all kinds. Despite the observed short-comings of this behaviorist taxonomy and repeated calls for greater thinking skills in the intelligence community, this review of literature did not identify any instances where the USAF has acknowledged or even realized that there is a revised version of the taxonomy that could bring intelligence curriculum into the present century.

Bloom's Original and Revised Taxonomies

Educators arguably improved upon pedagogy and assessment for decades by using Bloom's Taxonomy (1956) to develop objectives and to align student achievement goals with those objectives. Bloom's Taxonomy (1956) framed learning goals in terms of knowledge, skills, and abilities and espoused the idea that "knowledge was the necessary precondition for putting these skills and abilities into practice" (Armstrong, 2017). Bloom's Taxonomy (1956) presented levels of development along a continuum of six ascending categories of observable behaviors that are represented by the following

nouns: knowledge, comprehension, application, analysis, synthesis, and evaluation (as cited in Armstrong, 2017). This taxonomy attempted to reduce teaching inequalities and create measureable conditions for students by aiding educators in their development of learning objectives. According to Anderson et al. (2001), using a taxonomy to organize objectives helps educators to "plan and deliver appropriate instruction," "design valid assessment tasks and strategies," and, "ensure that instruction and assessment are aligned with the objectives" (as cited in Armstrong, 2017).

On one hand, Bloom's Taxonomy (1956) benefited curriculum pedagogy by providing a framework that aided the development of learning objectives, but on the other hand, its dependence on rote knowledge as fundamental to all higher levels of cognition and a reliance on nouns, as observable and measurable results of learning, have produced unfavorable achievement results, as seen in my own study of a rote *vis-recce* curriculum. Paul and Elder (2007) described Bloom's Taxonomy (1956) as a form of educational fad that fails to define critical thinking and to prescribe a proper guide for interacting with the knowledge, skills, and abilities categories. To remedy these potential pitfalls, Paul and Elder (2007) suggest "teachers should focus learning on significant knowledge" (p. 28) and to vary the order of the steps "in accordance with the demands of the context and situation" (p. 28). And throughout each level of cognition, Paul and Elder (2007) suggest that teachers guide students to reason and evaluate their reasoning within the context of the discipline they are learning.

Drawing from their intimate knowledge of the original taxonomy and decades of curriculum observations, Anderson et al. (2001) published a revision of Bloom's original work that replaced the original nouns with verbs to "describe the cognitive processes by

which thinkers encounter and work with knowledge" (Armstrong, 2017). If educators properly implement this simple modification (i.e., creating action-oriented objectives), they place students in a more active role in the learning process by explaining what the student will be expected to do versus what the teacher is expected to observe. Anderson et al. (2001) used the following verbs to describe their cognitive processing dimensions: remember, understand, apply, analyze, evaluate, and create (as cited in Armstrong, 2017). Like Bloom's Taxonomy (1956), Anderson et al. (2001) placed knowledge at the base of the cognitive process; however, they made another significant addition by adding types of knowledge that aimed to account for the level of thinking that could occur within each cognitive dimension. Anderson et al. (2001) defined these types of knowledge as factual knowledge, conceptual knowledge, procedural knowledge, and metacognitive knowledge (Armstrong, 2017).

When used properly, the Revised Bloom's Taxonomy (Anderson et al., 2001) captures several of the critical thinking principles that the original taxonomy missed, and it provides an opportunity for educators to integrate several key tenets of the Paul and Elder critical thinking framework. By including types of knowledge into the revised taxonomy, Anderson et al. (2001) provided educators an opportunity to align objectives to higher levels of thinking and interaction with knowledge at all stages along the cognitive continuum. At the basic knowledge level, Paul and Elder (2007) propose having "students state in their own words what they are trying to learn" (p. 27), and as they progress to the application phase, "have the students exemplify in their own words what they have stated and elaborated, using their own examples from their life experience" (p. 27). By creating a model for metacognition along the entire spectrum of

cognitive development, Anderson et al. (2001) laid the groundwork that can be used to further draw from Paul and Elder's elements of reasoning and intellectual standards to create objectives for how students will interact with knowledge. This marriage of ideas creates an opportunity to meet the cognitive demands of the 21st Century intelligence curriculum, specifically the *vis-recce* curriculum that is the subject of this DiP.

Keywords Glossary

1. **Critical thinking:** Critical thinking is the art of analyzing and evaluating thinking with a view to improving it" (Paul & Elder, 2007, p. 4).
2. **Elements of reasoning:** The elements of all thinking that include: purposes, questions, information, concepts, inferences, points of view, assumptions, and implications (Elder & Paul, 2012, p. 5).
3. **Intelligence analyst:** Refers to commissioned officers and enlisted members of the USAF who serve in a USAF intelligence specialty that supports USAF operations.
4. **Intelligence instructor:** Refers to intelligence personnel who have been certified by their parent command and their unit's Senior Intelligence Officer to provide instruction to intelligence analyst trainees.
5. **Intellectual standards:** The standards by which critical thinkers evaluate their reasoning, including: clarity, accuracy, precision, relevance, depth, breadth, logic, significance, and fairness (Elder & Paul, 2012).
6. **Intellectual traits:** The ultimate goal of critical thinking are intellectual traits or dispositions that include: "fairmindedness, intellectual humility, intellectual courage, intellectual autonomy, intellectual empathy, intellectual perseverance, intellectual integrity, and confidence in reason" (Paul and Elder, 2007, p. 46).

7. **Mission Qualification Training (MQT):** “Training necessary to qualify intelligence personnel in an assigned position to perform the unit intelligence mission” (US Department of the Air Force, AFI 14-2C-130V1, p. 9, para. 3.1).

8. **Ready Intelligence Program (RIP):** Includes internal intelligence training and continuation training (CT), and it serves to ensure intelligence personnel perform specific mission essential tasks with sufficient frequency to maintain proficiency in their duty positions (US Department of the Air Force, AFI 14-2C-130V1, p. 15, para. 4.3).

9. **Unit Intelligence:** “A level of organization under HHQ [Higher Headquarters] (MAJCOM) [Major Command] required to establish an intelligence function. Unit Intelligence encompasses Intelligence Wings, Intelligence Groups, Intelligence Squadrons, and Intelligence support to flying operations” (US Department of the Air Force, AFI 14-202V1, p.16, para. 5.1).

10. **Weapon systems visual recognition (*vis-recce*):** Refers to the task of visually identifying enemy/blue/gray weapon systems, to include air, ground, and naval systems by North Atlantic Treaty Organization [NATO] designation, name or numerical designator (US Department of the Air Force, AFI 14-202V1, p. 10, para. 3.3.1.3)

11. **Weapon systems visual recognition assessment (*vis-recce* test):** “The USAF also mandates that the only acceptable assessment is a "timed VR [visual recognition] test via visual presentation system" (US Department of the Air Force, AFI 14-2C-130V1, p. 10, para. 3.3.1.3).

CHAPTER 3

METHODOLOGY

Introduction

This action research study followed a qualitative research design that is best defined as an observational study, and it was guided by the following research question: *What are USAF intelligence analysts' perceptions of the efficacy of weapon systems visual recognition training in the operations intelligence profession*? In this research, I conducted two cycles of action research that aimed to understand intelligence analysts' views of weapon systems visual recognition (*vis-recce)* training requirements and pedagogy before and after receiving a Critical Thinking Training (CTT) Seminar that was guided by Formative Assessments. Data for the first cycle of action research consisted of a survey of a 15 intelligence analysts from across the intelligence community, and the second cycle included semi-structured interviews, field notes, observations, informal conversations, a participant-researcher-developed *vis-recce* pretest, and a *vis-recce* posttest from three of the 15 student-participants ("Sally," "Joe," and "Bill) who were selected to participate in a CTT Seminar. According to Mertler (2014), action research includes four primary stages: planning, acting, developing, and reflecting. This chapter provides a review of the purpose of the study, the identified problem of practice at the research site, and the historical significance of the problem, and it follows with an explanation of the relationship between how qualitative research was conducted in relation to the four steps of the action research paradigm. A more detailed description of

the findings associated with this research can be found in Chapter 4 of the present Dissertation in Practice (DiP).

Purpose of the Study

Understanding intelligence analysts' perceptions of *vis-recce* training leads to an understanding of the level of thought intelligence analysts apply towards the subject, and it lends clues to how a CTT Seminar and Formative Assessments might be used to in a traditional behaviorist curriculum. The following purposes, representing separate iterations of the action research cycle, guided the present qualitative action research study:

1. Understand intelligence analysts' perceptions of weapon systems visual recognition training requirements and curriculum pedagogy; and, 2. Determine the impact of Formative Assessments on the critical thinking skills of intelligence analysts regarding weapon systems visual recognition after a CTT Seminar.

Ultimately, the study aimed to increase vocational performance by helping intelligence analysts develop critical thinking skills, even during the most fundamental of unit-level intelligence tasks. The study's goal of helping intelligence analysts overcome the stated problem of practice was fundamental to the study, and it was fueled by additional objectives that were purposed to encourage continual intellectual growth and that would help the intelligence analysts further develop their abilities throughout their USAF missions and careers.

Statement of the Problem of Practice

In the USAF intelligence profession, intelligence analysts who are assigned to flying missions are required to be the subject matter experts regarding their ability to

visually identify and describe military weapon systems. This requirement is born of defensive forward observer roles and an anti-fratricide necessity of differentiating combatants between friend and foe. The life-preserving effect of this *vis-recce* activity is one of several reasons all operations intelligence analysts are required to demonstrate a near-infallible military *vis-recce* ability on a standardized military *vis-recce* test.

Intelligence analysts could be expected to visually identify over 1,400 air, land, and naval weapon systems at multiple angles and distances in a broadly-focused unit intelligence mission, but in practice this is typically reduced to those systems that pose the greatest concern to the mission. Despite this typical reduction in required *vis-recce* skills, the problem of practice identified for this study was that the majority of intelligence analysts assigned to a USAF base in the mid-Western US failed their timed Microsoft PowerPoint-based assessments that were designed to meet the USAF standard, and that USAF standard, itself, did little to enable knowledge retention and the development of critical thinking skills that are essential to quality intelligence analysis. Nearly 100 years ago, famed educator Franklin Bobbitt (1918) stated, "The new age is more in need of facts than the old; and of more facts; and it must find more effective methods of teaching them" (p. 11). Traditional approaches to the curriculum have not met this need, so this action research methodology served as an opportunity for the participant-researcher to become actively involved within the research setting, focusing research efforts directly on a single problem of practice with the goal of developing actionable solutions for intelligence analysts to improve their performance and learn to develop and nurture their own critical thinking skills.

Research Site and Participants

As is common with qualitative research designs, the present observational action research study required the participant-researcher to become a trusted agent and a full participant in the study to develop the depth of research that was required of the research question. The purpose of this level of participant-researcher interaction with the participants was to encourage the participants to "open up to the researcher in order to share honest feelings, perceptions, or opinions" (Mertler, 2014, p. 93). At times, the action research paradigm made the necessary level of interaction simpler because I, as the participant-researcher, was already a trusted member of the intelligence community and target population at the research site. Other factors associated with the research site and participants complicated the research.

Research site

The research site was an active duty USAF intelligence unit at a mid-Western USAF base. The research, including a CTT Seminar, was conducted in the unit intelligence training facilities. Since the intelligence training facilities included the student-participants' own workstations in an unobservable classified environment, I conducted the majority of the study, including the CTT Seminar, in the site's traditionally-oriented auditorium that served as the venue for the unit's regularly-scheduled internal intelligence training and briefing activities. From one perspective, the close relationship between intelligence training and the operations intelligence mission provided promise that any positive results of the action research study would be immediately actionable in an operational intelligence unit. From another perspective, I

had to compete with the mission demands that were present at the research site because of the on-the-job nature of how intelligence training is conducted.

Participants

To grasp a broader understanding of the problem, the present study adopted the funnel-like characteristic of a case study where "the teacher-researcher looks for possible people or places that might serve well as the sources of data for investigating the chosen topic" (Mertler, 2014, p. 92). Using this method during the first cycle of action research, the present study included a survey of 15 intelligence analyst participants who were widely diversified by rank (i.e., Senior Airman to Brigadier General), qualification (i.e., non-mission qualified, mission qualified, and intelligence instructor), and gender. For the second cycle of action research, three of the 15 participants (i.e., "Sally," "Joe," and "Bill") were permanently assigned to the research site, so they were selected for semi-structured interviews and for participation in the CTT Seminar. "Sally," "Joe," and "Bill" were diversified by socio-economic status, rank, gender, and educational background, and their participation in the second cycle of action research resulted in the field notes, observation, informal conversation, feedback, and *vis-recce* pre-test data for the present study. To help overcome the challenges of a small study and to gain a deeper understanding of the problem, the selected student-participants would be widely diversified by military rank, ethnicity, experience, education, and gender.

Historical Context

Significance of Weapon Systems Visual Recognition

Chapter 1 of this DiP described how the 1994 friendly-fire incident in Iraq occurred, in large part, because of flawed *vis-recce* skills. *Vis-recce* is a well understood

combat necessity, and it has been since war began. From the perspective of an intelligence analyst, accurate *vis-recce* can yield valuable clues to enemy intentions on the battlefield. Where other resources may not be able to aid intelligence gathering efforts, airborne and ground-based humans may be able to because of their proximity to combat. It is for these reasons that a seemingly simple intelligence analysis learning goal is so important to research. More important than the research or resolving the problem of poor student performance on the *vis-recce* test is the potential to discover a viable solution that has the potential to save friendly lives and aid intelligence collection efforts in combat.

USAF Standards for Weapon Systems Visual Recognition

Herbert Kliebard (1975) wrote, "If anything is ingrained in curriculum thinking today, it is the notion that it is the job of curriculum planners to anticipate the exact skills, knowledge, and . . . competencies that will stand one in good stead at an imagined point in the future" (p. 71). This line of thinking has long-driven USAF curriculum pedagogy. More specific to the study of intelligence analysis training, several facts support why analysts need to develop skills in *vis-recce*, but true learning has been restrained by poorly developed objectives and ineffective evaluation methods. USAF intelligence analysis curricula and objectives have been guided by a strict adherence to scientific curriculum-making methodologies and Bloom's Taxonomy (1956), which has produced inconsistent outcomes in a vocation that is as much art as it is science. USAF intelligence analysis educators seem to seek out the system or the best method to achieve end-state objectives, but just as the views of curriculum experts are diverse, so are the individual learners. The USAF *vis-recce* training requirement for an air mobility unit is

directive and standards-based. According to Air Force Instruction (AFI) 14-2C-130V1 (2013):

> The trainee will identify enemy/blue/gray weapon systems . . . This includes air, ground, and naval systems. Specific tasks: Demonstrate ability to visually identify aircraft . . . by North Atlantic Treaty Organization designation, name or numerical designator and determine whether the aircraft is a threat or non-threat. (US Department of the Air Force, p. 10, para. 3.3.1.3)

The USAF also mandates that the only acceptable assessment is a "timed VR [visual recognition] test via visual presentation system" (US Department of the Air Force, AFI 14-2C-130V1, 2013, p. 10, para. 3.3.1.3). It is important, however, to this action research that the USAF does allow some instructional flexibility and general guidelines for addressing substandard performance.

The USAF approaches *vis-recce* as a core requirement for aircrew and intelligence analysts, and the testing method is unquestionably fixed. According to AFI 14-2C130V1 (2013), "the trainer will introduce instruction techniques for VR [visual recognition] of enemy/blue/gray weapon systems mandated by unit training programs and will train to the same standard required of aircrew" (US Department of the Air Force, p. 18, para. 5.2.2.2.3). On one hand, this statement requires strict adherence to the standard, but on the other hand, it leaves room for the instructor to experiment with delivery and technique. AFI 14-202V2 (2008) dictates, "the minimum passing grade for examinations is 85 percent-corrected to 100 percent" (US Department of the Air Force, p. 19, para. 6.4.6), but it places the onus on the instructor for substandard student performance. According to AFI 14-202V2 (2008), "poor testing performance on examinations indicates

areas requiring increased training emphasis" (US Department of the Air Force, p. 19, para. 6.1). Undoubtedly, the USAF guidance establishes the *vis-recce* assessment standard, but there is ample flexibility in the guidance to conduct this action research study prior to implementing the standard pedagogy.

The Weapon Systems Visual Recognition Curriculum

Unit-level USAF intelligence training requirements have changed very little over the past several decades. In fact, intelligence analysts at the research site support tactical airlift and airdrop missions that are almost identical to the missions flown during the Korean and Vietnam wars. There is no dialogue or critical thinking in the current *vis-recce* course. Students are simply required to hear basic weapon systems design instruction, memorize images, and know the associated NATO designators. The curriculum is based on "the simplest level of thought (that of making sense of ordinary objects in everyday experience" (Paul & Elder, 2012, p. 5). The *vis-recce* curriculum is the decades-old work of traditional curricularists with a focus on the intelligence analysts' vocation. Much like Pinar's (1978) view that "traditional curriculum work is focused on the schools" (p. 149), the USAF's traditional curriculum is focused on a quantitative measure of mission readiness for the USAF organization.

Strict behaviorist thinking has been the acceptable standard for visual observers and intelligence analysts for decades, and there is no evidence that constructivist approaches have been used to teach *vis-recce* skills. Military research on *vis-recce* is sparse, but the US Army did conduct a curriculum study in 1975 that required students to examine static images before being evaluated on their recognition of 3-dimensional models (Baldwin, Cliborn, & Foskett, 1976). In spite of a 14 percentage point decline in

visual recognition skills in a 10-week period, this behaviorist method has remained the standard for *vis-recce* training in the US military. In the US Army's study, the researchers determined that it was "reasonable to assume that there is a practical limit (saturation level) to the number of aircraft that can be remembered" (Baldwin, Cliborn, & Foskett, 1976). The research inferred that individuals should be able to recall between 40 and 82 aircraft, but there was little evidence in their research to support their inference. From a practical standpoint, this seems illogical because of a simple realization that there is no known limit to the amount of objects humans can identify in the world once they have assigned meaning to them.

The strict USAF *vis-recce* testing standard that stands today is analogous to the high-stakes testing that affects US public education. In Au's (2007) examination of 49 qualitative studies regarding the effects of high-stakes testing, he found "that high-stakes tests encourage curricular alignment to the tests themselves" (p. 245). His findings were consistent with the *vis-recce* curriculum at the research site where students are presented with a group of stock images that they are expected to memorize, and after the student is satisfied with their preparation, they take a timed test that includes many of the same images. The current curriculum pedagogy provides very little opportunity for analysts to discuss *vis-recce* principles. The analysts are set to receive mode while an instructor initially presents some basic principles, without regard to the analysts' learning preferences, and without guiding them to make meaning within the *vis-recce* discipline. Then, the analysts are left to their own devices. The outcome—either the analysts memorize, or they fail the test.

Aside from the strict one-sided standards, it is very possible that poor dialogue and critical thinking skills are at least partially responsible for sub-standard *vis-recce* performance at the research site. Through initial observation, it appeared that instructors did not fully acknowledge the problem, and analysts failed to realize their full potential because the lack of dialogue and critical thinking in the instructional model seemed to cause a teaching method and learning preference mismatch. Both instructors and analysts employ "naïve thinking, which sees historical time as a weight, a stratification of the acquisitions and experiences of the past" (Freire, 1970, p. 159), instead of thinking critically about the true purposes of weapon systems visual recognition, one of which is the aim to save lives.

As already stated, current USAF *vis-recce* training requires exactly what Freire opposed—transmission of information by the instructor and passive receipt and required retention on the part of the analyst. This method has proven itself ineffective, likely because the instruction and assessment methods are designed to support one of many learning preferences in an increasingly more diverse national culture and USAF organization. Students are not offered any guidance on how to connect the hundreds of random images with any established schema; they are just expected to memorize.

Analysts eventually pass their assessments after countless hours reviewing the testable images, but if asked any number of important questions about why *vis-recce* skills are important to an intelligence analyst, most students would not be able to produce a valuable response. Eisner (2001) wrote,

> The deeper problems of schooling have to do with teacher isolation and the fact that teachers don't often have access to other people who know what they're doing when they teach and who can help them do it better. (p. 281)

Most intelligence instructors have very little formal education on even the most basic instructional techniques and even less yet on techniques to encourage metacognition. Most instructors simply teach the habits and techniques they have learned through their own experiences. This action research aims to seek out a long-term development solution to address that instructor and intelligence analyst training gap at the research site.

Research Design and Objectives

The present action research study followed an observational qualitative research design that ultimately resulted in the full integration of the participant-researcher into the study as a full participant where "the researcher is first and foremost part of the group—as opposed to being an 'outsider'—who also happens to be collecting data on the group (Mertler, 2014, p. 94). By nature of qualitative research, the present study was less structured so I could produce a more holistic view and deep understanding of the problem of practice. As a full participant in the study, I was in a position to gather a wide range of data at different points during the research, providing previously-unrecorded nuanced data relating to *vis-recce* training.

The present study, included two iterations of the action research cycle, first, to gain an understanding of intelligence analysts' general perceptions of *vis-recce* training and, second, to determine the effects of a CTT Seminar and Formative Assessments on intelligence analysts' learning. In the first iteration of the action research cycle, I

conducted surveys with 15 intelligence analysts with various levels of *vis-recce* experience. After conducting the research and reflecting on the results of an inductive analysis of the initial survey data, I selected three of the 15 analysts for further study, including a semi-structured interview, an informational *vis-recce* pre-test, and participation in a CTT Seminar at the research site. During the CTT Seminar, I captured field notes, observation, informal conversation, and feedback data from the three student-participants to arrive at the conclusions that would inform the final action plan that is presented in Chapter 5 of the present DiP.

Research Strategy

In context of the ultimate goal of addressing the stated problem of practice, the present study sought to understand intelligence analysts' perceptions of *vis-recce* training before curriculum modification and to determine the impact of a CTT Seminar and Formative Assessments on their *vis-recce* performance and metacognitive abilities. Although no hypothesis was formed because of the nature of qualitative research, I expected to witness a transformation in the student-participants' views towards "*vis-recce*," general learning, and their own thinking upon conducting the second cycle of action research. Since action research is cyclical in nature, I chose to implement two cycles of research to, at first, gain a broad understanding of intelligence analysts' views towards *vis-recce* and, second, to gain a deeper understanding of the impact of a CTT Seminar and Formative Assessments on addressing the stated problem of practice.

Cycle 1: Action Research. The first cycle of action research, most directly related to the research question that guided the present study: What are USAF intelligence analysts' perceptions of the efficacy of weapon systems visual recognition

training in the operations intelligence profession? And, it aimed to understand intelligence analysts' perceptions of the *vis-recce* training requirements and curriculum pedagogy. Data collection for this cycle of action research included a review of the present classified curriculum pedagogy at the research site and an informal survey of the 15 intelligence analysts who were previously described in this chapter.

Action research planning stage. Corresponding with Mertler's (2014) action research planning phase, this first cycle of research included the development of the problem of practice, narrowing the research focus, and gathering pertinent information that included a review of the current *vis-recce* curriculum pedagogy and USAF requirements. These data were balanced with a thorough exploration of diverse literature relating to the variables that are known to limit or influence student achievement. The review of the current *vis-recce* curriculum pedagogy included an evaluation of the visual recognition lesson plan, intelligence instructor abilities and delivery methods, instructor sensitivity to diversity, the learning environment, and an assessment of how effectively each element had been aligned to the USAF standards, learning goals, and the intelligence analysts' learning needs.

Action research acting stage (informal survey). After analyzing pertinent literature and information relating to *vis-recce* and learning, I planned to conduct informal surveys of the 15 intelligence analysts previously described in this chapter. This informal survey, corresponding with Mertler's (2014) acting stage, was kept informal to keep the participants at ease and to facilitate rapid and opportunistic responses with a diverse population of intelligence analysts. To capture the details of these informal surveys, I used a digital data journal. My notes were entered into the "Informal Interview

Template" (see Appendix C of this DiP) as soon as feasible after the interview to preserve legibility and to expedite my notes and my reflections on the interviews. An inferential analysis of the data in this stage informed the next stage of the action research process.

Action research developing stage (action plan). Informed by the results of the previous stage, the developing stage (Mertler, 2014), of this first action research cycle led to my determination that a second phase of research was required to understand the effects of a CTT Seminar and Formative Assessments on the intelligence analysts' *vis-recce* performance and on their thinking skills.

Action research reflecting stage. Reflection was a critical component to informing my professional practice. During Mertler's (2014) reflection stage, I evaluated and took notes on the reliability of the data collection methods and population that were used for first cycle of action research. I also reflected on the selection of literature that shaped my action plan for the second cycle, and I discussed my reflections extensively with the participants and other intelligence instructors before developing and implementing the CTT Seminar and Formative Assessments in the second action research cycle.

Cycle 2: Action Research. Informed by the results of the first cycle of the present action research study, the second cycle aimed to determine the impact of Formative Assessments on the critical thinking skills of intelligence analysts regarding *vis-recce* after a CTT Seminar. The Formative Assessments were aligned with Paul and Elder's (2007) intellectual standards and the Revised Bloom's Taxonomy (2001). I selected three of the 15 intelligence analysts from the previous action research cycle for

participation in the second cycle. The research strategy for this cycle included semi-structured interviews and data collected from field notes, observations, informal conversations, feedback, a participant-researcher-created *vis-recce* pretest, and a *vis-recce* post-test.

Action research planning stage. To lead off the second cycle of action research, I reevaluated and expanded on the literature on critical thinking and Formative Assessments, drawing heavily from the well-documented and widely-implemented methods developed by the Foundation for Critical Thinking. I developed a basic CTT Seminar with Formative Assessments that was intended to facilitate my full immersion into a guided discussion on critical thinking in the intelligence curriculum, more specifically, the *vis-recce* curriculum. As Mertler (2014) stated is common with qualitative research, I was unsure of what data collection methods would best suit the second action research cycle, so I planned to employ multiple collection methods to account for the small participant population and for my uncertainty. The collection methods included informal structured interviews of the three student-participants, a participant-researcher-developed *vis-recce* pretest, informal interviews and feedback, a *vis-recce* posttest, and field observations.

Action research acting stage. Data collection during this stage began with semi-structured interviews with the three student-participants whose demographics are further described in Chapter 4 of the present DiP. Following, semi-structured interviews, student-participants were administered an unclassified participant-researcher-developed *vis-recce* pretest that was developed in accordance with USAF guidance. The purpose of this pretest was not to serve a quantitative evaluation; it was analyzed to provide a deeper

understanding of the nature of the problem. After the *vis-recce* pre-test, I facilitated a CTT Seminar and guided student-participant learning through the use of Formative Assessments. Although it does not include the pertinent related discussion topics, see Appendix D of this DiP for the information that was used to establish a baseline understanding for critical thinking. Field observations and informal conversations were captured for the duration of the second cycle, and the cycle concluded with a *vis-recce* post-test that was not intended to be statistically evaluated.

Semi-structured interviews. Semi-structured interviews occurred in my personal office with the student-participants at the beginning of data collection. For these semi-structured interviews, I developed and used an interview guide (see Appendix B of this DiP), but I maintained the liberty to follow the discussions where they led. Each interview was planned to take approximately 30 minutes. After completing the semi-structured interviews, I typed my notes and had the interviewees "member-check" my comments for accuracy.

Informal interviews. To support the semi-structured interviews that began data collection, I also conducted informal interviews that were "spontaneous, that take [took] place throughout the data collection process, and that are [were] typically part of the daily interactions with students in a classroom setting" (Mertler, 2014, p. 133). These informal interviews provided a large amount of data to compare with the responses the analysts provided during the semi-structured interviews. The intent of these informal interviews was for them to remain "spontaneous" and comfortable.

The majority of the informal interview opportunities were expected to occur during the various study or preparation phases of *vis-recce* training, and the remaining

informal interviews were expected to occur after the students completed an assessment. The purpose behind this abstract plan was to capture the students' feelings about *vis-recce* and critical thinking so I could verify or triangulate the results of their semi-structured interviews with their "real-world" reactions to the CTT Seminar and Formative Assessments.

Data recording for spontaneous interviews was expected to be problematic and inconsistent if the students were not placed at ease, and this had an effect on the delivery and recording method. Mertler (2014) recognized this notion as well: "consistency is usually not a concern when collecting qualitative data; it is typically more desirable for the researcher to have some flexibility and to be able to ask clarifying questions . . . to pursue information not intentionally planned for" (p. 130). Do to the active duty USAF environment, interviews and other data were not video recorded. Due to those constraints, I kept the interviews brief in order to maintain as much validity and reliability as feasible while relying on my memory to paraphrase the key thoughts, comments, and observations. As with the semi-structured interviews, I planned to maintain reliability by having the interviewees "member-check" my notes for accuracy, but the interviewees would not be provided the notes until the end of the training session. I elected to delay the analysts' review to avoid any disturbances that could be caused if they began to discuss the details of the interview.

To capture the details of these informal interviews, I developed and used a digital data journal. My notes were entered into the "Informal Interview Template" (see Appendix C of this DiP) as soon as feasible after the interview to preserve legibility and to expedite my notes and my reflections on the interviews. The interviewees were

presented the paraphrased notes for review on a version of the template that had my comments extracted, and I planned to annotate the interviewees' review in the top left block of the template.

Field observations. The foci of my field observations were on analysts' and the instructor's conversations, on specific student-developed study and learning techniques, and on random observations that seemed to be of interest to the study. During conversations, I planned to take note of any subject matter that seemed pertinent to the research. I also planned to carefully observe the student-participants' use of critical thinking tools, reasoning, and techniques that resulted from their interaction with the CTT Seminar and Formative Assessments. Additionally, since the analysts were allowed to maintain some academic liberties during the course of this research, their individual study habits, techniques, and shared reflections were noted and analyzed with respect to the curriculum and their performance. All of the above observations were recorded on a personally-developed "Field Note Template" (see Appendix A of this DiP).

Vis-recce pre-test. I developed and administered a 15-question Microsoft PowerPoint-based *vis-recce* pre-test in the style of the USAF requirement to gain an understanding of the student-participants' baseline *vis-recce* knowledge and to gain a deeper understanding of the problem of practice. I administered this *vis-recce* pretest before the CTT Seminar, and I placed the students at ease by explaining that the test would not affect their current mission qualification status.

Vis-recce post-test. I administered a *vis-recce* post-test after the CTT Seminar, Formative Assessments, and five days of self-study. Much the same as the pre-test, the post-test was only intended as an additional point of data that would be included into the

narrative summary of the present qualitative action research study as support for a future action research plan.

Action research developing stage (action plan). The action plan that has been developed to respond to the themes and patterns that emerged from the second cycle of action research are presented in Chapter 5 of the present DiP.

Action research reflecting stage. Reflection on the action research cycle continued to be a critical component of informing my professional practice and action-oriented curriculum improvements after the second iteration of the action research cycle. Further details on those reflections can be found in Chapter 5 of the present DiP.

Ethical Considerations

For the purpose of this action research study, and in consideration of the unit intelligence mission and personnel, it was my determination that the USAF mission supported a flexible action research plan with very few potential ethical pitfalls. Fichtanan and Yendol-Hoppey (2014) state:

> When the process of teacher inquiry is used as a mechanism to help teachers learn and improve their own practice locally as well as to contribute to school improvement efforts, teachers are not doing anything differently than they would normally do as a good, ethical teacher. (p. 148)

Fichtanan and Yendol-Hoppey (2014) propose, "when teachers engage in the process of inquiry, they are engaging in a process that is a natural and normal part of what good, ethical teaching is all about" (p. 148). They propose that a careful examination of student work and questioning that can benefit the entire class is ethical teacher-researcher

behavior. Therefore, the practice of interviewing and collecting data on intelligence analysts in the training environment is justified by the intent of the outcome.

Ultimately, the USAF has provided guidance on what intelligence analysts should learn and how they should be assessed. In my goal of developing intelligence analysts who are able to meet or exceed those standards, I have succeeded if I also respect them and their legal privacies. I do not, however, interpret the mission-first USAF mantra as free reign to unnecessarily pry into analysts' lives. Throughout my research, I balanced the USAF's needs with the intelligence analysts' personal rights, privacy, and rights to a quality education.

Conclusion

The underpinning approach for this DiP included a qualitative action research design that primarily took the form of an observational study, fully integrating the participant-researcher into the study. Guided by the question, "What are USAF intelligence analysts' perceptions of the efficacy of weapon systems visual recognition training in the operations intelligence profession?" the study aimed to address a problem of practice at a mid-Western USAF base where intelligence analysts struggle with their *vis-recce* training requirements. The study was conducted across two cycles of the action research process to, first, understand intelligence analysts' perceptions of *vis-recce* training requirements and the USAF's mandated curriculum pedagogy and to, second, determine the impact of Formative Assessments on the critical thinking skills of intelligence analysts after participating in a CTT Seminar.

Two cycles of the action research process were conducted to understand the nature of the problem and to inform the development of an action plan that is the subject

of Chapter 5 of the present DiP. For the first cycle of action research, this study planned to conduct informal interviews of 15 intelligence analysts who were widely diversified by rank, experience, and qualification to aid the participant-researcher's understanding of the institutional views towards "*vis-recce*." The second cycle of this qualitative action research study included the development and implementation of a CTT Seminar and Formative Assessments that "Sally," "Joe," and "Bill," three student-participants who were permanently-assigned to the research site, were selected to participated in. Data during the second cycle were gathered from semi-structured interviews, informal interviews, field observations, a participant-researcher-created *vis-recce* pretest, and a *vis-recce* post-test. All data during this cycle were analyzed to inform the action plan that is presented in Chapter 5 of the present DiP.

CHAPTER 4

FINDINGS AND INTERPRETATION OF RESULTS

Introduction

The findings and the interpretation of the results of this Dissertation in Practice (DiP) are presented in Chapter 4. The data were gathered in accordance with the methodology described in Chapter 3 of this DiP with the goal of addressing a problem of practice at a mid-Western USAF base where the majority of intelligence analysts fail their Microsoft PowerPoint-based weapon systems visual recognition assessments. Two cycles of a qualitative action research process were used to, first, understand intelligence analysts' perceptions of weapon systems visual recognition *vis-recce* training requirements and, second, to determine the impact of a critical thinking training (CTT) Seminar and Formative Assessments on intelligence analysts' critical thinking skills during *vis-recce* training.

Data for the first cycle of action research consisted of a survey of a 15 intelligence analysts from across the intelligence community, and the second cycle included semi-structured interviews, field notes, observations, informal conversations, a participant-researcher-developed *vis-recce* pretest, and a *vis-recce* posttest from three of the 15 student-participants ("Sally," "Joe," and "Bill") who were selected to participate in a CTT Seminar. The initial survey gathered data on intelligence analysts' perceptions of the usefulness of *vis-recce* skills. The survey data captured during the first phase of action research were gathered to

support the participant-researcher's deeper understanding of the problem of practice, and an analysis of the data resulted in the development of a CTT Seminar for the second action research cycle. An inferential analysis of the data associated with the present study led to the discovery of three themes in the *vis-recce* training environment that are discussed in the following sections of Chapter 5.

Research Questions

The present study was guided by the following research question that, first, aimed to make sense of intelligence analysts' views of *vis-recce* training and, second, led into a study of the impact of a CTT Seminar and Formative Assessments on intelligence analysts' *vis-recce* performance and critical thinking skills:

1) What are USAF intelligence analysts' perceptions of the efficacy of weapon systems visual recognition training in the operations intelligence profession?

The stated purposes of this DiP were achieved, revealing that a CTT Seminar and Formative Assessments had a favorable impact on intelligence analysts' *vis-recce* skills. Most intelligence analysts were found to initially struggle with providing meaningful purpose or motivation for *vis-recce* training. After receiving a CTT Seminar that guided intelligence analysts' learning through Formative Assessments, however, all student-participants *vis-recce* performance improved, and they explained greater appreciation for visual recognition skills, demonstrated evidence of intellectual growth that could have a positive impact on their future performance in the operations intelligence profession, and were able to constructively critique potential pitfalls of the training methods that were created for this study. Formative Assessments that were guided by universal intellectual standards and elements of reasoning, such as those developed by Paul and Elder (2007),

were catalysts for an observable metacognitive transformation in the weapon systems visual recognition learning environment. The following sections of this DiP include a summary of study findings

Findings of the Study

The present action research study included two cycles of the action research process. This section explains the instruments used and the findings associated with each iteration of the action research cycle. After determining the focus of the study, or problem of practice, and refining the research question, the first cycle of the present study captured informal survey data from 15 intelligence analysts to understand intelligence analysts' perceptions of the *vis-recce* curriculum. After an inferential analysis of the survey data, a reflection on the literature, the participant-researcher planned a second action research cycle to determine the impact of a CTT Seminar and intellectual standards-based Formative Assessments on intelligence analysts' *vis-recce* skills and critical thinking abilities. Data collection during the second action research cycle included semi-structured interviews, a *vis-recce* pretest, a *vis-recce* posttest, field observations, and information conversation data collected from three of the 15 intelligence analysts who were selected to participate in the CTT Seminar. Data collected during each action research cycle is present in the following sections, and action plan that resulted from the completion of the second cycle of action research is presented in Chapter 5 of this DiP.

Cycle 1: Action Research

Demographic data. Initial survey data was captured from 15 active duty and retired USAF intelligence analysts from various locations across the intelligence

community. These participants had USAF intelligence experience ranging from 3 to over 35 years. The USAF ranks associated with this population ranged from Senior Airman to Brigadier General (Retired). Of this population, all participants were either mission qualified or exempt from mission qualification in an intelligence discipline, but all participants had knowledge and experience with USAF *vis-recce* requirements. The education level associated with this population ranged from high-school and USAF intelligence training graduation to individuals holding multiple Graduate degrees. Five of the participants were female, and the remaining 10 participants were male. Participant responses are paraphrased below, unless otherwise cited.

Informal interview question 1. What is/are the purpose(s) for visual recognition training?

Response 1. Six respondents suggested the purpose was because intelligence analysts are required to train aircrew (personal communication, October 2015 – December 2016).

Response 2. Six respondents suggested the purpose was because the USAF is reluctant to change outdated intelligence training requirements (personal communication, October 2015 – December 2016).

Response 3. Two respondents suggested the purpose was to help gain an understanding of the weapon systems' capabilities (personal communication, January 3, 2017).

Response 4. One respondent suggested the purpose was to help analysts build a bigger picture (personal communication, December 30, 2017).

Informal interview question 2. Do you think visual recognition training is still useful to the USAF intelligence community?

Response 1. **"**There are other things to spend our time on, like ISR [intelligence, surveillance, and reconnaissance training]. *Vis-recce* training is really just a waste of time" (personal communication, March 27, 2016)

Response 2. The remaining 14 respondents answered similarly to the quote above or in uncertain terms (e.g., maybe, I guess, there are other capabilities that can do that, not really, or I don't use it) (personal communication, October 2015 – December 2016).

Informal interview question 3. Do you think critical thinking training could help analysts become better with visual recognition skills?

Response 1. "I don't see how. You're either good at *vis-recce*, or you're not" (personal communication, January 3, 2016).

Response 2. "No, critical thinking doesn't have anything to do with memory" (personal communication, March 15, 2016)

Response 3. "What does critical thinking even mean" (personal communication, October 15, 2016)?

Response 4. "I don't know. Give it a shot" (personal communication, March 17, 2016)

Response 5. All respondents provided neutral or negative views towards using critical thinking to augment visual recognition training (personal communication, October 2015 – December 2016).

Theme: Uncertainty about *vis-recce* and critical thinking training

Intelligence analysts of all ranks seemed to understand *vis-recce* as a requirement, but thinking about *vis-recce* seemed to stop short of an observable motivation to study it. Additionally, most analysts had negative or neutral views towards critical thinking, especially with regards to its integration into the *vis-recce* curriculum.

Pattern—determining purpose. The majority of intelligence analysts seemed to find it difficult to assign meaningful purpose to *vis-recce* training, and even for those who assigned some sort of purpose, the seemed uncertain.

Pattern—lack of efficacy for critical thinking in vis-recce. None of the participants had any positive thoughts about using critical thinking training to augment the *vis-recce* curriculum.

The initial objective of the present study was to understand intelligence analysts' views of the *vis-recce* curriculum, and the majority of analysts seemed unable to support any substantial purpose for "*vis-recce*," despite the USAF's requirements. After reflecting on each stage of this brief action research cycle, an in consideration of the apparent lack of interest or understanding of critical thinking, I further questioned that analysts may simply lack a critical-thinking framework to guide their understanding of "*vis-recce*." The conclusion of the first cycle of action research required a second cycle of research that established a critical thinking baseline for intelligence analysts and guided their understanding of the purpose of *vis-recce* through the use of Formative Assessments. The following section outlines the CTT Seminar and Formative Assessments that were developed for the second action research cycle, and the following section describes the data that were collected during cycle two.

CTT Seminar

As the participant-researcher, I was immersed as a full-participant during the CTT Seminar. Informed by the first action research cycle iteration, I developed the CTT Seminar and guided discussions for three student-participants. The CTT Seminar was intended to set a baseline understanding for critical thinking and to serve as a guided for intellectual discussions about "*vis-recce*." This section provides a brief overview of the lesson as it was delivered. Student reactions to the lesson are presented as field observations in the Chapter 4, "Findings of the Study" section, of this DiP. The lesson slides may be viewed in Appendix D of this DiP.

Lesson overview. I led a discussion on a 40-slide CTT Seminar for three student-participants the week following the student-participants' semi-structured interviews. The CTT Seminar took place on a Tuesday and the following Thursday mornings from 8:00 AM to 12:00 PM.

Instructional environment. The CTT Seminar occurred in the study site's traditionally-oriented auditorium (i.e., podium, white board, and slide projection in front of the seating area) that is commonly used for unit intelligence training. Despite the traditional room design, I explicitly identified the intent of the lesson as a guided and active interaction between student-participants and the participant-researcher. Although instruction was limited to two mornings, electronic mail and text messages were used after the scheduled instructional blocks and throughout the week to maximize communication opportunities between student-participants and the participant-researcher.

Content. The first section of the 40-slide CTT Seminar was presented on Tuesday morning, and it was guided by the following three instructional objectives: 1)

The student will be able to articulate how the elements of reasoning (purpose, questions, information, interpretations, concepts, assumptions, implications, and points of view) are used in study and logical reasoning; 2) The student will be able to articulate how the universal intellectual standards (clarity, accuracy, precision, depth, breadth, logic, significance, and fairness) may be used to evaluate reasoning; and, 3) The student will be able to demonstrate what it means to reason and study within a discipline. The second section of the lesson was focused on making linkages between *vis-recce* and critical thinking. Section two was presented on Thursday morning, and it was guided by the following two instructional objectives: 1) Given an example weapon system, the student will be able to research and explain the relevance of the material clearly, accurately, and precisely with appropriate depth, breadth, and logic in verbal and written formats, and 2) Given a timed Microsoft PowerPoint-based assessment, the student will be able to identify distinguishing features of enemy/blue/gray air, ground, and naval weapon systems and demonstrate the ability to visually recognize those systems by name or NATO designator to a minimum of 85 percent accuracy.

Section one of the CTT Seminar included discussion on the fundamentals of the Paulian critical thinking framework that is described extensively in Chapter 2 of this DiP—elements of reasoning, universal intellectual standards, and intellectual traits—while section two was dedicated to discussing the weapon systems visual recognition total-form concept in the context of the Paulian critical thinking framework. The following are samples of paraphrased slide-related key comments or actions that the participant-researcher made or performed during instruction:

Slide 1—lesson introduction. The *vis-recce* methods we use today have been around since the 1940s, and all literature that I've been able to find over the past several years and through 20-years' experience is based on some rote memorization skill. Intelligence analysts, however, have a much greater need than to exercise or develop muscle memory—they/we have a need to think critically, to think analytically. Decades of this type of training have proven to have little effect on skill retention, and I believe that's largely because the teaching style/memorization requirements have failed to help students think about *vis-recce* in a meaningful way. My goal with this CTT Seminar *vis-recce* training is that you will not only construct knowledge and retain skills, but you will also learn how to develop critical thinking skills that will benefit you throughout your careers as analysts or in your personal lives. Hopefully, this short lesson will help you develop greater autonomy with your lifelong learning endeavors (personal communication, January 10, 2017).

Slide 2—lesson rule. Actively participate and take the liberty to move around and communicate with other students and me about the content of this lesson (personal communication, January 10, 2017).

Slides 3-6—objectives. Objectives are often overlooked by students and glossed over by instructors, but for students/critical thinkers, it's important to fully understand the requirements of the objective (i.e. Problem) you are faced with. Pay attention to key words in this objective (personal communication, January 10, 2017).

Slide 7—critical thinking defined. I guided a student-participant discussion on their interpretation of critical thinking.

Slide 8—key assumptions. I guided discussion on assumptions, biases, student opinion about bias, and how bias may apply to the intelligence community. I also guided discussion on potential pitfalls in the intelligence community if such biases are not controlled.

Slides 9-16—intellectual traits. Now that we have a better understanding of what critical thinking is, we can begin to imagine what critical thinkers look like. Let's begin to also think about these words in terms of what you do as an intelligence analyst or a visual recognition expert. Could intellectual humility also equate to analytical humility? Yes (personal communication, January 10, 2017).

Slide 17—elements of reasoning. Reasoning can be thorough and follow each of the elements and NOT be critical thinking because it is not evaluated for quality by the use of intellectual standards (personal communication, January 10, 2017).

Slide 18—universal intellectual standards. These standards are only a snapshot of the standards that could exist. It is highly advised that each profession develop and adhere to standards that relate to the profession, and one purpose of that thinking is to define the standards of thinking that apply to your discipline (personal communication, January 10, 2017).

Guided question 1. Do intelligence products need to adhere to all of the universal intellectual standards? Are there other standards that apply (personal communication, January 10, 2017)?

Guided question 2. Does visual recognition thinking need to adhere to all of the universal intellectual standards? Are there other standards that apply (personal communication, January 10, 2017)?

Slide 19—thinking within a discipline. It is up to your professional judgment, and the professional judgement within the field, to decide the standards that are important within your professional discipline (personal communication, January 10, 2017)?

Formative assessments. Three Formative Assessments were assigned during the CTT Seminar. The first two formative assessments were assigned to be completed at end of the first morning of instruction. The second Formative Assessment was assigned to be completed as homework after the second day of instruction.

Task 1 description—"From and intelligence analyst's point of view and as a group, students will brainstorm, discuss, and document purposes that analysts are required to develop and maintain weapon systems visual recognition skills" (Baker, 2017, slide 22).

Verbal intent. The purpose of this task is for you to begin to understand that there are problems to be solved for every task you will face as an analyst. There are also several underlying instructional motives: as a group, you will hopefully learn to understand the diverse capabilities, ideas, and knowledge you all possess. You should expect to see your teammates as an invaluable resource for you in your profession (personal communication, January 10, 2017).

Expectations. Student-participants were given 20 minutes to discuss and respond to the task. They were provided an expectation to evaluate their own use of logical processes in their brainstorming and to evaluate their own responses in context of the intellectual standards. There was no specific requirement for documentation method—only that the students-participants documented their responses.

Student products. Students used the white-board to document their responses to the task prompt. I participated in discussions as requested by the student-participants or as I observed a need to facilitate dialogue. I guided discussions on student responses at the completion of the task, identifying each area that adhered to the intellectual standards and making suggestions where appropriate.

Task 2 description. "As a group, students will discuss and document potential sources of information and study techniques that may be used to build their weapon systems knowledge" (Baker, 2017, slide 22). This task took place simultaneously with Task 1, so the detailed description of Task 1 requirements and activities apply to Task 2.

Task 3 description. **"**Given an example weapon system, the student will be able to discover material relevant to the given weapon system and explain the material's relevance to the weapon system clearly, accurately, and precisely in verbal and written formats" (Baker, 2017, slide 38).

Constraints and partial remedies. Task 3 was assigned at the end of the second day of training, which was the final scheduled day. Student-participants were offered the opportunity to opt-out of completing the task. Two students, "Sally" [pseudonym] and "Joe" [pseudonym] chose to complete it during their personal off-duty time between Friday and Monday. "Bill" [pseudonym] was unable to complete the task due to other commitments. Student-participants were unavailable to be evaluated on the verbal component of the task; however, they each provided their required responses and responded to additional electronic mail and text message solicitations.

Expectations. Student-participants were given three days to research available resources for a given weapon system. "Sally" [pseudonym] was assigned the Mi-24,

Hind, and "Joe" [pseudonym] was assigned the Mirage 2000. Both weapon systems were unknown to them. Student-participants were required to discover any sort of relevant resource that they felt helped them gain a better understanding and personal connection with the weapon system, and they were required to provide a written response, in their own personal style, that conveyed the relevance of the material to the aircraft and to their own learning. Student-participants were required to evaluate themselves by using universal intellectual standards as their rubric.

Assessment. Student-participants were evaluated on their ability to convey their findings in accordance with the universal intellectual standards, and they were each provided feedback on their product. These electronic mail feedback sessions are recorded as informal feedback in the following section of this DiP.

Cycle 2: Action Research

Three of the 15 participants from the first action research cycle, who were permanently-assigned to the research site, were selected for participation in the second cycle. While planning to conduct the this action research study, a larger participant population was expected; however, only the three participants, identified in this study by rank and pseudonym, were available for the study due to USAF deployments, prior commitments, and unit mission requirements. Of the three studied, only one student-participant was previously mission qualified. The student-participants did, however, provide a strong sample of the diversity that is common in the USAF intelligence community.

"Sally" [Pseudonym]. This study captured demographic data, semi-structured interview, field-observation, pretest, posttest, and informal feedback data from "Sally" who was unknown to the participant-researcher prior to the present study.

Demographic data. "Sally" [pseudonym] is a 29 year-old white female who has earned a Bachelor's degree with double majors in Japanese Language and Culture and International Affairs. She has served on active duty in the USAF for fewer than two years, and she graduated from the USAF's basic intelligence officer course within two months prior to the study. She had not begun the study site's unit intelligence training and was not mission qualified for the unit's intelligence mission.

Semi-structured interview perceptions. I conducted an interview with "Sally" [pseudonym] in my office. Even after introductions, "Sally" [pseudonym] was reluctant to respond to my interview questions. Assessing that she may be intimidated by conducting an interview with the study site's senior intelligence officer, I attempted to ease the tension by using the moment to mentor a young officer. After the mentoring session, "Sally" [pseudonym] was more willing to attempt to respond to the interview questions.

When asked what *vis-recce* training she had received during her recent basic intelligence training experience, "Sally" [pseudonym] responded that the schoolhouse did not have a block of instruction dedicated to "*vis-recce*." She remarked that there was some mention of it as part of the total form concept discussions students had when they were required to prepare threat intelligence briefings (personal communication, January 7, 2017). Since "Sally" [pseudonym] had little prior experience with "*vis-recce*," she could assessed from her experience that its purpose was to help gain a greater

understanding of a threat system's capabilities (personal communication, January 7, 2017).

When it was clear that "Sally" [pseudonym] did not have a background in *vis-recce* that would provide any additional support for the study, I asked her what sort of critical thinking or analysis training she had received in the basic intelligence course. She did not recall any blocks or elements of instruction that were dedicated to critical thinking or analysis. She replied that she felt like the school simply focused on threat knowledge and briefing skills (personal communication, January 7, 2017). Upon completion of the interview and mentoring session, "Sally" seemed pleased with the upcoming training opportunity.

Pretest results. "Sally" [pseudonym] correctly answered 0 of 13 items (0 percent) on the Microsoft PowerPoint-based pretest. She attempted to answer 10 of the 13 items, and filled in the blanks with humorous responses (e.g., "grasshopper" and "☹") for the final three (personal communication, January 10, 2017). Her responses to each of the items were far from being comparable to the intended response, except that she identified the F-15 Eagle as an F-14 Tomcat.

Task 3 performance. "Sally" [pseudonym] was assigned to research the Mi-24, Hind. Before accepting the assignment, she asked clarifying questions about the objectives, and she attributed her questioning directly to the universal intellectual standards that were presented during the critical thinking lesson. "Sally" [pseudonym] asked for more specificity in the types of resources she was allowed to use, and she asked for clarification if she was to write about what she learns of the aircraft or the resource, clearly indicating to me that she was seeking clarification for the problem she was being

asked to solve and the types of information she should use (personal communication, January 12, 2017). In her response, she referenced two articles that presented the technical and mission capabilities of the helicopter, and her response was thorough, and she communicated her response to the objective clearly, accurately, and precisely.

Task 3 informal feedback. Due to USAF mission constraints, "Sally" [pseudonym] was unable to orally present the results of her research or receive oral participant-researcher feedback. After assessing her response, I sent her an electronic mail message with four questions for her to reflect on and reply to:

*Question 1. "*While you were looking for information about the Hind and keeping its visual characteristics in mind, did you find that you were more comfortable with its features" (personal communication, January 16, 2017)?

Question 2) "Did you connect with a story about the Hind that's interesting to you or one that motivates you somehow to remember what the Hind looks like" (personal communication, January 16, 2017)?

*Question 3. "*Did you evaluate your writing and thoughts with the intellectual standards as you put your response together" (personal communication, January 16, 2017)?

*Question 4. "*Did you recognize any benefit from this task" (personal communication, January 16, 2017)?

"Sally's" [pseudonym] responses are as follows:

Response 1.

Yes, once I became more familiar with the HIND after seeing photos and even doing a brief research of helicopter anatomy (because my basic knowledge on

helicopters is weak), I can confidently say that I'm more comfortable with its features and can identify it easily. (personal communication, January 17, 2017)

Response 2. "Honestly the one part of the HIND that sticks out to me is how formidable of a helicopter it is. It seems that the Russians built quite the badass for tactical employment" (personal communication, January 17, 2017).

Response 3.

I always feel like I could have analyzed my own writing further, and probably tweaked more of it before submission. What I find to discourage me from doing this in a thorough manner is the extra time that I might take in this process. Additionally I think I become impatient, and I just think that my work should be 'sufficient' for submission. With that said, I did consider my thoughts to the intellectual standards; but I also considered any lack of clarity from the instructions given (not by you but by the vague instruction paragraph) and responded to it with my own interpretation on how deep the instructions wanted me to go with analyzing a weapon system. (personal communication, January 17, 2017).

Response 4.

Aside from getting to know the MI-24 HIND, I benefitted from understanding how to analyze a weapon system type that I was originally rather unfamiliar with – helicopters. From a greater picture's perspective, this task showed me from start to finish how my mind processes getting a task done. I recognize the importance of asking myself throughout a task 'Am I being clear enough? Can this be easily interpreted in a different way?' Besides that, just assigning me to get familiar with

> a particular system places information of that system in a part of my mind where I will never (or at least for quite a while) forget about it. It becomes information that is quality to my memory and not subject to 'dumping' anymore. (personal communication, January 17, 2017)

Posttest results. "Sally" [pseudonym] correctly answered 13 of 13 items (100 percent) on the Microsoft PowerPoint-based posttest after two days of self-study.

"Joe" [Pseudonym]. This study captured demographic data, semi-structured interview, field observation, pretest, posttest, and informal feedback data from "Joe" who was unknown to the participant-researcher prior to the present study.

Demographic data. "Joe" is a 23 year-old Filipino-American who immigrated to America after he graduated from high-school, and he holds a Bachelor's degree in International Relations. He has served on active duty in the USAF for fewer than two years, and he graduated from the USAF's basic intelligence officer course within two months prior to the study. He had not begun the study site's unit intelligence training and was not mission qualified for the unit's intelligence mission.

Semi-structured interview perceptions. I conducted an interview with "Joe" [pseudonym] in my office. After introductions, "Joe" [pseudonym] was somewhat reluctant to respond to my interview questions, but he appeared to want to answer my questions. After using attempting to ease tension and use this as a second mentoring opportunity for a young officer, "Joe" [pseudonym] attempted to answer survey questions to the best of his ability, but he struggled to find experience to draw from.

When asked what *vis-recce* training he had received during his recent basic intelligence training experience, "Joe" [pseudonym] responded that he thought he

remembered basics like WEFT [wings, engines, fuselage, tail] descriptions, and he could not recall a formal block on *vis-recce* (personal communication, January 7, 2017). When asked if his prior instruction on total form concept was intellectually challenging, he responded that "it was just part of the job" (personal communication, January 7, 2017). "Joe" [pseudonym] had little prior experience with "*vis-recce*," but he assessed a purpose for *vis-recce* was to affect decision-making processes and to help analysts "anticipate attacks" (personal communication, January 7, 2017).

When asked if there was a block of critical thinking or analysis training in the basic intelligence course, "Joe" [pseudonym] did not recall any blocks of instruction or elements of requirements that were dedicated to critical thinking or analysis (personal communication, January 7, 2017). Upon completion of the interview, and mentoring session, "Joe" expressed some excitement about what he had learned of the career-field during that interview and that he was looking forward to the training (personal communication, January 7, 2017).

Pretest results. "Joe" [pseudonym] correctly answered 2 of 13 items (15 percent) on the Microsoft PowerPoint-based pretest. He attempted to answer the first 10 of the 13 items, and filled in the blanks with "N/A" for six response items (personal communication, January 10, 2017). For the items he answered, his responses were far from being comparable to the intended response, except that he identified the F-15 Eagle as an F-14 Tomcat.

Task 3 performance. "Joe" [pseudonym] was assigned to research the Mirage 2000. Before accepting the assignment, he asked if he could also relate the relevance of the resource to his ability to recognize the aircraft (personal communication, January 12,

2017). His task response, that follows, was clearly reflective, and he connected the story to his learning preference:

Task 3 response.

Distinguishing a weapon system from a distance is a skill that comes with experience. It's a craft that can take months for some people but years for others. This raises the question of the importance of an effective study habit. Such as what actions or perspective shifts can make an individual better at visual recognition? The experience I tend to forget are pretty mundane, such as power [point] presentations, studying for a statistics exam and of course waiting in line in the DMV. On the other hand, the experience that sticks out most to me are things that I have a personal connection to. It's a very frustrating situation when you have the desire to fly and learn about airplanes but can't remember certain aircrafts [sp] after going through numerous numbers of presentations on different weapon systems.

When I read this fantastic interview of the Mirage 2000 pilot, I couldn't help but feel the connection this pilot had with his aircraft. He talked about flying the Mirage 2000 in the pure vertical position at 60 knots and decelerating while being chased. Fortunately for Ian, he managed to position his aircraft back to its normal level position. This example shows the durability and unique design that make the Mirage 2000 one of a kind.

Ian also talked about the single engine and its delta wings. He said despite the aircraft having only one engine and delta wings, it was capable of reaching other weapon systems such as the F-16. Overall he described the Mirage 2000 as a

"sexy French aircraft" that is built like a tank and can pull 9Gs at any day/night of the year. Personally, this article captures everything that I need to know when it comes to visual recognition of the Mirage 2000. Not only did it illustrate the shape of the aircraft, wing shape and relevant parts of the aircraft, but it did it with style. Ian gave his personal insight to what made those unique features important in air to air combat. (personal communication, January 17, 2017)

Task 3 informal feedback. Due to USAF mission constraints, "Joe" [pseudonym] was unable to orally present the results of his research or receive oral participant-researcher feedback. After assessing his response, I sent him an electronic mail message with two questions for him to reflect on and reply to:

Question 1. "Did you evaluate your writing and thoughts with the intellectual standards as you put your response together" (personal communication, January 16, 2017)?

Question 2. "Do you perceive any weaknesses to this method of study" (personal communication, January 16, 2017)?

"Joe's" [pseudonym] consolidated response is as follows:

Response.

I have to admit after referring back to the lessons and reviewing the intellectual standards a few times, I've had a difficult time finding a weakness to this method. Mainly because this method of study is essential to thinking well in every aspect of language. Also it's hard to argue against a method that actually works. Intellectual standards prevents thinkers from being on auto pilot and thinking out of intuition. Having these steps actually helped me formulate questions that are

> vital to my reasoning process. But, I'll do my best to play devil's advocate … I would argue that most people do not and will not base their reasoning on a framework because human beings are emotional by nature. I know you mentioned that acknowledging our biases is a key part of critical thinking but I think human beings by nature are biased. Elimination of this type of thinking is impossible, so the only way to control it is by minimizing this type of thinking. However, this is impossible because most people don't justify their thinking, they just follow what works. (personal communication, January 17, 2017)

Posttest results. "Joe" [pseudonym] correctly answered 13 of 13 items (100 percent) on the Microsoft PowerPoint-based posttest after two days of self-study.

"Bill" [Pseudonym]. This study captured demographic data, semi-structured interview, field observation, pretest, and informal feedback data from "Bill" who has been a peer to the participant-researcher for 3.5 years.

Demographic data. "Bill" is a 43 year-old African-American male who holds a Bachelor's degree in International Relations with an emphasis in Latin American Studies, and he is a graduate of the USAF's Air Command and Staff College. He has served in the USAF for over 20 years, and he is currently serving full-time in the USAF Reserves as the site's Air Force Reserve Command unit's senior intelligence officer. "Bill" is a fully mission qualified intelligence instructor and evaluator at the study site.

Semi-structured interview perceptions. I conducted an interview with "Bill" [pseudonym] in his office. No introductions were required since I have known and worked closely with "Bill" [pseudonym] for 3.5 years. "Bill's" [pseudonym] experience as an intelligence officer surpasses mine by six years, but we have the same total time in

service in the intelligence community. "Bill" [pseudonym] was able to respond to all of the interview questions, so his responses are presented below:

Question/Response. When asked if he could explain the purposes that intelligence analysts are trained on visual recognition skills, "Bill" [pseudonym] responded that it is a "standard skill" (personal communication, January 8, 2017).

Question/Response. When asked if he could recall a time that he had to use visual recognition skills in the line of his duties, outside of training, "Bill" [pseudonym] responded, "I haven't experienced any events where *vis-recce* was a factor" (personal communication, January 8, 2017).

Question/Response. When asked if he thinks visual recognition skills are still valide, "Bill" [pseudonym] responded, "I don't know, but I feel like they are" (personal communication, January 8, 2017).

Question/Response. When asked if he thinks visual recognition skills are still valid, "Bill" [pseudonym] responded, "I don't know, but I feel like they are to the point of knowing what a weapon system does" (personal communication, January 8, 2017).

Question/Response. When asked if he thinks visual recognition helps analysts think more deeply about the impact the systems have on USAF operations, "Bill" [pseudonym] responded, "Yes, when you understand the layout of a ground weapon site—not simple parts recognition" (personal communication, January 8, 2017).

Question/Response. When asked if he enjoys weapon systems visual recognition, "Bill" [pseudonym] responded, "Yes, when it's made to be a fun game instead of a test because the threat of test failure is frustrating" (personal communication, January 8, 2017).

Question/Response. When asked if he enjoys weapon systems visual recognition, "Bill" [pseudonym] responded, "Yes, when it's made to be a fun game instead of a test because the threat of test failure is frustrating" (personal communication, January 8, 2017).

Question/Response. When asked what types of training he had received on visual recognition and if any of those training courses helped him think critically, "Bill" [pseudonym] explained that he had received training during basic intelligence training, mission qualification training, during unit internal training, and even on posters that were placed strategically across the unit. He explained that he had gained some ability to think critically through these activities when he had time to relate the systems to a purpose (personal communication, January 8, 2017).

Question/Response. When asked if he could provide recommendations for useful techniques, "Bill" [pseudonym] suggested the use of perspective-based training (i.e., visual identification of systems that appear to be at a distance that would be common for the aircrew members to observe) and a feedback-oriented lesson that focuses on difference training when an analysts decides a wrong answer (personal communication, January 8, 2017).

Pretest results. "Bill" [pseudonym] correctly answered 10 of 13 items (77 percent) on the Microsoft PowerPoint-based pretest. He provided responses for all 13 items, and his incorrect responses were close comparisons to the intended answer. His responses were, in fact, systems of the correct country of manufacture. The three items he missed were three of the same items that received no response from "Sally" [pseudonym] and "Joe" [pseudonym].

Task 3 performance. "Bill" [pseudonym] was unable to complete this task due to his primary duty commitments.

Posttest results. "Joe" [pseudonym] correctly answered 13 of 13 items (100 percent) on the Microsoft PowerPoint-based posttest after two days of self-study.

Field observations. During the CTT Seminar, I recorded any notable student-participant behaviors and reactions. These behaviors and reactions represented a wide-range of responses that caught my attention.

Environment reactions. All student-participants initially responded to the learning environment as if it were a traditional lecture-based lesson (i.e., they did not speak unless prompted by the participant-researcher and they sat in the auditorium seats while the participant-researcher guided learning through the lesson); however, after being prompted to participate in the first task, student-participants had an observable decrease in anxiety and an increased desire to communicate. On the second day, I engaged the student-participants in a feedback session from the previous part of the lesson before they could take a seat. Before the lesson began, "Sally" [pseudonym] said, "I think I'm going to take your advice and stand today" (personal communication, January 12, 2017), and "Joe" agreed to follow suit. Both student participants joined me at the front of the class as we discussed *vis-recce* together.

Lesson reaction. All student-participants seemed alert and intellectually engaged but reluctant to communicate until after the first task. All student participants seemed nervous to be called on during prompts (e.g., provide your definition of critical thinking). They seemed highly alert and interested, however, in the vignettes and life examples that I provided throughout the lesson, especially when I was able to connect critical thinking

to long term success in their profession. At the end of the first day, "Joe" [pseudonym] remarked, "I wish I had received this sort of education in college. I feel like I've not only begun to learn how to really do my job, but I also feel like I received a valuable life lesson" (personal communication, January 10, 2017).

At the end of the first day, both student-participants stayed 30 minutes past their scheduled training time to continue discussing how the methods may be used to support *vis-recce* learning. During that conversation, both student-participants seemed excited to participate in discussions. "Sally" [pseudonym] began to demonstrate epistemological connections by asking questions about her father's vehicle. She verbally wondered about why the pistons in her father's car were horizontal when most other engines have vertical pistons. She, then, began to make connections to the research she would like to do to find out why the car has that characteristic. I asked her if she thought she would forget that information if she researched it and made a connection to her family. She realized the comparison I was beginning to make with *vis-recce* and stated that she understood how she would like to learn *vis-recce* (personal communication, January 10, 2017).

Task 1 and 2 reactions. Student-participants were reluctant to begin this task. They lingered and seemed to attempt to decipher the objective for about 10 minutes. I guided them in a discussion over the objective and asked them to use the intellectual standards to alleviate their confusion. Each of the student-participants slowly began to ask questions about the objective. Then, they begin to begin to openly brainstorm ideas, but they quickly downplayed their initial thoughts, in a seemingly embarrassed way, before they would write anything on the board. I encouraged them to just write anything down that comes to their mind to get brainstorming started and to begin thinking out loud

with each other. Finally, "Sally" [pseudonym] picked up the marker and began to write thoughts. After about 20 minutes into the task, the student-participants seemed to be more open and comfortable with the task and with each other.

Interpretation of the Results of the Study

The present action research study sought to understand intelligence analysts' views of *vis-recce* and to determine the impact that a CTT Seminar and guiding Formative Assessments might have on the intelligence analysts' *vis-recce* performance. The participant-researcher was fully-immersed in a qualitative observational study as a full-participant during both cycles of action research that were conducted during the present study. During the first action research cycle, the participant-researcher conducted an informal survey of 15 intelligence analyst participants to gain insights on community perceptions of the efficacy of weapon systems visual recognition training, and the second cycle of the research attempted to address the theme of uncertainty that was discovered during the first action research cycle. For the second cycle of action research, three of the 15 participants were selected to complete semi-structured interviews, a CTT Seminar, a pretest, and a posttest with the participant-researcher who recorded field observations and additional informal communique.

A complete inductive analysis of the second research cycle revealed the following themes to be addressed in the action plan that is presented in Chapter 5 of this DiP: 1) Attitudes of Intelligence Analysts Towards *Vis-Recce* and 2) Attitudes of Intelligence Analysts Towards Critical Thinking Training (CTT) and Formative Assessments.

Given the nature of qualitative research and the limitations that were present in this study, it is not generalizable to the entire USAF intelligence community; however,

the findings of this study represent utility in departing from the USAF's traditional training delivery methods by encouraging intelligence instructors to integrate critical thinking into *vis-recce* curricula. For the present study, a CTT Seminar was implemented in accordance with Paul and Elder's (2007) methods, and Formative Assessments that were aligned with the Revised Bloom's Taxonomy (Anderson et al., 2001) and evaluated with intellectual standards were used to guide learning, resulting in evidence of increased metacognitive skills and interest *vis-recce* training. An interpretation of the interplay between the emerging themes of the study reveals both strengths and challenges of the method presented in this study. An analysis of each of the two themes and related patterns are presented in the following section, and suggestions for conducting an action plan are outlined in Chapter 5 of this DiP.

Theme: Attitudes of Intelligence Analysts Towards *Vis-Recce*

After analyzing the patterns of apathy toward *vis-recce* and a lack of a substantive view of critical thinking, I realized that a CTT Seminar could establish a baseline for critical thinking that could encourage analysts to engage in deep-thinking about "*vis-recce*," and guided by intellectual standards-based Formative Assessments (prior to the *vis-recce* test), analysts might be able to discover and understand the importance of the USAF *vis-recce* requirement.

Pattern—institutional apathy toward "*vis-recce*." During the informal interviews of the first action research cycle and the semi-structured interviews of the second action research cycle, it became evident that intelligence analysts found it difficult to assign meaningful purpose to *vis-recce* training. The analysts' observable demeanor

and/or lack of enthusiasm about *vis-recce* helped form the inference that there is an apathy toward *vis-recce* training in the intelligence community.

Pattern—lack of substantive view of critical thinking. None of the participants in either cycle of action research had any positive thoughts about using critical thinking training to augment the *vis-recce* curriculum.

Theme: Attitudes of Intelligence Analysts Towards CTT and Formative Assessments

The Formative Assessments were created for the student-participants, but data collection produced evidence of their willingness and excitement to participate in developing meaningful Formative Assessments that could contribute to an improved professional practice. Coupled with the observable motivation that emerged from this study, there was strong evidence supporting the benefits of formative assessment differentiation.

Pattern—motivation to improve. The student-participants demonstrated excitement throughout the study, and the more dialogue that occurred between the students and the participant-researcher, the more motivated the student-participants became. In one instance, I asked the students how they thought they would best learn "*vis-recce*," and "Sally" said, *"I would like to see the weapon system in person."* After some discussion, the student-participants discovered several options for creating such a learning opportunity through studying and naming components from accurate aircraft models and through site and museum visits where the actual systems are on display. The student-participants did not withhold their excitement for the Formative Assessments they were provided either. For example, "Joe" said, *"I wish you had been my college*

professor and intel school instructor." In this instance, he was visibly excited by the opportunity to participate in a Formative Assessment that put him in charge of his own learning.

Format Assessments provide student-participants opportunities to apply the critical thinking lessons as they prepared for the *vis-recce* test. The intent of Formative Assessments was for student-participants to make cognitive connections with weapon systems and to evaluate, with intellectual standards, their own written and oral summaries of resources that supported their learning as they worked toward the final *vis-recce* test. In the student-participants' own words, the intended results occurred, and that was verifiable through an observable transformation in their thinking about "*vis-recce*."

Pattern—cognitive development. Formative Assessments provided an opportunity for student-participants to make cognitive connections between a weapon system and some personal interest, providing an opportunity to reinforce their knowledge of the weapon system. Student-participants consistently remarked on their views of the strength of the Formative Assessments. "Sally" said, *"I know this method has helped me place my knowledge of the Hind in a part of my brain that I will always be able to access."* And "Joe" said, *"I feel like I made a personal connection to the Mirage 2000 that I can't forget because the pilot's story I read was so exciting and descriptive."*

Conclusion

Two cycles of the action research process were conducted to address a problem of practice at a mid-Western USAF base intelligence unit where the majority of intelligence analyst struggle with *vis-recce* training requirements. A qualitative research design was used to address the following question: *What are USAF intelligence analysts' perceptions*

of the efficacy of weapon systems visual recognition training in the operations intelligence profession? The participant-researcher, first, conducted an informal survey of 15 intelligence analysts to understand intelligence analysts' perceptions of *vis-recce* training and, second, selected three of the 15 intelligence analysts (i.e, "Sally," "Joe," and "Bill") for semi-structured interviews and participation in a CTT Seminar that was guided by intellectual standards-based Formative Assessments.

After an inferential analysis of the findings and results of the present qualitative action research study, two major themes and associated patterns emerged that support the development of an action plan that is presented in Chapter 5 of this DiP. One broad theme identified the *Attitudes of Intelligence Analysts Towards Vis-Recce* found that intelligence analysts were apathetic towards *vis-recce* training and lacked a substantive understanding of critical thinking. A second theme identified positive *Attitudes of Intelligence Analysts Towards CTT and Formative Assessments* through the student-participants' excitement to participate in Formative Assessment development and their ability to make personal connections to the concepts within the *vis-recce* curriculum.

CHAPTER 5

SUMMARY, CONCLUSIONS, AND ACTION PLAN

Introduction

A summary of the present qualitative action research study, a discussion of the conclusions, and the participant-researcher's action plan for the study site are provided in Chapter 5. The present study aimed to address a problem of practice at a mid-Western United States Air Force (USAF) base's intelligence unit where the majority of intelligence analysts often fail a required Microsoft PowerPoint-based weapon systems visual recognition summative assessment (i.e., *vis-recce* test). The *vis-recce* test is designed to ensure that the analysts meet USAF requirements. A qualitative action research design was used to describe the impact that a Critical Thinking Training (CTT) Seminar had on these USAF intelligence analysts' general *vis-recce* performance.

Data consisted of a survey of 15 intelligence analysts and semi-structured interviews, field notes, observations, informal conversations, and informal feedback from three student-participants (i.e., "Sally," "Joe," and "Bill") who were selected to participate in the CTT Seminar. The initial survey gathered data on intelligence analysts' perceptions of the usefulness of *vis-recce* skills. The surveys were gathered to support the participant-researcher's deeper understanding of the problem of practice and to inform curriculum, pedagogy, and assessment strategy differentiation at the USAF study site. After the surveys were conducted, the participant researcher selected three intelligence analysts (of the 15) for

semi-structured interviews and participation in the CTT Seminar. The present study was guided by a single qualitative research question that led to the discovery of three themes in the *vis-recce* training environment that are discussed in the following sections of Chapter 5.

Research Question

What are USAF intelligence analysts' perceptions of the efficacy of weapon systems visual recognition training in the operations intelligence profession?

Guided by the research question, the present study identifies two major themes that illuminate the complexity of the stated problem of practice within the context of the USAF's intelligence training culture. The Themes and Key Questions guide the Action Plan that is presented in this chapter, and they are as follows:

Theme 1: Attitudes of Intelligence Analysts Towards *Vis-Recce*

Key questions:

1. How does the intelligence community view *vis-recce* training?
2. Do intelligence analysts think CTT can be integrated into the *vis-recce* curriculum to improve upon it?

Theme 2: Attitudes of Intelligence Analysts Towards CTT and Formative Assessments

Key question:

1. How might intellectual standards in CTT be used to differentiate weapon systems visual recognition Formative Assessments?
2. How are intelligence analysts impacted by critical thinking instruction?
3. How does CTT impact the instructor's Formative Assessment methods?

Summary of the Problem

The problem of practice identified for this study is that the majority of the intelligence analysts assigned to a USAF base in the mid-Western US failed their timed Microsoft PowerPoint-based assessments that were designed to meet the USAF *vis-recce* requirement, and that USAF requirement, itself, did little to enable knowledge retention and the development of critical thinking skills that are essential to quality intelligence analysis. A CTT Seminar is needed in the USAF intelligence profession, specifically for analysts who are assigned to units supporting flying missions, to guide their development of *vis-recce* skills. The gravity of this requirement is born of the anti-fratricide and self-defense necessities of differentiating combatants between friend and foe and providing early warning to defending forces of an impending attack. The life-preserving effect of this visual recognition activity is one of several reasons all operations intelligence analysts are required to demonstrate a near-infallible military weapon systems visual recognition ability on a standardized summative *vis-recce* test. I determined that Formative Assessments guided by CTT would enable these analysts to perform better on the *vis-recce* test that is required by the USAF.

Purpose of the Study

The two purposes of this qualitative action research study were to:

1. Understand intelligence analysts' perceptions of weapon systems visual recognition training requirements and curriculum pedagogy; and,
2. Determine the impact of Formative Assessments on the critical thinking skills of intelligence analysts regarding weapon systems visual recognition after a CTT Seminar.

Research Site and Participants

The present study included 15 participants who were widely diversified by rank (i.e., Senior Airman to Brigadier General) and qualification (i.e., non-mission qualified, mission qualified, and intelligence instructor). The 15 participants responded to surveys, and they provided data on intelligence analysts' views of *vis-recce* requirements from across the USAF intelligence community. Three of the 15 participants ("Sally," "Joe," and "Bill") were assigned to the research site at the mid-Western USAF base where the participant-researcher served as the senior intelligence officer, so they were selected for semi-structured interviews and for participation in a CTT Seminar, providing field notes, observation, informal conversation, and feedback data for the present study. The CTT Seminar took place in the study site's traditionally-oriented auditorium that served as the venue for the unit's regularly-scheduled internal intelligence training and briefing activities.

Non-traditional training setting challenges. The active duty USAF operations intelligence training environment was absolutely the greatest challenge to the present study. Early in the planning stages of the action research, it seemed the intelligence unit would have plenty of participants and few mission commitments to contend with. By the time the plan had been developed, the world had changed, and so had the commitments and assignments of potential participants. At first, it was difficult creating time for conducting the study. Then, it became difficult finding available participants. Eventually, the planned research methodology suffered, but through coordination with unit leadership and flexibility within the action research methodology to refocus the research, the study was able to be conducted. There is a common phrase used in the

USAF: “Flexibility is the key to airpower” (anonymous), and I learned very clearly that phrase applies to action research as well.

Action Research Methodology

The present action research study followed a qualitative research design that sought to understand intelligence analysts’ perceptions of the efficacy of *vis-recce* training before and after participating in a CTT Seminar and Formative Assessments. As the participant-researcher, I conducted surveys with 15 intelligence analysts with various levels of *vis-recce* experience, and three of the 15 analysts were selected for further study, participating in a CTT Seminar at the research site. Informed by the themes and key questions that resulted from an inductive analysis of the survey data, I led a CTT Seminar and developed Formative Assessments for the three student-participants. During the CTT Seminar, I captured field notes, observation, informal conversation, and feedback data from the three student-participants to arrive at the conclusions that informed my development of an action plan that is presented in the following sections of Chapter 5 of the present DiP.

Professional awareness. A significant benefit I discovered during the action research process was discovering how much I did not know about the curriculum pedagogy I was expected to lead. Conducting action research required me to study a problem and actively plan solutions for the problem. This process created an opportunity for me to understand the impact of the CTT Seminar on Formative Assessments and the ways in which I can work in reciprocity with other analysts to prepare them for the final *vis-recce* test.

Challenges in action research. The most significant realization of the action research method was the powerful tendency towards researcher bias. Bias is already extremely difficult to minimize in most studies, especially qualitative studies, but action research makes research personal. After authoring the USAF's first advanced analysis and critical thinking course and teaching similar critical thinking methods to senior Iraqi intelligence leaders, I had to deliberately remind myself of my preconceived notions and challenge my findings with the same standards that I aimed to instill in the student-participants. Even still, the nature of action research seemed much more personal than other empirical studies because it was focused on a problem of professional practice that I had a personal interest in.

Summary of the Study

I identified a problem of practice at a USAF base in the mid-West US where intelligence analyst performance on a *vis-recce* test was sub-standard, and I subsequently arrived at two key themes from an inductive analysis of the data gathered during the present study. A summary discussion of the two themes and key questions follows:

Theme 1: Attitudes of Intelligence Analysts Towards *Vis-Recce*

Key questions:

1. How does the intelligence community view *vis-recce* training?
2. Do intelligence analysts think CTT can be integrated into the *vis-recce* curriculum to improve upon it?

I did not expect the level of institutional apathy toward *vis-recce* that I discovered during an inferential analysis of the data. After conducting surveys with the 15 participants, ranging from Senior Airman to Brigadier General, I realized that I might

have resistance to creating buy-in for the CTT Seminar. I expected to find that some of the analysts simply did not enjoy learning *vis-recce* and that they did not benefit from the existing standard curriculum and pedagogy. What I found, however, was that most intelligence analysts did not care about a CTT Seminar or learning *vis-recce* skills despite the USAF's requirement. Much of this, I attributed to an institutional lack of a substantive view of critical thinking and to a lack of awareness of the purpose for "*vis-recce*."

This "apathy" enabled me to realize that a CTT Seminar that would establish a baseline for critical thinking and intellectual standards-based Formative Assessments (prior to the *vis-recce* test) might help the analysts understand the importance of the USAF *vis-recce* requirement. Since good reasoning begins with solving some problem or being guided by some purpose, I chose to implement a flexible Formative Assessment method that was aligned metacognitively at the basic knowledge level of the Revised Bloom's Taxonomy (Anderson et al., 2001). To achieve this metacognitive knowledge, I guided students, in fact, they guided themselves with the intellectual standards that I presented in the CTT Seminar. Like a problem-based learning method, this method produced an intangible cognitive and social artifact by empowering students to "conduct research, integrate theory and practice, and apply knowledge and skills to develop a viable solution to a defined problem [or purpose]" (Savery, 2006).

Theme 2: Attitudes of Intelligence Analysts Towards CTT and Formative Assessments

Key question:

1. How might intellectual standards in CTT be used to differentiate weapon systems visual recognition Formative Assessments?
2. How are intelligence analysts impacted by critical thinking instruction?
3. How does CTT impact the instructor's Formative Assessment methods?
4. How can intelligence analysts in the CTT work together to develop Formative Assessments?

For the Formative Assessment I developed, I asked the student-participants to discover some resource of their choosing that related to a given weapon system and write about how that resource helped them connect that weapon system to a personal purpose and to explain how it helped them construct knowledge. This method's cognitive artifacts demonstrate a relationship to Dewey (1933), the philosophical founder of constructivism and the social and cognitive constructivist theorists Vygotsky (1978) and Piaget (1972), respectively. The student-participants, aided by my role as a learning facilitator, created products that represented their own unique connections and metacognitive abilities, and most importantly, the connections they made indicated a more permanent relationship to the weapon system they were given to study.

The CTT Seminar improved student performance and my own development and implementation of Formative Assessments. The CTT Seminar also helped student-participants develop a substantive view of critical thinking and education within the *vis-recce* discipline, and it helped them demonstrate an understanding of a model for evaluating the quality of their own thinking. Furthermore, the CTT seminar and the intellectual standards that guided it helped me redefine and model, perhaps revolutionize, education within the operations intelligence discipline. The use of intellectual standards-

guided Formative Assessments helped me capture each student's individual logic and guide their logic toward making meaningful connections, even within a subject that most intelligence analysts are apathetic towards.

Beyond increased metacognition, I also discovered that analysts in the CTT are motivated by a number of variables that may help me develop Formative Assessments. Intelligence analysts are often visibly and intrinsically motivated, and during the CTT, they expressed a motivation to do well on the *vis-recce* test. For example, "Joe" said, *"I wish you had been my college professor and intel school instructor*." He was visibly excited by the opportunity to participate in a Formative Assessment that put him in charge of his own learning.

There are a host of other reasons intelligence analysts could be motivated to develop Formative Assessments. For example, intelligence analysts may be motivated by the prospects of earning recognition or performance stratifications that have a direct impact on their future career opportunities and promotion. Some may simply be motivated by the opportunity to be a part of something new and imaginative—something focused on a meaningful purpose or problem to solve. Possibilities for potential student motivations are endless, but motivation for any purpose could create an excitement for improving *vis-recce* Formative Assessments.

The CTT Seminar provides intelligence analysts a forum that relates directly to the root of action research—the intent to solve some problem of practice. CTT sets a baseline for well-reasoned thinking, and its success requires participation and free-flowing dialogue that produces potential solutions for problems of practice, much like the Formative Assessment did for the student-participants. Instead of providing a personally-

developed Formative Assessment to the intelligence analysts, I could have asked the student-participants to develop their own learning method for *vis-recce*. In fact, at the end of the study, I asked the students how they thought they would best learn "*vis-recce*," and "Sally" said, *"I would like to see the weapon system in person."* After some discussion, the student-participants discovered several options for creating such a learning opportunity through studying and naming components from accurate aircraft models and through site and museum visits where the actual systems are on display.

Despite the analysts' initial uncertainty and apathy towards *vis-recce* and critical thinking training, the CTT Seminar proved to be a welcome surprise for student-participants. The CTT Seminar led to a Formative Assessment that provided student-participants (i.e., the analysts) an opportunity to apply the critical thinking lessons as they prepared for the *vis-recce* test. The intent of the Formative Assessment was for student-participants to make cognitive connections with a weapon system and to evaluate, with intellectual standards, their own written and oral summaries of resources that supported their learning as they worked toward the final *vis-recce* test.

Student-participants consistently remarked on their views of the strength of the Formative Assessments. "Sally" said, *"I know this method has helped me place my knowledge of the Hind in a part of my brain that I will always be able to access."* "Joe" said, *"I feel like I made a personal connection to the Mirage 2000 that I can't forget because the pilot's story I read was so exciting and descriptive."* As they evaluated their work, they seemed excited by the quality of their writing, and they seemed to have made lasting connections that could have an impact far outside the classroom. "Joe" remarked, *"I feel like I have learned a life lesson during this course."*

Developing an Action Plan for the USAF Operations Intelligence Unit

Paul and Elder (2007) posit that thinkers should continually evaluate their thinking to build critical thinking skills. Drawing from this fundamental view of critical thinking, the primary question that guided this research focused specifically on Formative Assessments within a CTT Seminar that could increase intelligence analysts' performance on the final *vis-recce* test that evaluated their *vis-recce* knowledge. The Formative Assessments built into the CTT Seminar provide student-participants an opportunity to think about *vis-recce* from a problem-based critical thinking perspective.

The intent of this Action Plan is to continue to create CTT Seminars that build Formative Assessment lessons for intelligence analysts in the USAF. The CTT offers opportunities to reframe the analysts' ideas of *vis-recce* training and provides them with an opportunity to evaluate their own thinking in context of a new critical thinking framework. Moreover, the Formative Assessments provide an opportunity for analysts to think about their own learning, and they provide an opportunity for feedback and thought modeling between the participant-researcher and the student-participants.

Challenges in the action plan. Operations intelligence duties are directly affected by mission requirements. Sometimes those missions allow time for deep thinking, and sometimes they do not. Paul and Elder (2007) posited that people become more efficient thinkers after regular application and continued study. During an informal feedback session, I likened critical thinking to compounding interest, stating the more we invest in our thinking the more efficient and powerful our intellectual purchasing power becomes. Following this idea, I support the regular application and systematic evaluation

of critical thinking when mission timelines do permit, with the hypothesis that those skills will become second-nature with experience.

The student-participants seemed to enjoy being a part of something that was new and purposeful, an inquiry that was aimed at improving their own professional skills and intelligence training curricula. Even after discovering an element of apathy towards *vis-recce*, the participants seemed hopeful that the nature of this unfamiliar research process would produce favorable results. The three student-participants were excited during all phases of the study, so much so that they excited me to teach, despite being somewhat demotivated by my own anticipation that students could demonstrate some apathy towards "*vis-recce*." These observations highlighted the willingness that people have to create change when they are empowered by a process such as action research.

Action plan ideas. Following Paul and Elder (2007), I plan to provide a definition and model of thinking and reasoning (through CTT Seminars) to the operations intelligence community that I serve. The intelligence analysts reference thorough checklists for the products they provide (e.g., intelligence mission briefings and aircrew debriefings). I will also expand on the checklists to guide analysts' development of intellectual support for each product they produce. I will guide the information gathering and presentation from a critical thinking perspective.

Conclusion and Action Plan

Mertler (2014) wrote, "Constant reflection results in the acquisition of new knowledge as it pertains to the teaching and learning process" (p. 23), and he cited Parsons and Brown's studies that have shown how action research has had a direct impact on teachers' professional practice and on their ability to solve problems (Mertler, 2014, p.

24). This idea of understanding and solving problems is central to the critical thinking methods that guided the present study. This action research study created many learning opportunities and experiences, and it created an opportunity for invaluable systematic inquiry into a problem that was affecting my personal practice. It also presented significant challenges along various stages of the research, and it highlighted obstacles that reached across my personal application of the research to the action research methodology, itself. Previous sections of Chapter 5 have summarized the study and the nature of the action research methodology as it was conducted. This conclusion summarizes the action plan and suggestions for future research that resulted from the present study.

The Action Plan

Two themes were discovered and evaluated during the present action research study:

1. Attitudes of Intelligence Analysts Towards *Vis-Recce*
2. Attitudes of Intelligence Analysts Towards CTT and Formative Assessments

The positive impact of differentiated Formative Assessments is my multicycle Action Plan focus. The intent of this action plan is to continue to deliver CTT Seminars that create Formative Assessment opportunities for intelligence analysts in the USAF, but it transitions to a quantitative measurement of the impact of continued CTT and Formative Assessments on intelligence analysts' performance on the *vis-recce* test.

Action plan: phase I. Although there were weaknesses with the sufficiency and relevance of the data collected during the present action research study, the results support further study and action. This action plan is presented as an adaptation of Mills' (2011) table (as cited in Mertler, 2014, p. 212).

Research finding. The present action research study found that a CTT Seminar that was supported by intellectual standards-based Formative Assessments resulted in increased intelligence analyst motivation to learn, evidence of potential for increased performance on the *vis-recce* test, and signs of intellectual growth.

Recommended action. After training future researchers, I recommend conducting several quantitative iterations of the action research cycle that directly evaluate the impact of a CTT Seminar and Formative Assessments on the USAF's Microsoft PowerPoint-based *vis-recce* test. I recommend conducting several iterations of the action research cycle to capture sufficient data from the mission qualified and available non-mission qualified intelligence analyst population. This level of sufficiency should be determined by the researcher.

Who is responsible? Intelligence instructors who are trained in the critical thinking methods used during the CTT Seminar at the study site should be responsible for conducting future action research cycles.

Who needs to be consulted? The study site's new intelligence and unit leadership should be consulted prior to implementing the action plan.

Who will collect data? Since intelligence instructors are required by Air Force Instructions to collect data for trend analysis, they should be required to collect the quantitative data.

Timeline. The action plan should be conducted over 12 months to inform the study site's intelligence training section with actionable results.

Resources needed. All necessary resources are in place for a quantitative action plan: the participant-researcher-developed CTT Seminar, the unit's *vis-recce* curriculum,

instructor-participants, and student-participants. Intelligence instructors would need to be trained on the CTT and Formative Assessment methods used during the previous action research.

Action plan: phase II. Although it is my personal preference to retain intellectual standards because of the empirical studies that support them and the life-long impact I believe them to have, researchers may want to disaggregate the variables of the quantitative research question after sufficient data has been gathered to support the first phase of the action plan. The purpose for this phase would be to gain a more precise understanding of the variables that affect intelligence analysts' performance on the *vis-recce* test.

Share the results. Although the data collected from the present study and future action plan are specific to the research site, it is important to share the results with other units across the USAF's Air Mobility Command and with the Command Headquarters itself. The Command has been excited to evaluate the results of the study. The Command is also in the position to share the results with other units and to shape the way professional inquiry is done across the USAF intelligence community. Sharing the results of the present study may provide the opportunity to fill a void in USAF *vis-recce* training literature and open a forum to share the suggestions for future research that have arisen from the present study.

Action plan's impact. I espouse the theory that the Formative Assessment methods used for this study will aid intelligence analysts' ability to commit knowledge to long-term memory and to develop life-long critical thinking benefits. Wing intelligence units are in the position to follow trends in student performance for at least three years,

providing several opportunities to evaluate the long-term memory and metacognitive abilities of the students who are trained in the methods used in the present study.

Suggestions for Future Research

Introducing critical thinking and intellectual standards-based Formative Assessments into a unit-level intelligence curriculum opens a world of possibilities for a discipline that is seldom researched. This section provides a few of the many potential research possibilities that have arisen from the present study. These suggestions are based on success of the CTT Seminar and Formative Assessments that were the foci of the present study.

Critical thinking across the intelligence curricula. I have been a supporter of integrating critical thinking into intelligence curricula since 2006, especially the methods developed by Paul and Elder, and my passion for those methods have only been reinforced through the present action research study. Paul and Elder presented in multiple forums the importance of developing a substantive view of education within each professional discipline. Through my experience in the intelligence field, I have come to know that there is little consensus on what standards for reasoning an intelligence analyst should be trained to.

There are plenty of examples of tasks to be performed, but even the duty tasks do little to reinforce the thinking that goes into them. Through the present action research study, I learned that there was an apathy towards *vis-recce* and CTT, largely because of a lack of institutional understanding or tangible priority for either. Numerous educational theories and methodologies, however, seemed to converge on the problem of practice, leading me to develop a CTT Seminar that would provide intelligence analysts with an

intellectual baseline and Formative Assessments that would help them move beyond the basics of educational theories, such as constructivism, to creating self-directed metacognitive processes that would guide and help them evaluate their construction of knowledge.

I suggest intelligence trainers consider how they teach analysts to think within the discipline so the analysts are led down an intellectual path where they may develop the traits of a critical thinker. I do not believe a lesson in critical thinking should have a definitive start and stopping point within the curricula. I believe it should transcend the elements of the discipline, and I also believe the present study, using a CTT Seminar and Formative Assessment opportunities as a baseline, supports that idea.

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APPENDIX A

FIELD NOTE GUIDE

Field Note Template

Observation # **Date:** **Time period:** **Student code:**	**Observations** **(Actual Observation)**	**Observer's Comments** **(Preliminary Interpretations)**
All students will be identified by codes to preserve anonymity.		

APPENDIX B

SEMI-STRUCTURED INTERVIEW GUIDE

Semi-structured Interview Guide (For Students)

1. Can you explain the purpose(s) intelligence analysts are trained and evaluated on visual recognition skills?
    a. *Have you personally experienced these realities?*
    b. *Do you think these skills are still valid today?*
2. Do you believe there is utility in the process of weapon systems identification for intelligence analysts? (Explain)
    a. *Does weapon systems visual recognition help you think more deeply about the impact the weapon systems have on USAF operations?*
3. Do you enjoy weapon systems visual recognition?
    a. *Why or why not?*
4. Is there one category of weapon system you prefer to identify over the others (i.e., air, naval, or ground weapon systems)
    a. *If you do, is there a reason for your special interest or some personal experience with that specific category of weapon system?*
5. What types of training have you received on weapon systems visual recognition (e.g., formal intelligence training, unit mission qualification training, and unit internal training)?
    a. *Did any of those training events require the use of techniques other than rote memorization?*

b. *Do you feel like you gained critical thinking or analytical skills, long-term knowledge, or any important techniques during your previous visual recognition training events that justify a need for the methods used? (Explain)*

6. Has your experience with weapon systems visual recognition been intellectually challenging and engaging? (Explain how or how not)
7. What do you feel are the most important elements of visual recognition training?
    a. *Do you think those elements receive appropriate focus in the training you have received?*
8. Can you provide an example of a technique, other than rote memorization, that you think would be useful for visual recognition students (e.g, building a system briefing, reflecting on stories related to the system, and creating a drawing of the system's main components)?
    a. *Would you enjoy having the academic liberty to select and use such other techniques during weapon systems visual recognition training?*
9. How, and how often, do you generally use your visual recognition skills in the performance of your home-station and deployed duties?
    a. *Is there any part of your duties where weapon systems visual recognition skills seem more relevant?*

APPENDIX C

INFORMAL INTERVIEW GUIDE

Informal Interview Template (Interviewer Notes)

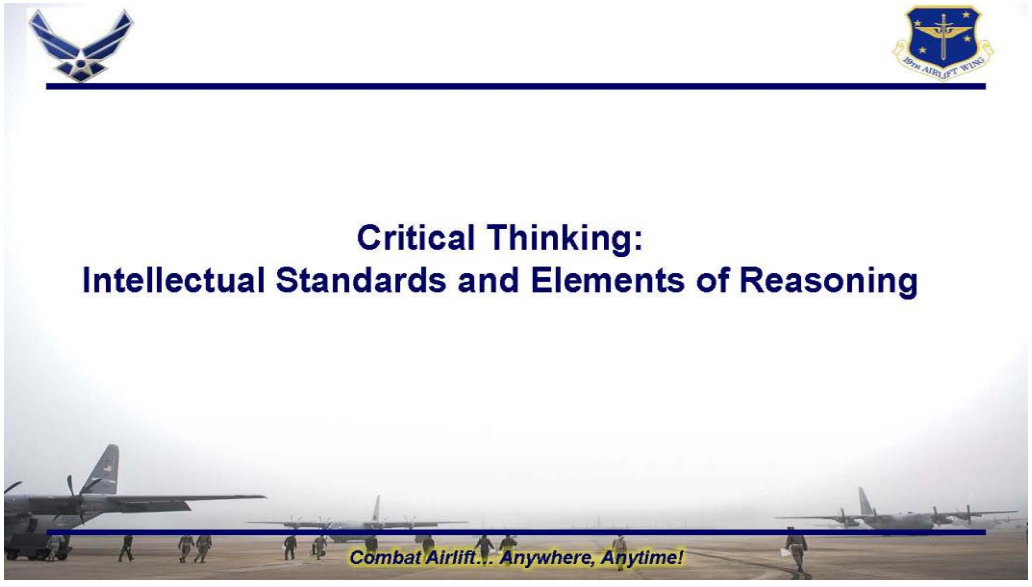
Interview # **Date:** **Time conducted:** **Data/Time validated:** **Student code:**	**Interview** **(Paraphrased Notes)**	**Interviewer's** **Comments** **(Preliminary** **Interpretations)**
All students will be identified by codes to preserve anonymity.		

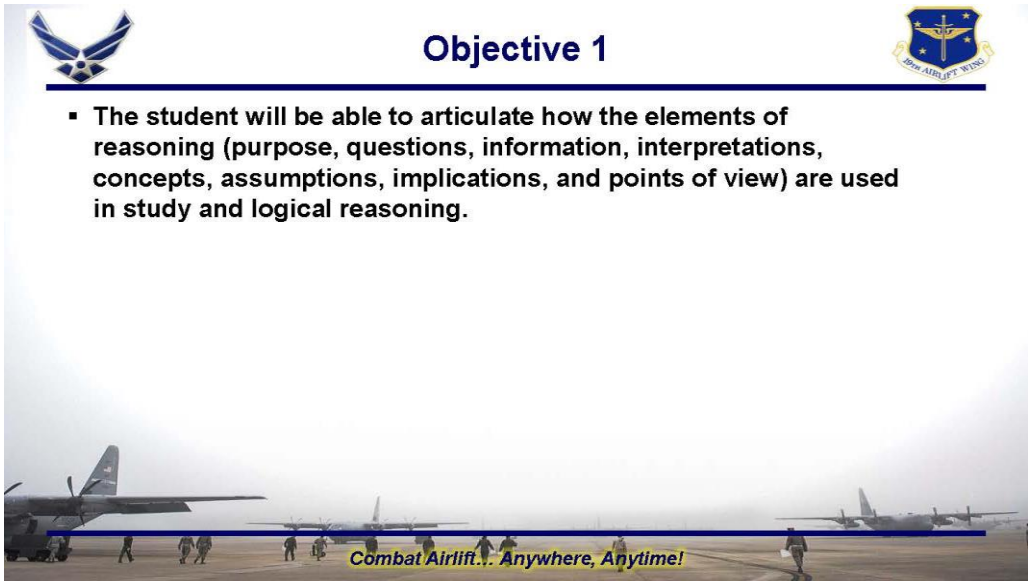
Informal Interview Template (Interviewee Review)

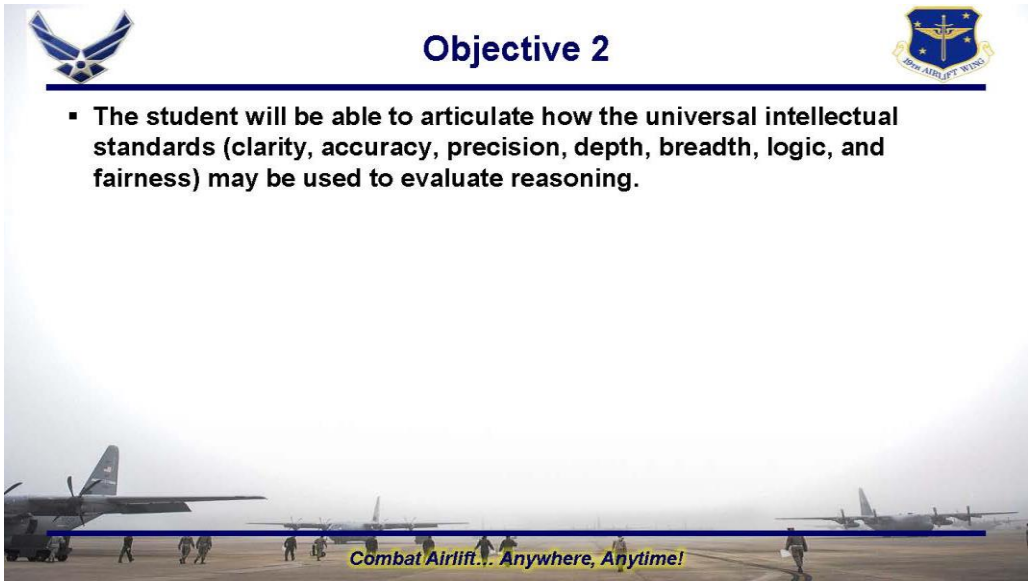
Interview # **Date:** **Time conducted:** **Data/Time validated:** **Student code:**	**Interview** **(Paraphrased Notes)**
All students will be identified by codes to preserve anonymity.	

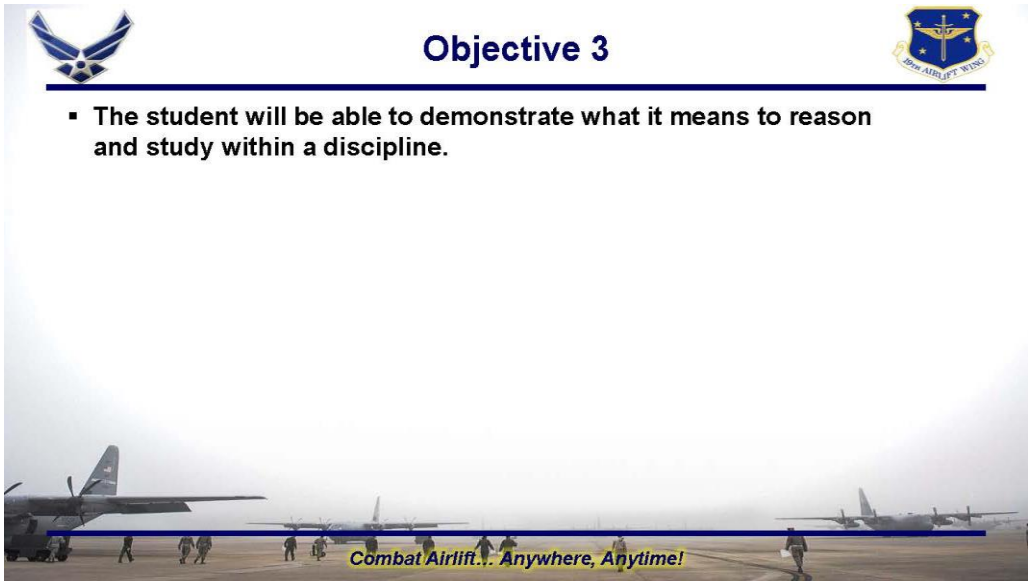
APPENDIX D

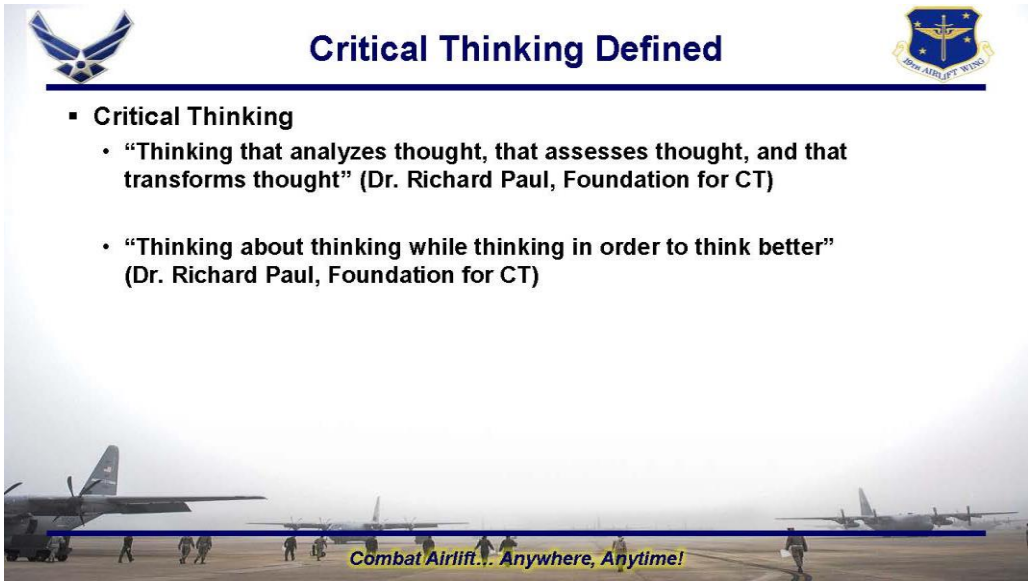
CRITICAL THINKING TRAINING (CTT)




Objective 1
The student will be able to articulate how the elements of reasoning (purpose, questions, information, interpretations, concepts, assumptions, implications, and points of view) are used in study and logical reasoning.
Combat Airlift... Anywhere, Anytime!


Objective 2
The student will be able to articulate how the universal intellectual standards (clarity, accuracy, precision, depth, breadth, logic, and fairness) may be used to evaluate reasoning.
Combat Airlift... Anywhere, Anytime!





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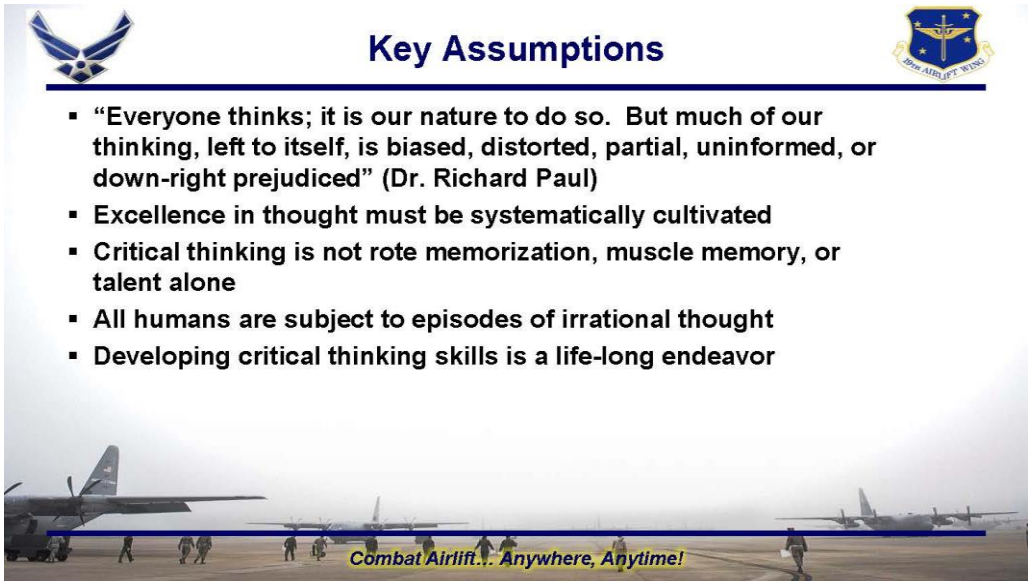

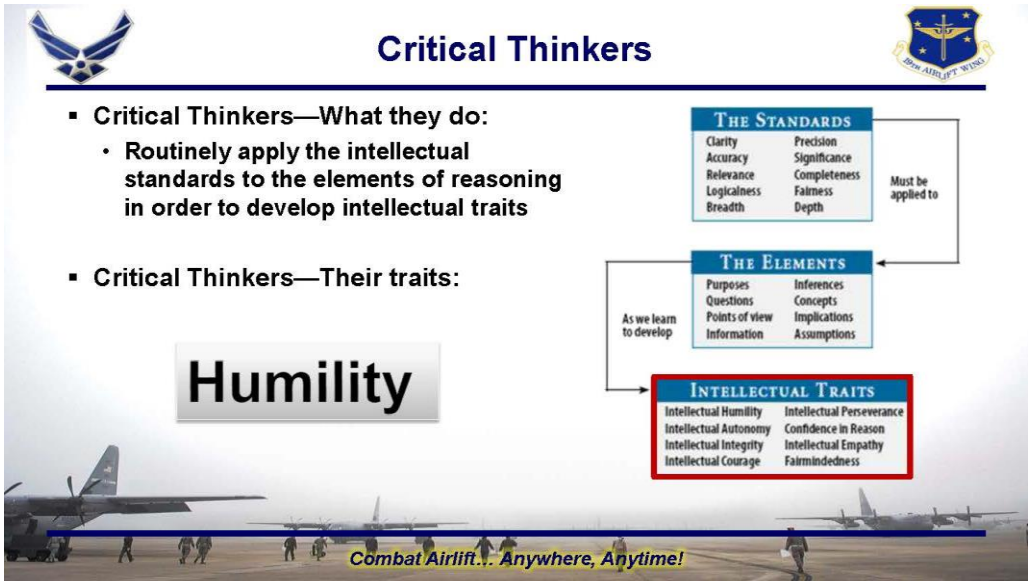

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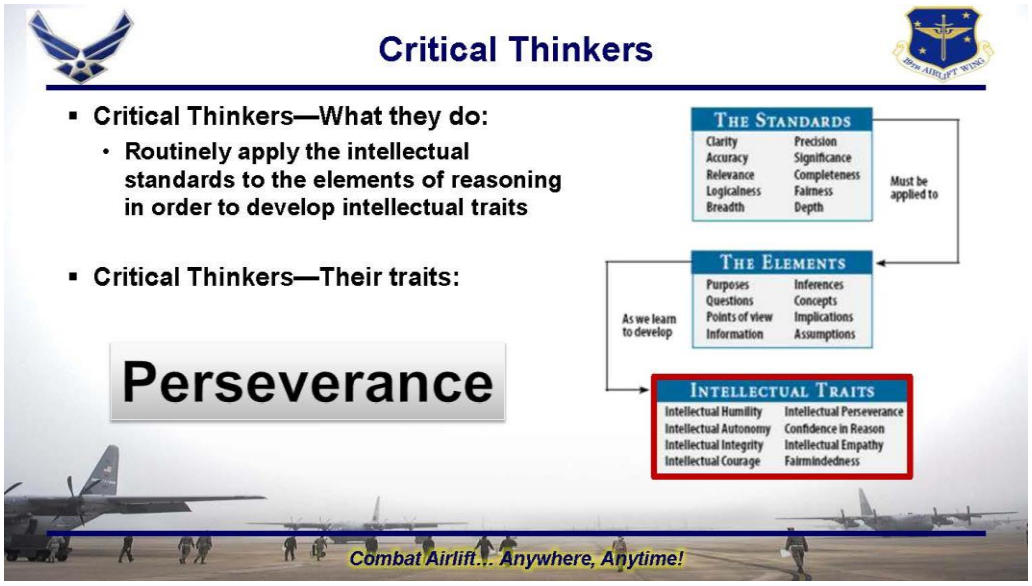

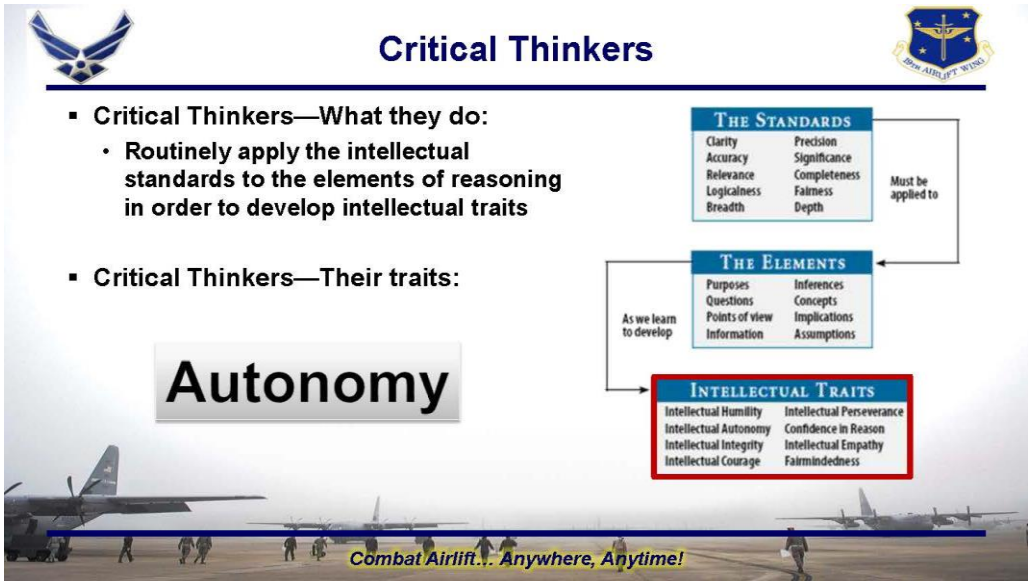

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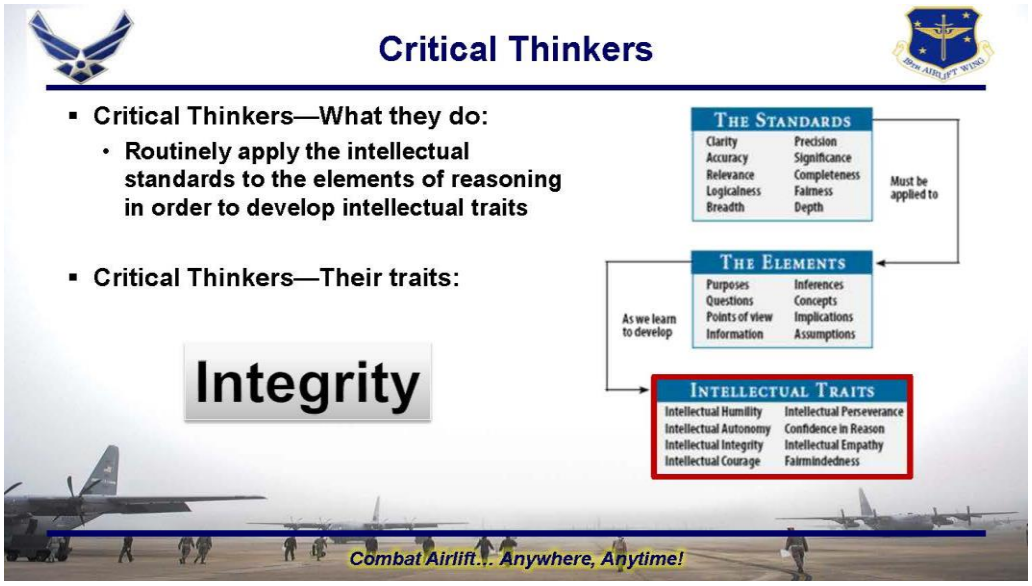

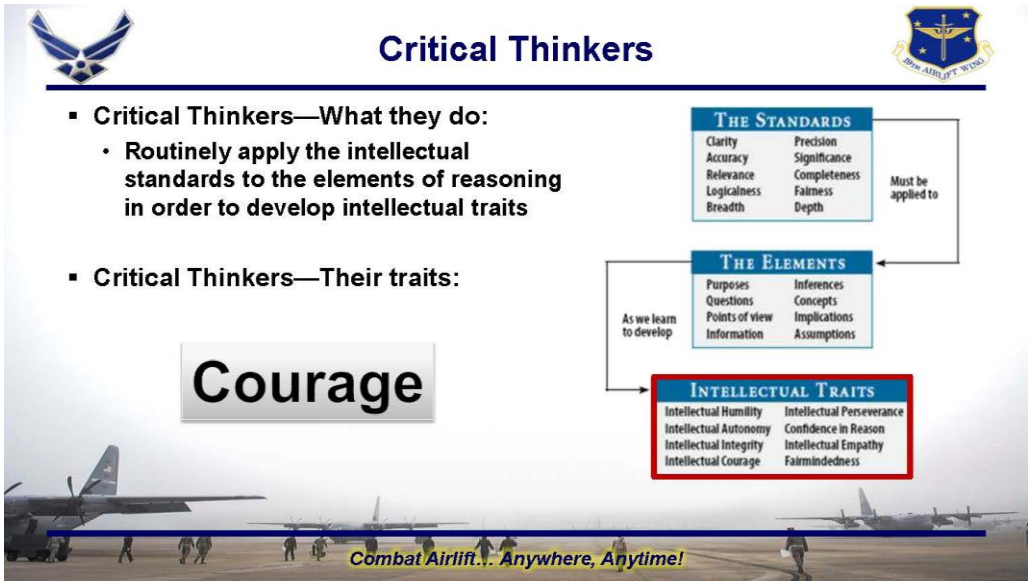

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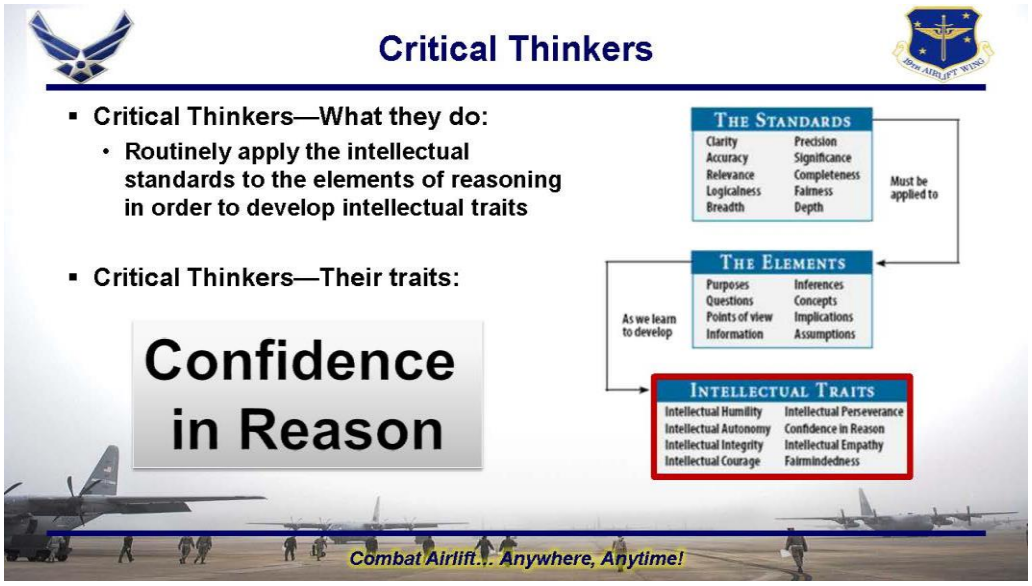

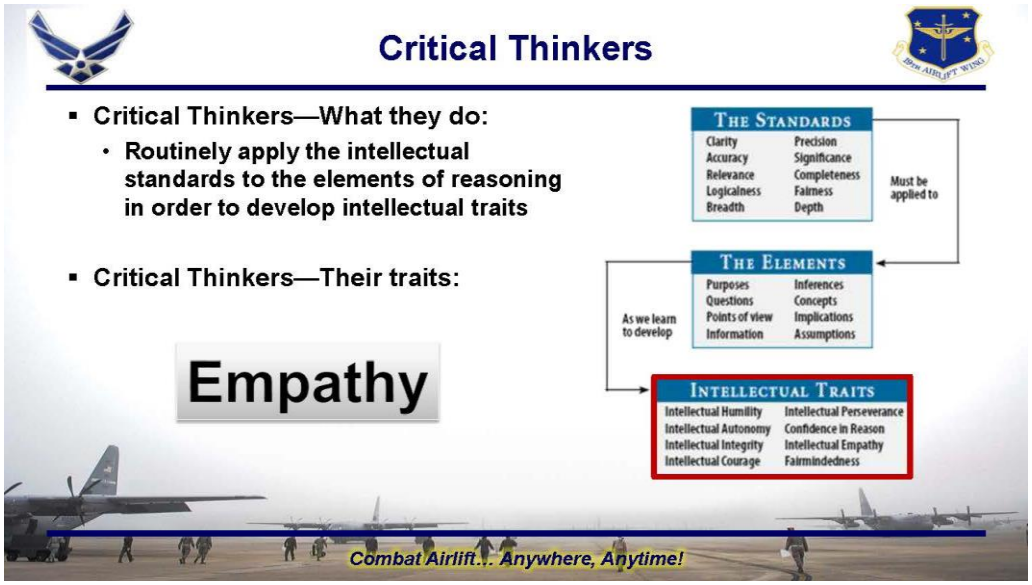

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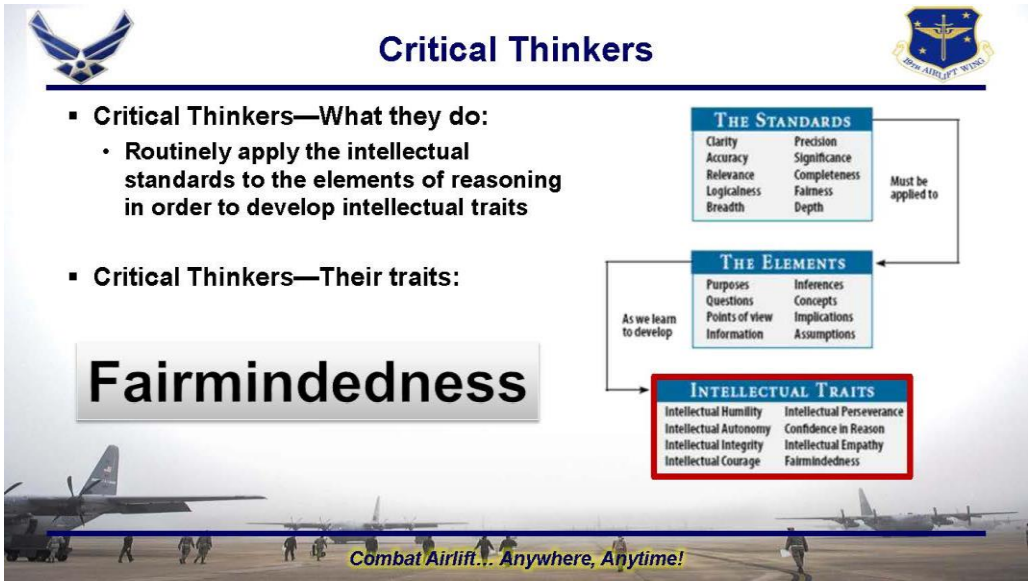

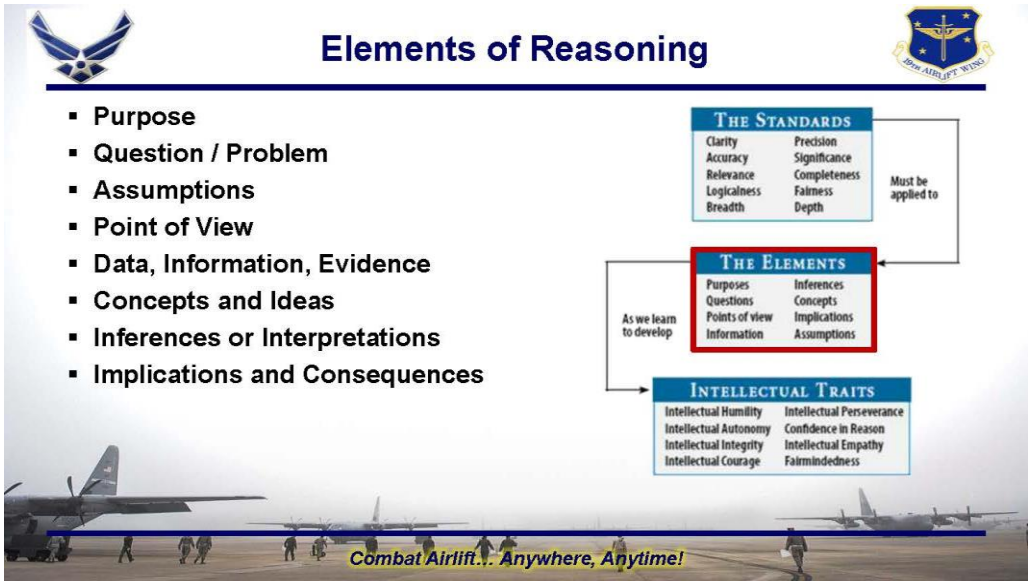

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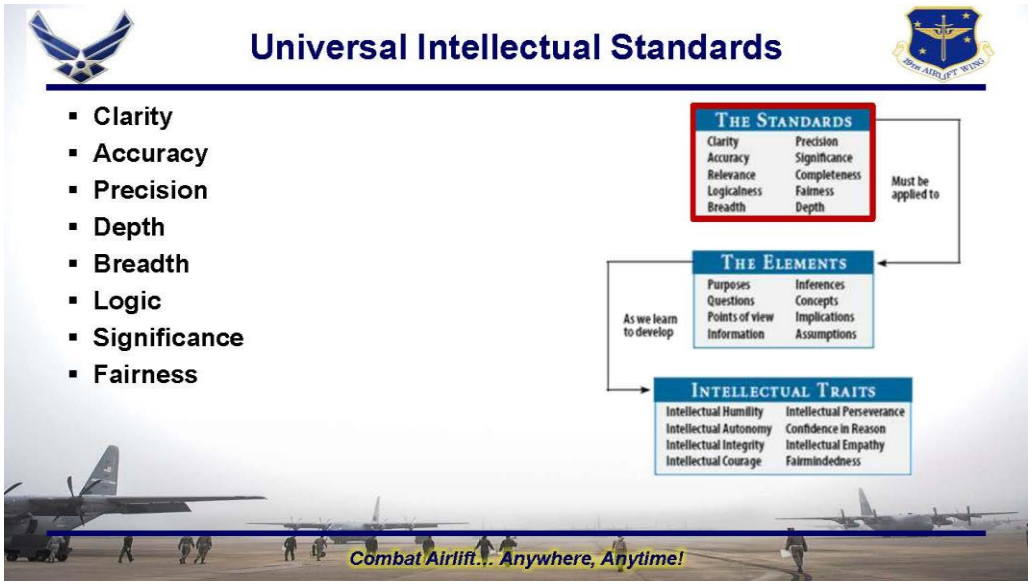

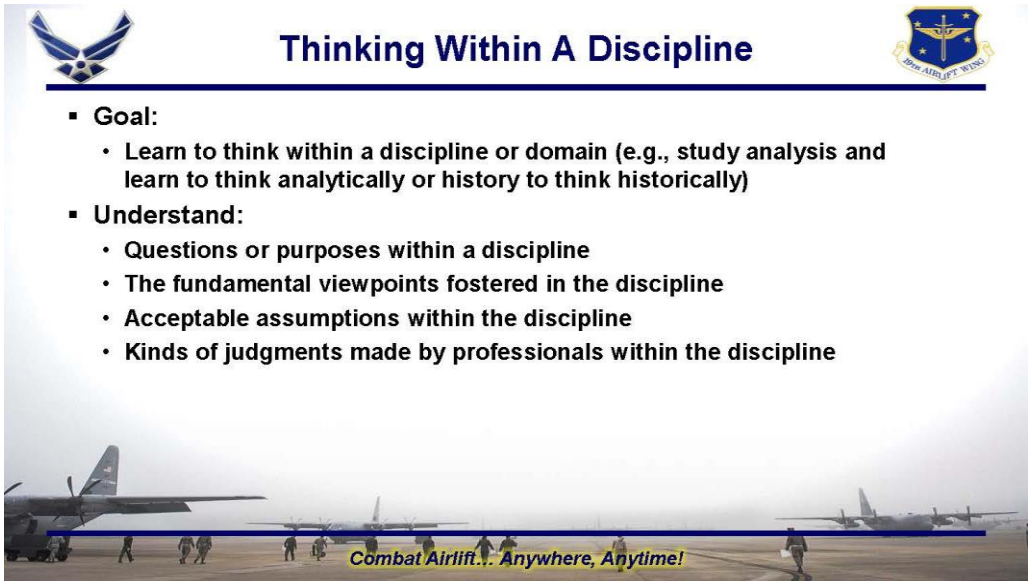

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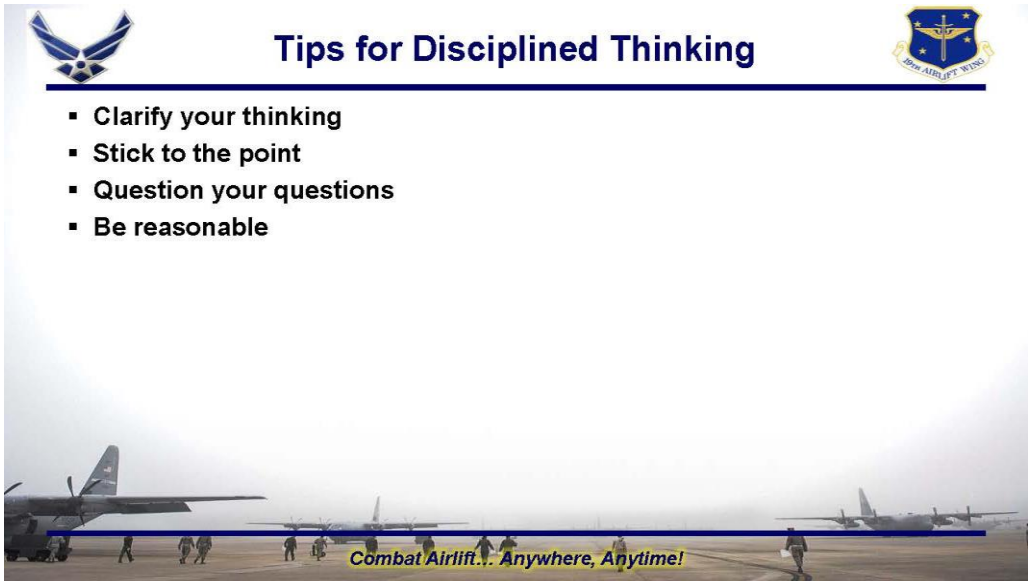

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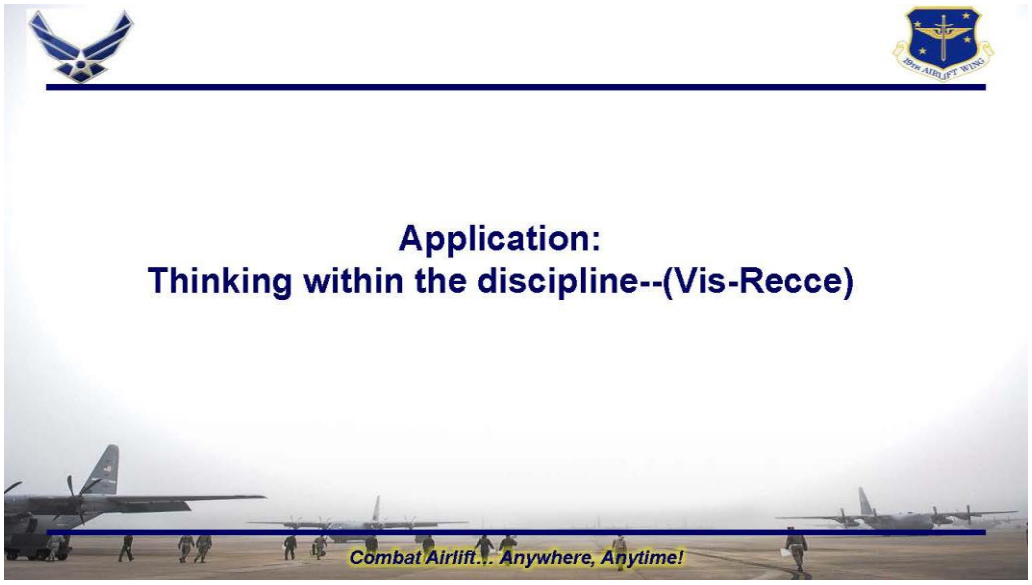

Observed Task

- From an intelligence analyst's point of view and as a group, students will brainstorm, discuss, and document purposes that analysts are required to develop and maintain weapon systems visual recognition skills.
- As a group, students will discuss and document potential sources of information and study techniques that may be used to build their weapon systems knowledge.

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Vis-Recce Relevance

- Knowing what aircraft go with what types of weapons, tactics, capabilities will enable the analyst to confidently inform operators (or Sr. leaders) of the most likely and worst case adversaries they will encounter in a given AO.
  - Either through timely imagery or intelligence reports, the analyst will be able to identify aircraft and associate countries of origin, weapon systems, EW capabilities, and discern whether it is a true threat to air operations.

EXAMPLE FROM CURRENT MQT CURRICULUM—SOME VALIDITY, BUT THE LOGIC IS FLAWED

Combat Airlift... Anywhere, Anytime!

Task Results Presentation, Discussion, and Feedback

Resources

- Foundation for Critical Thinking: http://www.criticalthinking.org/
- Aircav: http://www.aircav.com/recog/recogtoc.html
- Master Gunner: http://www.mastergunner.net/afvid/index.php


Questions
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