ABSTRACT

A PROGRAM EVALUATION OF THE ADVANCED HELICOPTER
MULTI-SERVICE PILOT TRAINING SYSTEM:
RECOMMENDATIONS FOR THE COMMANDING OFFICER

By Zachary B.J. Templin

Advanced Flight Training is the placement of Student Naval Aviators into the Advanced
Helicopter Multi-Service Pilot Training System (MPTS) to become Naval Aviators of rotary-
wing aircraft. The curriculum is comprised of ground, simulator and flight events, totaling 104
events. The mission of Helicopter Training Squadron Eighteen is to complete every flight student
in accordance with the MPTS curriculum successfully within 28 calendar weeks.

A program evaluation of the MPTS was conducted for Helicopter Training Squadron
Eighteen to identify areas of inefficiency within the MPTS, as it pertained to operations at HT-
18. Specifically, the objective was to determine what inefficiencies caused HT-18 to have
difficulty completing Student Naval Aviators in the MPTS curriculum within 28 weeks and to
identify corresponding process improvements.

On average, HT-18 required 33.5 weeks to train each flight student after controlling and
minimizing the difference between actual time to train and the MPTS requirement. Additional
training time resulted in first order effects of increased asset usage and maintenance costs.
Second order effects entailed increased student loading and instructor manning constraints. Most
importantly, Advanced Flight Training squadrons were not producing Naval Aviators on time to fleet forces, straining fleet squadrons’ readiness objectives for naval operations.

The program evaluation of the MPTS curriculum consisted of a combination approach in which descriptive research identified student completion times as analyzed through central tendency determinations, as well as percentages of canceled events from Ad Hoc reports. Students and instructors were then surveyed to identify and corroborate areas of inefficiency. The MPTS curriculum, as executed by HT-18, was found to harbor inefficiencies and on average produced Naval Aviators beyond the mandated 28 weeks requirement.

Based upon data analysis, several specific areas of inefficiency were determined. Weather cancelations for the local operating area of Milton, Florida contributed to the majority of the total flight event cancelations. Upon further analysis of each of the seven flight stages within the MPTS curriculum, both the Basic Instrument and Radio Instrument stages were identified as inefficient stages of training resulting in increased time, asset use, and cost.

From the survey data, both students and instructors similarly identified key inefficiencies within the MPTS. Physiological factors, manning, and the rate of student accessions were identified as contributors to inefficiency within HT-18. The results of this evaluation indicated that HT-18 implement specific actions to combat these areas of inefficiency to reduce the average training time. Recommendations included altering the current scheduling practices for Basic Instruments and Radio Instruments, as well as accounting for known weather phenomena. Lastly, it was recommended HT-18 implement optimization software for weather constraints to improve flight event priorities and event completion efficiency.
A PROGRAM EVALUATION OF THE ADVANCED HELICOPTER
MULTI-SERVICE PILOT TRAINING SYSTEM:
RECOMMENDATIONS FOR THE COMMANDING OFFICER

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Chapter 1: Problem Definition

Background

The United States Navy employs aircraft ranging from fixed-wing to rotary-wing aircraft around the world in hundreds of different mission-sets. To become an operator of the world’s most sophisticated and capable aircraft, Naval Aviators must successfully complete flight school. In order to be afforded the opportunity to start flight school, a candidate must undergo physical, mental and psychological screening. Once the candidate is approved, they are then screened for flight aptitude through several examinations testing spatial awareness, memory and decision-making skills. Once a candidate has undergone screening and is approved for flight school, the now Student Naval Aviator, must successfully complete four phases of flight school to include Aviation Pre-flight Induction, Primary Flight Training, Intermediate Flight Training and Advanced Flight Training. This research problem deals with the Advanced Flight Training phase of flight school.

Advanced Helicopter Flight Training is conducted at NAS Whiting Field in Milton, Florida. Student Naval Aviators matriculate from Primary Flight Training and are placed into one of three helicopter training squadrons: Helicopter Training Squadron Eight (HT-8), Helicopter Training Squadron Eighteen (HT-18) and Helicopter Training Squadron Twenty-eight (HT-28). All three squadrons are commanded by Training Air Wing Five, who is commanded by the Chief of Naval Air Training.

HT-8 was the first helicopter training squadron established on December 3rd, 1950 and was originally called Helicopter Training Unit One (“History of Helicopter Training Squadron
Eight”, n.d.). In 1962, the first helicopter Naval Aviator was designated (“History of Helicopter Training Squadron Eight”, n.d.). In October 1985, a portion of HT-8 branched off to form HT-18 and later, in 2007, one-third of each squadron branched off to form the third and final squadron HT-28 (“History of Helicopter Training Squadron Eight”, n.d.). The primary mission of each helicopter training squadron is to transition Student Aviators through basic and advanced rotary-wing pilot training for the United States Navy, Marine Corps and Coast Guard (“History of Helicopter Training Squadron Eight”, n.d.). Each helicopter training squadron also provides rotary-wing training and designation to selected members of various allied nations, refresher and transition training to fleet aviators, and indoctrination flights for midshipmen and flight surgeons (“History of Helicopter Training Squadron Eight”, n.d.).

Within the Advanced Flight Training phase of flight school, Student Naval Aviators are placed into the Advanced Helicopter Multi-Service Pilot Training System (MPTS), which is a curriculum where students undergo undergraduate helicopter training (Naval Air Training, CNATRAINST1542.156D). The curriculum is comprised of ground, simulator and flight events resulting in a total of 104 events (Naval Air Training, CNATRAINST1542.156D). For ground events, students are required to have completed courseware and classroom instruction with several classes culminating in formal exams. For simulator and aircraft events, students are evaluated based on absolute maneuver grading metrics by instructor pilots.

If a student fails to score a 90% or above on examinations or does not perform at or above the level prescribed in the minimum absolute maneuver grading minimums for the simulator or flight event, the student is given an unsatisfactory grade and must repeat the event.
The student’s grades from each event are then totaled at the end of the curriculum and a Naval Service Score is computed (NSS) (Naval Air Training, CNATRAINST1542.156D). If the NSS for the student is below the allowable threshold, the student is then recommended for an evaluation which could ultimately result in attrition. If the student’s NSS is above the allowable threshold, the student has satisfactorily completed the curriculum and will graduate and be designated a Naval Aviator. Shortly after graduation, the Naval Aviator will proceed to the Fleet Replacement Squadron for their respective service and aircraft. The mission for each helicopter training squadron is to complete every flight student in accordance with the curriculum, successfully, within 126.1 days or 28 calendar weeks (Naval Air Training, CNATRAINST1542.156D).

Throughout the curriculum, there are a multitude of inefficiencies that delay completion beyond the mandated 28 weeks to include: weather, mid-program attrition, scheduling, maintenance and other human factors for both instructor pilots and students alike. For squadrons with students who regularly complete the MPTS outside 28 weeks, additional inefficiencies arise, resulting in a marked decrease in production rates ultimately reducing the readiness of operational fleet forces within the United States Navy. The overall objective of each helicopter training squadron is to produce Naval Aviators within the 28 weeks to operational fleet forces.

Research Problem

Due to the importance of providing well-trained Naval Aviators to operational fleet forces on time, the inefficiencies within the MPTS must be identified and improved upon thus increasing program efficiency and decreasing the time required for students to complete the
curriculum. This research study examined the following problem: “What inefficiencies cause Helicopter Training Squadron Eighteen to have difficulties completing a Student Naval Aviator in the MPTS curriculum within 28 weeks and what actions can be taken to correct the inefficiencies to improve the time in which students complete the curriculum.”

In order to answer the primary research question, the following series of sub-questions have been investigated:

1. To what extent are scheduling inefficiencies contributing to increasing the time required for students to complete the curriculum?
2. To what extent do aircraft availability or maintenance issues impact the time required for students to complete the curriculum?
3. To what extent do curriculum constraints or inefficiencies contribute to the time required for students to complete the curriculum?
4. To what extent do human factors decrease efficiency within the curriculum to include personal issues of both students and instructor pilots? Are there manning issues that contribute to additional inefficiencies?
5. What actions can the training squadrons take to improve the curriculum completion time?

The aforementioned questions constituted the framework for the primary research question and helped identify the inefficiencies within the MPTS. Due to the high student turnover rate associated with Advanced Flight Training, even small improvements leading to more efficient operations within each squadron ultimately result in large gains to fleet operational forces.
Research Audience and Rationale

The objective of this research has been to identify inefficiencies as they pertain to the MPTS to include scheduling, aircraft availability, maintenance and manning issues. This research study has identified inefficiencies within the squadron and has determined the extent to which these inefficiencies impact the time required for a student to complete the curriculum. Lastly, recommendations have been provided to improve efficiency within the program. The findings from this study are instrumental in improving overall efficiency but also enable each training squadron to produce designated Naval Aviators to operational fleet squadrons within the prescribed amount of training time, directly improving the ability of fleet squadrons to meet their own objectives and accomplish their respective missions.

Therefore, at the local organizational level or squadron level, corrections can be made to improve efficiency. The first and most direct user of this information is the operational departments within each helicopter training squadron. The operations department runs the scheduling, assigns assets and indirectly deals with manning issues on a day-to-day basis. The secondary audience for this information is the commanding officer and executive officer of each respective training squadron. The commanding officer is responsible for meeting the mission objective and the research findings directly impact the squadrons’ ability to meet mission. The tertiary audience is the operational department of Training Air Wing Five. The operational department for the wing is aware of the increasing rate at which students complete the curriculum outside the 28 weeks and were interested in the findings of inefficiencies as well as the recommendations to improve the curriculum.
The research findings from this report identify critical inefficiencies experienced in HT-18 within Training Air Wing Five and additionally provide recommendations to improve inefficiencies ultimately resulting in a higher student completion rate within the mandated 28 weeks. The secondary benefit to the research findings are more efficient asset usage, directly translating to improved financial savings as well as a reduction in asset fatigue.

Lastly, the research findings identify key inefficiencies that originate from the MPTS. In the near future, the Chief of Naval Air Forces will approve a new helicopter model to be utilized for Advanced Flight Training. Squadrons will be tasked to originate and implement a new MPTS to fully accommodate this new helicopter model. From the findings identified from this research, the squadrons are able to better anticipate potential areas of inefficiencies with the new MPTS before production rates decrease, thus rendering the squadrons positioned for continued efficiency directly contributing to each squadron’s ability to meet mission.

**Research Study Scope/Delimitations**

For the purposes of this research, only the Advanced Helicopter MPTS Curriculum has been analyzed to include only the Navy, Marine Corps and Coast Guard students from HT-18 helicopter training squadron from the past year. Allied Forces students, as well as flight doctors and tilt-rotor students, were outside the scope of this research study. For the purposes of data collection, the research study has evaluated data from the time in which the student matriculates to the helicopter squadron to the day the student is designated a Naval Aviator, referred to as time to train (TTT) (Naval Air Training, CNATRAINST1542.156D).
This research study only evaluated the confines of the MPTS in terms of specific constraints on events, prerequisites and scheduling within HT-18’s local organization; additionally, changing the curriculum by taking out events or changing elements of events like duration of events, are outside the scope of research. In terms of asset usage and maintenance practices, specific aircraft fatigue issues, phase inspections etc. are also outside the scope of study. Manning and personnel factors outside of the squadron-level has not been analyzed or discussed in detail within the study. Needs or deficits outside of the squadron level for instructor pilots has not been evaluated.
Chapter 2: Review of the Related Literature

Introduction to the Literature

Flight training is an extremely dynamic process that comprises a myriad of variables that must be effectively understood and managed in order to conduct efficient training. Currently, there are a number of different approaches to flight training to meet certification standards and/or training objectives in both the civilian and military aviation industries. Each approach centers primarily on identifying variables and constraints of the curriculum and instituting control measures to insure both quality and efficiency in training. The variables that impact training efficiency range from weather and human factors to maintenance and scheduling practices. Due to the nature of flight training, the variables are in constant flux, training programs must be able to identify which variable is changing and quickly adapt by optimizing the squadron’s assets to accommodate the change. The literature concerning program efficiency, in regard to flight training, ranges from scheduling methods to software applications and continues to be developed by further technological innovation and research.

Presentation of the Literature

Elements of an Ideal Flight Student. Much of the literature concerning flight training attempts to identify skills and aptitudes that directly translate to improved performance in the cockpit. Candidates who possess these characteristics tend to progress through flight training with higher performance evaluations. Currently, the general consensus within the community is that there are differences in skillsets and aptitudes required of pilots depending on the type of aircraft
flown and missions the aircraft will perform. To that end, it is widely agreed upon that no one training curriculum meets all training objectives for both military and civilian flight programs.

There is a marked difference in training requirements between fixed-wing and rotary-wing aircraft, rotary-wing missions in general are more varied, and in many respects, are more hazardous than their fixed-wing counterparts (Larsen, Randle & Popish, 1995). Identifying a trainee’s ability to perform well within a training program based on prerequisite skills and aptitudes become a point of efficiency, if the training programs are able to identify an “ideal candidate” then they are able to reduce the amount of wasted cost required in removing individuals from the curriculum who do not possess the prerequisite characteristics. The pilots of rotary-wing aircraft are a diverse lot whose skills vary over a much broader range then those of their fixed-wing brethren (Larsen, Randle & Popish, 1995).

Of the prerequisite characteristics a flight student should possess, cognitive and psychomotor aptitudes were identified as highly valued within current literature. Cognitive and perceptual psychomotor tests were conducted in which scores from these tests were then correlated to performance of the candidates with grades achieved in the flight curriculum (Griffin, 1995). Understanding the relationship between cognitive ability and performance could potentially lead to placing a flight candidate into a program that matches their aptitudes with required skillsets for a particular airframe. Thus placing a candidate in a training environment in which they will excel, improves the student’s efficiency within the respective curriculum. Higher-order cognitive skills, a result of “deep comprehension” are achieved when individuals are able to effectively overcome
contradictions, anomalous events, obstacles, constraints or experiences that fail to match expectations (Vogel-Walcott, Carper, Bowers & Nicholson, 2010).

The student, as a variable of the flight training program, must also have the propensity to keep pace with the rigors of flight school thus improving efficiency by successfully completing events on the first attempt. Unsatisfactory events result in not only wasted assets but also additional time to train because they will have to repeat the event in order to pass. Additionally, safety, while not a direct contributor of efficiency, is an indirect variable which leaves squadrons positioned for continued operation. If an aircraft were to be damaged due to pilot error, the asset would be rendered unusable resulting in a reduction in the amount of aircraft available to be utilized for training events. Learners who cannot translate information into performance pose a potentially catastrophic risk to both the learner and his or her fellow troops (Larsen, Randle & Popish, 1995). The cost of a mistake or mechanical failure can be catastrophic however, the impact of such a result can further impact the squadron in its entirety to include downing all aircraft, instructor pilots and students, ultimately halting production.

**Physiological Considerations.** Other factors that indirectly influence MPTS efficiency is the student/instructor’s physiological factors relating to performance namely nutrition, regular exercise and sleep hygiene. The Navy has determined that these factors are of such importance that they have created a specific sector of medicine known as Naval Aerospace Medicine, whose sole function within the aviation community is to deal specifically with the relationship of physiological factors, flight and aviators. The science of Human Factors got its naval beginnings at the Naval Safety Center, and today consideration of human factors is an essential part of
aircraft and cockpit design, maintenance, flight briefings and mishap investigation (Dunn, 2015). In the aviation community, fatigue is defined as ‘a physiological state of reduced mental or physical performance capability resulting from sleep loss or extended wakefulness, circadian phase, or workload (mental and/or physical activity) that can impair a crew member’s alertness and ability to safely operate an aircraft or perform safety-related duties (Gander et al., 2014).

While fatigue is largely discussed when addressing safety issues or concerns, fatigue also plays a consequential role in performance. During the biological night, sleepiness and fatigue are higher and performance is slower, with increasing time awake, sleepiness and fatigue increase and response rates slow (Gander et al., 2014). These issues manifest themselves within the syllabus as students and instructors alike continue to work against their body’s circadian rhythm incurring sleep debt during the times in which they are scheduled for quick day into night flight and sim events. For example, when a student has previously been scheduled during the daytime between 0800 through 1500, their body adjusts to the scheduling, allowing for peak performance during this time. The following day, the very same student is scheduled for a night flight event where the event begins at 1800 and concludes approximately 2200. This event has caused a disruption in the student’s sleep cycle, resulting in fatigue during their event thus slowing down their reaction rate, critical thinking and decision-making skills, ultimately impacting their performance. A decrease in performance ultimately impacts MPTS efficiency as the student may fail an event, requiring additional repeat events to progress through the syllabus.

Similarly to sleep hygiene, nutrition and healthy lifestyles contribute to performance and readiness for both students and instructors. According to an Army research study which followed
Active Duty, Reserve and National Guard Soldiers ranging in age from 19 to 37, of the respondents surveyed, the following lifestyle observations placed them in the highest quartile for best overall health; meeting the US Dietary Guidelines, good sleepers, high frequency and physical activity (Purvis et al., 2013). Poor nutritional/dietary habits degrade mission readiness while contributing to other health disorders and affect all domains of performance (Purvis et al., 2013). In such a demanding curriculum, it is evident that for both students and instructors to perform, a holistic approach to health directly influences a variety of performance factors. From sleep hygiene to nutrition and physical activity, maintaining a healthy lifestyle allows for improved performance and responses. Additionally, correctly managing the aforementioned health considerations will leave flight crews positioned for continued performance by reducing illness, injury and the onset of chronic fatigue.

**Simulation Approach.** There are many training models that exist within aviation training programs. Simulation Based Training (SBT) is an extremely popular tool utilized within training programs to efficiently and effectively apply learned concepts into simulated situations. Additionally, these models are more easily practiced in simulators where cost of operation is substantially lower than in-aircraft events. Simulations provide an environment that replicates the real-world context where skills and knowledge will be employed (Vogel-Walcott, Carper, Bowers & Nicholson, 2010).

The simulated environment facilitates skills practice and allows trainees to integrate their sub-skills under more realistic conditions and allows learners to observe how their actions and decisions impact a simulated scenario, which helps focus their attention and facilitate a deeper
level of knowledge (Vogel-Walcott, Carper, Bowers & Nicholson, 2010). Simulators are widely utilized in aviation in both military and civilian training programs, they often supplement events in the aircraft and provide an opportunity to practice concepts not easily replicated in the actual aircraft. Additionally, current research indicates the effectiveness of simulator training clearly shows that the knowledge, skills and habits acquired during such training exert a direct influence on the pilot’s readiness to perform missions in the air (Kozuba and Bondaruk, 2014). Simulator fidelity is at the forefront of many pilot training programs and is pushing the envelope of technological innovation and development.

Due to the increased cost of fuel, environmental impacts and significant wear and tear on weapon systems, all these factors point to the greater use of simulation (Howard, 2014). With simulators, instructors can allow students to make mistakes so that lessons of competency and decision-making are learned, such lessons that may put an aircraft into an unsafe flight regime if it were to occur in the actual aircraft. Simulators also provide an efficient environment in which to practice flight concepts, normally aircraft must transit to an area, which allows them the maneuvering space to conduct training. Simulators can place the student in any prescribed scenario instantly so that more of the training time is utilized for actual training. Additionally, fleet aircraft become more complex and sophisticated, utilizing simulators allows for multiple layers of understanding. Fleet simulators will be able to not only be upgraded with software improvements but also be able to be linked with multiple simulators in real-time scenarios (Axe, 2006). Simulators undoubtedly contribute to efficiency, because of their low operation costs, a growing number of customers are using simulation to maintain operator proficiency and to rehearse mission profiles which complements its use as a training tool (Howard, 2014).
Despite the many advantages of utilizing simulators to supplement training in the aircraft, current research suggests, there are some elements to aviation training that cannot be replicated. One major limitation of simulators is that they cannot replicate physiological effects on the human body to include certain vestibular effects, nor can they replicate physiological exhaustion (Majumdar, 2012). Depending on the type of event, simulators may not adequately model responses of the aircraft. The exact duplication of all aircraft characteristics is unlikely to be achieved, regardless of the simulator’s computing power (Pavel et al., 2015). The capabilities of simulator visual and motion systems, in particular, are still limited when compared to reality (Pavel et al., 2015). Although simulator modeling of actual aircraft responses may not be as accurate for all realms of flight, its use as a tool, particularly in flight school, is undoubtedly necessary and serves as an essential low-cost learning aid and supplement to training in the aircraft.

**Standards and Metrics.** Another aspect of structuring efficient flight training programs is determining standards and metrics to evaluate student performance as well as identifying metrics of training that can be utilized for data analysis, indicating areas of training that are inefficiently operated. Much of the literature indicates quality of training continues to contend with training efficiency with all flight training programs. The use of common standards for defining competencies, assessing performance with metrics and enabling technologies to collect performance data, make it possible to evaluate warfighter performance across sites and across time, providing numerous important contributions to the training community (Schreiber, 2013). A more indirect (but not less powerful) benefit, using common standards in the assessment of performance enables comparative studies to inform the selection and development of advanced
technologies, thereby making the development of our warfighter man/machine systems and their training pipelines more efficient (Schreiber, 2013).

The climate of every squadron is largely premised on efficiency and budgets are becoming more constrained, every training event must be utilized efficiently. Overall, implementation of common standards for defining competencies, assessing performance with metrics, and enabling technologies to collect performance data, has proved successful and promising (Schreiber, 2013). Every flight and simulator event is thoroughly debriefed so that instructors and students capitalize on learning points experienced within the events. Preflight planning and briefing cannot be overly emphasized so that each training event is both quality instruction and efficiently executed. In the near future, standardized data collection at a number of training installations, including various mission training centers and full mission trainers will be utilized, in order to identify inefficiencies and therefore rectifying these known inefficiencies within the flight training curriculum (Schreiber, 2013). Flight training programs are quickly adapting to current constraints and are taking advantage of any method that brings new efficiency to their respective curriculum.

**Scheduling Constraints.** The scheduling process for every flight training program is a very difficult process in which all variables which contribute to flight training culminate. In the past, squadrons manually scheduled assets to include aircraft, students and instructor pilots based on curriculum flow. In addition to many of these variables, there are other variables outside of the squadron’s control that contribute to flight training efficiency namely weather, maintenance and personnel issues. For many squadrons, the scheduling department develops a flight schedule
in approximately 12 hours or more for the following day. On the maintenance side of flight operations, the ability to balance fleet health with accomplishing the flight schedule is the most demanding part of the maintenance leader’s job. The sorties and hours required to keep our pilots trained or execute a contingency, often stretch the ability to manage scheduled maintenance (Giles, 2009). In flight training programs, every decision or variable change comes at a cost. If the unit focuses solely on generating excessive numbers of sorties, the quality, safety and reliability of the aircraft will suffer (Giles, 2009). It is the balance of scheduled sorties versus maintenance and weather that every squadron has attempted to manually control.

However, technological improvements have been made and software has started to revolutionize squadrons’ scheduling processes. Many squadrons are currently running optimization software, which helps reduce the amount of time spent on writing the schedule as well as controlling efficiencies within the scheduling process itself. Some of the variables a scheduler must account for are: instructor pilot qualifications, event cycles, specific flight event constraints, the amount of transit time required in order to complete the event, available manning and student/instructor scheduling limitations. Optimization of flight training schedules is made possible by utilizing a mixed integer, linear, mathematical optimization model (Jacobs, 2014). Within the software models, priorities can be assigned so that when the system optimizes a schedule by changing one of the aforementioned variables, the software will re-optimize and provide a mathematically efficient flight schedule.

If a squadron were to amass the flight schedule by making manual inputs, as soon as a variable changes, the schedule would be rendered inefficient. When compared to the manual
method, when a variable changes, all of the dependent variables will change as a result of their relationships and therefore require more time to remedy the issue and then rewrite the schedule to accommodate the change (Giles, 2009). Software has undoubtedly changed the way squadrons have scheduled their assets, improving squadron efficiency. For example, the United States Naval Academy has switched to an automated flight scheduling system and solo rates improved by 28%, attrition decreased by 14% and the daily scheduling workload went from 12 hours down to just three hours (Barkley, 2016). This system has saved the United States Naval Academy over $600,000 in systems and personnel costs resulting in a reduction in a student’s time to train (Barkley, 2016).

**Summary of the Literature**

As evidenced by the vast array of research conducted pertaining to flight training programs, the perfect merger of safety, quality and efficiency cannot be overstated. A large portion of research has attempted to establish connections with ideal skills and aptitudes for flight students thus allowing flight training programs to filter out students who do not possess these attributes and place students who have a particular skillset into flight training. Additionally, students who possess certain skills could eventually be placed into an aircraft that is more conducive to their skillset, thus improving a student’s performance and ultimately improving training efficiency.

Equally as important as placing the correct personnel who possess the critical skillset to be successful in flight training, managing physiological performance by implementing elements of a healthy lifestyle is imperative. Nutrition, exercise and sleep schedule/hygiene directly
translate to an individual’s performance and must be afforded by smart scheduling and setting an appropriate climate of health within the command. Healthy lifestyles leave individuals positioned for continued performance and reduces cancelations and unsatisfactory performance.

Other variables are discussed in great lengths to include performance metrics, evaluation processes and data collection. Much of the literature concerning these issues indicate gained efficiencies by establishing a flight training program that utilizes metrics as well as data tools for analyzing efficiencies. Much of the issues concerning the management of the dynamic variables are that much of the production rates do not clearly identify areas of inefficiencies, or if they do, they do not isolate the culprit for the inefficiency. If evaluation processes and data collection are utilized, it will be easier to specifically identify areas of inefficiencies and to what extent the inefficiency impacts the training program.

Lastly, a large portion of the literature indicated improved efficiency through technology. Much of the higher level learning required to master flight training is done through scenario based training. For many flight training programs, this training occurs in simulators. As the fidelity of simulators improves with technology, much of the flight training can occur in the simulator at almost half the cost as if it were to occur in the aircraft. In addition, newly developed software is utilized to run the scheduling process and is improving scheduling efficiency. Due to the nature of writing the flight schedule and the types of constraints and variables that must be considered, software improves efficiency by not only optimizing scheduled assets for the squadron but also the time required to make a correction once a variable changes.
It is evident that no one training curriculum fulfills the needs of all aircraft flight training, the curriculum must be tailored based on requirements and training objectives for the specific aircraft and missions thereof. While there are a myriad of variables which directly impact the efficiency of flight training, there are also multiple approaches to help manage these variables, providing insight as to what extent these variables impact the flight schedule, the curriculum itself and the efficiency to which a student completes the program.
Chapter 3: Research Methodology

Research Approach

Due to the number of assets utilized to train the Nation’s most progressive and capable aviators, it is imperative that every component of the curriculum to include aircraft, students, instructors and respective departments are operating efficiently. Inefficiencies cause an increase in a student’s time to train, resulting in a higher consumption of assets, ultimately impacting the Navy’s ability to execute its missions. This research determined inefficiencies of the Advanced Helicopter Multi-Service Pilot Training System.

In order to determine the inefficiencies of the curriculum, this research followed a program evaluation typology. The MPTS curriculum was evaluated for inefficiencies. Once the inefficiencies were determined, this research identified the extent by which said inefficiencies impacted the time it took for the student to complete the curriculum.

The program evaluation of the MPTS curriculum was comprised of a combination approach in which descriptive research identified student completion times as analyzed through central tendency determinations as well as percentages of canceled events from operation reports. Lastly, students and instructors were surveyed to identify and corroborate areas of inefficiencies.

Data Collection Approach and Procedures

Data collected. This research utilized a program evaluation of HT-18’s training command to determine the inefficiencies within the MPTS and to determine the extent to which these inefficiencies impacted CNATRA’s mandated time to train. All data was primary, taken
directly from its source to include student time to train data, operation reports data and surveys amassed first-hand from students and instructors. This research was utilized to explain the sub-problems and therefore holistically answer the primary research question.

In order to examine to what extent inefficiencies within the scheduling portion of the flight operations impact curriculum efficiency, data was collected primarily from an Operation Model Events Report, which obtained its respective inputs from the Training Integration Management System network (TIMS). The report calculated a percentage of total events that were canceled due to scheduling constraints. The canceled events were derived directly from the TIMS network and entered by maintenance and instructor pilots when an event was canceled for a myriad of reasons. Additionally, from the TIMS network, the number of warmup events required as a result of students not being scheduled efficiently was considered as additional scheduling inefficiencies data. Other scheduling inefficiencies included students and instructor pilots who were scheduled for an event but were not able to conduct the event due to personal schedule conflicts.

Similarly to scheduling inefficiencies, the data utilized originated directly from the TIMS network. When the maintenance company L3, could not provide an aircraft for the scheduled event due to unforeseen circumstances like mechanical failure, the event was canceled within the TIMS network and labeled as “Aircraft Not Available”. The daily Ops Report draws this data to produce a total number of events that were canceled and were also labeled “Aircraft Not Available”. Other maintenance data helps to determine to what extent maintenance impacted curriculum inefficiencies when the aircraft had a downing discrepancy discovered either during
preflight or inflight. A downing discrepancy is a type of discrepancy that prevents the aircraft from being flown; most cases it is an essential flight instrument, or in other cases it can be a critical mechanical component that, if flown, might result in an unsafe situation. In situations such as these, the Flight Duty Officer (FDO) entered a cancelation due to “Maintenance”, which is different than “Aircraft Not Available”. Such a cancelation causes the maintenance company to lose money per their contractual agreement with the Training Air Wing.

In order to determine to what extent curriculum inefficiencies impacted the time to train, a more specific data set was required. From each student who has completed the syllabus, a total time to train was provided. This same number was also divided into different stages. The flight training curriculum is comprised of seven stages. A student’s time to train can be broken down into total time spent in each stage. A comparison was made by collecting all students who had completed the syllabus within a year’s time, then determined through central tendency methods, the average time that was spent per stage. This average was then compared to the allotted number of training days per each stage within the architecture of the curriculum and stages with the more inefficient timing were identified.

To determine to what extent human factors impact curriculum efficiency, data was obtained from the squadron’s safety department. The squadron’s safety department monitored and tracked the number of occurrences in which a student or flight instructor determined, due to personal, medical or fatigue issues, they were not able to safely perform their cockpit duties and canceled the event. The process is primarily a safety oriented program; however, each safety department tracks the number of these occurrences in the event a particular student or instructor
pilot develops a trend of cancelations and requires additional assistance with personal matters. The data for cancelations due to personal issues was derived from the squadron’s safety department and compared to the cancelations within the TIMS network. For a human factors cancelation, the FDO entered into the TIMS network a “Student or Instructor Pilot Not Available” cancelation code. The issue with this code is that it embodied two types of cancelations, one in which a scheduling conflict caused the cancelation and the other is when a human factors issues caused the cancelation. In order to break out the number of cancelations in each respective category, the safety data for the number of cancelations was compared with the total number within the TIMS network. The number of cancelations outside the safety department cancelation numbers then delineated the number of cancelations due to scheduling conflicts. In summary, the number of safety related cancelations was utilized to determine to what extent human factors impacted curriculum efficiency.

The last sub-question concerning what areas can be altered to improve curriculum efficiency is an open-ended question. The data to be collected was derived from the surveys (Appendix C, E, and G) in which students and instructors were surveyed for their perspectives on efficiency within the curriculum. A separate maintenance survey was constructed however, the maintenance personnel were contracted and unionized employees which presented multiple conflicts with the survey. It was later decided to terminate the survey for maintenance personnel due to human resource conflicts. This research utilized a frequency table for the open-ended response in order to highlight known issues amongst the ranks and offer solutions to improve these areas for improved efficiency.
Using the information in Table 1, the research topic and five sub-questions are stated. Additionally, the next column within Table 1 then delineates how the data was answered for the questions posed within each sub-question. Lastly, the far right column in Table 1 then identifies the type of data that was collected in order to answer each sub-question.

Table 1

*Linkage Between Research Questions, Data Necessary to Answer Them and Method for Collecting Them*

<table>
<thead>
<tr>
<th>Research Primary and Sub-Questions</th>
<th>Data Needed to Answer Question(s)</th>
<th>Data Collection Sources and Methods</th>
</tr>
</thead>
</table>
| Primary: What inefficiencies cause the helicopter training squadrons to have difficulties completing a Student Naval Aviator in the MPTS curriculum within 28 weeks and what actions can be taken to correct the inefficiencies to improve the time in which students complete the curriculum? | • Completion time or time to train for students whom have completed the curriculum within the past year.  
• Percentages of cancelation within each area to include scheduling, aircraft availability, maintenance issues and manning. | • Students’ time-to-train was derived from the training wing’s statistician by squadron’s reported completion dates for each student.  
• Flight schedule execution and cancelations data was derived from the TIMS network. This network also included maintenance department input.  
• Human factors data was derived from the squadron’s safety department. This data was captured outside of the TIMS network.  
• Data was derived from the Ops Model Events Report. This report was run daily for the squadron. It received its data from the TIMS network.  
• Surveys from both instructors and students provided feedback as to |

1. To what extent are scheduling inefficiencies contributing to increasing the time
2. To what extent do aircraft availability or maintenance issues impact the time required for students to complete the curriculum?

- Percent of canceled events due to Aircraft not available.
- Percent of Maintenance cancelations.

3. To what extent do curriculum constraints or inefficiencies contribute to the time required for students to complete the curriculum?

- Percent of canceled events due to required warm-up events which include both aircraft and simulator events.
- Compare stages with the longest time to train to what is allotted within the curriculum, highlight potential inefficiencies.

4. To what extent do human factors decrease efficiency within the curriculum?

- Percent of canceled events due to instructor pilot/student reasons.

Other areas of inefficiencies as it related to scheduling (Appendix C and E). Each survey utilized a Likert-scale (1-to-5) with open-ended questions.
- A frequency table was utilized and scheduling remarks were discussed as it related to data.
- Data is derived from the Ops Model Events Report, with the source of data for the report receiving inputs from the TIMS network. This data received high visibility within the organization due to civilian contractual issues.
- Surveys were also utilized for both students, instructors and maintenance which all used the Likert scale (1-to-5) with open-ended remarks (Appendix C, E and G).
- Each student’s time to train within the last year was utilized. Descriptive research was utilized to determine central tendency measures.
- From each student’s data within the past year, statistical analysis determined average time to train for each stage as compared to the allotted per the curriculum. Then stages with the highest differential was identified.
- Percent canceled due to pilot/student data was derived from the Ops Model Event
curriculum to include personal issues of both students and instructor pilots? Are there Manning issues that contribute to additional inefficiencies?

- Percent of ORMed flight events due to personal issues.

5. What actions can the training squadrons take to improve the curriculum completion time?

This open-ended question is included in order to examine areas and actions which could directly improve curriculum efficiency.

- This data was derived from the survey questions of students, instructors and maintenance personnel (Appendix C, E and G).
- A frequency table was utilized to identify areas that needed improved efficiency.

**Data collection procedures.** There are four general areas of data that were utilized for this research study. The first section of data was data relating to each student who completed the flight training curriculum. Each squadron gains students as a class every two-week period. Once the student is gained to the command, the student’s time to train begun. This timing is reported to the training wing by the parent squadron. The student then progresses through the syllabus and completes the curriculum if every event is passed successfully. The time at which the student is designated a Naval Aviator is the time in which the curriculum has been completed. The training wing maintains each squadron’s report on each student. This data is then utilized for several other areas of statistical analysis.

This research study utilized the training wing’s data compiled for every student who has completed the curriculum within the past year. This data summarized the time it took for each student to complete the syllabus and was graduated on a week scale. For example, a student’s time to train may be reported as 33.6 weeks. The training wing statistician then ran a report in
which the filtered values began and ended, totaling 365 days of training. In order for the report to be utilized in the research study, all personally identifiable information was deleted from each student’s data prior to the filter being run. This report does not only delineate the student’s total time to train but also the amount of time the student took in each respective stage within the curriculum. This data was then analyzed through measures of central tendency to determine the average time to train for all students within the last year as well as the average time to train for students within the past year for each stage of the curriculum. A general comparison was made from the data as to what the average time to train for Advanced Helicopter Multi-Service Pilot Training System was and how many standard deviations this data was outside of the average time to train as delineated within the curriculum.

The second area of data was provided through the TIMS network. All training squadrons and maintenance run their operations within the TIMS network. Multiple entities make inputs to the TIMS network, these inputs are then processed and in turn, updated in real-time for all participating members. On a day-to-day basis, the scheduling department creates the next day’s flight schedule in TIMS while the current flight schedule was executed. So any changes to the flight schedule for the current day would then automatically update the next day’s flight schedule.

For example, if an instructor cancels his/her event for a student for the current day, the cancelation will then be entered into TIMS, the next day’s follow-on event would then update automatically to reflect the canceled event so that the sequence of events was preserved from one day to the next. The FDO was primarily responsible for making accurate inputs into TIMS to
reflect what was executed. The FDO also assigned the cancelation codes if an event was canceled and insured the correct code was entered for the certain type of cancelation. The maintenance department primarily utilized the TIMS network to assign aircraft to the schedule lines for the current day while adhering to contractual constraints.

When an aircraft had a maintenance issue, the FDO canceled the event assigning the code as a cancelation due to “Maintenance”. The Ops Model Events Report amassed the data concerning the different coded cancelations for each day, filtered each cancelation by category and displayed the information on the report. This data is primarily used by the Operations Department as well as by the Executive Officer and Commanding Officer as it provides an up-to-date summary of sortie completions and percentages of each category canceled. The report takes the number of flight events scheduled per each squadron and identified the number of cancellation codes. The number of a certain code then provided a percentage when compared to the total sorties scheduled. This report, along with the available TIMS data, was utilized and amassed for a year’s worth of data. From this data, this research was able to provide a total percentage canceled due to the several different categories of cancelations. From the total categorical cancelations, inefficiencies were established based on rates of cancelations within the past year.

The third data set amassed was originated within the safety department. Each squadron operates a safety department. One of the data sets the safety department tracks are cancelations due to human factors. When an instructor or student has personal issues impinging on their ability to perform the duties and responsibilities of their respective crew position within the flight
due to personal issues, they cancel their event. This is a common safety practice so that personnel
are not flying during a time of great personal stress. The safety department manually totals these
types of events and keeps them on file annually.

This function of manually tallying human factors cancelations was done outside of TIMS. However, the FDO canceled the flight on the schedule and assigned a “Student/Instructor Not
Available” code to the cancelation. The issue with the data in TIMS is that under this code two
types of cancelations were covered, one was due to human factors, and the other was due to
scheduling constraints. In order to utilize only the human factor data, the number of human
factors cancelations through the safety department must be accounted for within the TIMS data.
The remaining portion of the cancelations due to “Student/Instructor Not Available” were
attributed to scheduling inefficiencies.

Lastly, the fourth data set utilized surveys that were distributed to students, instructors
and maintenance personnel. Each member of the respective group was emailed a consent letter
with a hyperlink embodied within the text. Once the respondent read and agreed to taking the
survey, they clicked on the hyperlink which took them directly to their respective survey
administered through the site www.surveyplanet.com. SurveyPlanet allowed respondents to
directly access their respective survey and submit their answers anonymously. Each survey
required approximately 20 minutes to complete. The site tracked each survey submission and
allowed the originator to analyze respondents’ submissions and provides further analysis of
every question. It was important that the respondents understand their survey responses were
anonymous, so that they felt free to answer candidly without fear of retribution and that they could still maintain their professional responsibilities and relationships within the organization.

Each survey was designed similarly, the respondent had two to three different general questions which helped to describe the respondent and what type of perspective they had. The following questions were derived from a 1-5 Likert-scale. The remaining questions on each survey were open-ended responses. Each response to the open-ended question were summarized and placed into a frequency table. Larger frequencies conveyed a greater number of individuals making similar comments.

There were three different surveys due to the three different groups, to which the surveys were tailored. Students (Appendix C) had a different perspective than instructors (Appendix E) or maintainers (Appendix G) therefore, the questions asked on each survey were slightly different. The Likert-scaled questions for each survey did attempt to identify specific inefficiencies but rather helped to describe whether or not inefficiencies existed as they related to the MPTS. Due to contractual- and union-related factors concerning the maintenance survey, it was decided that the survey would not be administered to the maintenance population. Hardships experienced while obtaining formal approval to disseminate the maintenance survey included respondents would need to be paid for their time in taking the survey, different jobs within the maintenance organization would most likely require separate surveys due to drastically different job responsibilities. Lastly, L3 human resources needed to legally approve the survey, this process required up to six months to obtain approval.
**Target Population.** The target population for the student-related data was total students within the past year. On average there were 12 students per class, the command received a new class every two weeks which equated to 26 classes within a year’s time. Twenty-six classes each with 12 students equated to 312 students who completed the Advanced Flight Training Curriculum. In terms of instructors, HT-18 was manned with 61 instructors. Lastly, the maintenance population consisted of approximately 100 maintenance personnel.

**Sample Details.** With regard to the surveys and due to the course length in which this research was conducted, only 26 students could be surveyed so 26 student surveys were sent out. This is due to the high turnover rate of the student population. Students, once completed with the curriculum were immediately sent to their gaining commands, typically this occurred within two weeks after completion at which point, they were extremely difficult to reach due to the administrative changes and the physical change in their location.

Similarly to the issues pertaining to the high turnover rate with students, instructors rotated out of the command every 33 months. The sample size for instructors was 61, so 61 surveys were sent out to the instructor population. Maintenance personnel were more long-term when compared to students and instructors. Once again, this research attempted to send out surveys to all 100 maintenance personnel. In comparing target population to sample size, because the target population was so small comparatively speaking, this research obtained as many surveys as the population allowed. Of the total sampled students, instructors and maintenance personnel, none of the sampled were considered a vulnerable population.
Of the student and instructor pilots, while still attached to their current commands, each respondent was contacted through their respective Navy military email account on Microsoft Office Outlook. The attached personnel onboard the command were delineated within the squadron’s administrative department. A list of personnel was obtained from the squadron and each respondent’s email was provided. For maintenance personnel, once permission was obtained from the Training Wing Commodore, approval from the program manager was sought however, it was later decided, due to the hardships in administering the survey, the survey would be terminated.

**Instrumentation.** All three surveys were specifically originated for this research study. A survey for students was originated and included as Appendix C. A survey for instructor pilots was originated and included as Appendix E. A survey for maintenance was also originated and included as Appendix G. All three surveys were specifically designed to be easily understood and properly taken with clear meanings. Additionally, one of the primary goals for each survey was the survey length. The training command is a fast-paced and demanding environment, this was a direct attempt to provide quality information as well as improve the number of respondents who would actually take the time to read the consent letter and follow the link to the survey and fill it out in its entirety. Each survey utilized the Likert-scale 1-5 scoring system. This scale was specifically chosen due to the gradient of available answers as well as its ease of use. Each survey also featured open-ended questions that were used to determine a frequency table for each respective survey.
The Training Integration and Management System (TIMS) network is one of the primary instruments that was utilized to run filters and obtain access to data throughout the squadron. TIMS integrated each respective squadron’s scheduling and execution, ultimately turning these entries into useable data that integrated with other users. All filters were ran by the researcher.

**Procedures.** This research study utilized a multipronged approach to data analysis. One approach centered on obtaining data of one year’s time for each student’s time to train as well as the Operation Unit Events Report data for each type of cancelation. Additionally, manual inputs from the squadron’s safety department were obtained. As soon as the data was obtained, the analysis began where central tendency measures were applied to sort and summarize the data to illuminate areas of inefficiencies.

The next layer of the approach featured the surveys. Each survey was distributed through email to each respondent from the SurveyPlanet website. As previously mentioned, the environment within the training command was extremely dynamic and demanding. In order to obtain a sizeable response from respondents the survey had to be easily completed and returned. The anticipated response rate for the surveys was thought to be slightly lower than 50% although actual response rates for instructors and students were far less. Responses to each survey were graphed against the Likert-scales paying special attention to how the questions were asked and the meaning of each scaled response. Open-ended questions were analyzed by constructing a frequency table. Both student-related time to train, TIMS data along with survey results were then analyzed.
Timing. This research study started on September 19th and concluded on December 18th 2016. An extension was not required for the research study. It is important to emphasize that collecting data over one year’s time did not adequately describe inefficiencies spanning multiple years. Additionally, the maintenance contract that is typically negotiated every three years influenced production rates as well in which the data did not adequately embody. ORM data spanned fiscal year 2016 while all other report-based data spanned from September 2015 through September 2016. Weather data spanned years 1973 through 2005.

Approach for Data Analysis and Synthesis

This research study primarily used measures of central tendency to organize and compare data fields for conclusions and recommendations. For the total number of students who had completed the curriculum within the last year, each student’s time to train was averaged utilizing the arithmetical mean for both total time over the course of the curriculum and by stage. Once each student’s data was submitted, a normal distribution was derived with a comparative analysis between the allotted time as structured into the curriculum versus the duration of time students actually required to complete the curriculum.

When each stage was separated into average time to train and compared to what was afforded within the curriculum, inefficient stages emerged where timing should either be adjusted or inefficiencies required improvement. The comparisons made utilizing the aforementioned data was important in identifying where inefficiencies were as they correlated with other areas within the curriculum.
Operational reports that were developed on a daily basis, were also amassed over a year’s time in order to determine the percentages of canceled events. These percentages were averaged over the one-year period and contrasted with the different types of cancelations. When compared to each other, higher averages indicated a higher percentage of cancelation and identified additional areas of inefficiencies.

Lastly, the survey data was averaged by each individual question, thus conveying higher averages or responses as either bearing strong impact or very little impact on efficiency. Each survey was averaged separately so only the student survey inputs were averaged together, similarly the instructor pilot and maintainer survey data followed suit. The open-ended responses were utilized to develop a frequency table, this frequency table was originated for the two different surveys separately.

From the data collection, comparisons were made amongst the different averages to identify areas of inefficiencies. Additionally, these comparisons helped answer to what extent these inefficiencies impacted the total time to train. From the comparisons, recommendations were made, backed by the statistical analysis, to improve the inefficiencies in an attempt to curtail student time to train.

**Methodological Limitations**

This research study faced a limitation of time. The student and operational-related data were easily obtained however, survey data did not cover the same timeframe. Survey data only covered 16 weeks and therefore only reflected current environmental issues within those 16 weeks. Surveying respondents captured current feelings and environmental influences however,
the survey data could be especially influenced by these factors because it was conducted for only 16 weeks.

In addition to the previously mentioned limitation, maintenance personnel were union regulated workers in which much of their job description and duties are contractually bound. The proposed maintenance survey was taken to the maintenance program manager in which the survey’s intent and specific survey questions were reviewed. Hardships administering the proposed maintenance survey were discussed. One of the hardships in administering the maintenance survey was that the survey had to be legally vetted through the maintenance human resources branch to ensure the survey was in keeping with the union-related policies for the company. It was determined that formal approval to administer the survey would take more than six months.

Secondly, each maintenance employee that would take the survey would have to be compensated for their time so there was an issue of what party would be financially responsible to compensate employees who elected to take the survey. Lastly, due to the vast array of the different types of jobs within the maintenance company, answers would most likely vary widely based the type of respondent and may not be as conclusive per the given sample size. Due to the aforementioned hardships experienced, it was decided that the maintenance survey would not be administered and data pertaining to maintenance related functions would make up for the maintenance survey data not collected.

In addition to the periodicity of the survey, personnel who made inputs into TIMS for various reasons introduced error into the system. Of special concern were the FDOs during flight
operations. During this time, FDOs were particularly busy with peripheral issues in addition to managing TIMS. If the FDO was not familiar with the cancelation codes, then faulty or erroneous codes could have been assigned to certain cancelations which might not have accurately reflected the actual situation. FDOs were formally trained to insure validity in making inputs to TIMS however, due to the high workload during this time, error was experienced. Additionally, consistency between FDOs was almost non-existent, this was a rotating watch meaning two different instructor pilots conducted this watch every day. With this understanding, utilizing data over a year created sizeable error within the data sample.

Additionally, the return rate for the surveys were less than desirable, the data did not represent each respective population adequately and potentially skewed the data due to sample size. With smaller populations and samples, this limitation had more of a potential to skew the data. A large contributing factor to the number of respondents was the environment of the training command. Time is extremely valuable to all personnel and presented some limitations on the amount of data that was returned and the quality of responses received.
Chapter 4: Data Analysis

Introduction

The data collection process utilized several areas of data to include surveys, TIMS output data from daily flight events as well as historical weather and ORM data. The data presented in this chapter is presented in both visual and text formats in which further analysis was used to develop links between the data and research questions. Additionally, specific data constraints, conflicts and other relationships were expounded upon within the analysis.

Data Presentation and Analysis

Current Time To Train. Per the MPTS, the time to train is 28 weeks, meaning that once students are gained to the squadron, they should complete the entire syllabus to include being winged within 28 weeks. An Ad Hoc Report was run from TIMS in which each Navy and Marine student’s time to train at HT-18 was derived from September 1st, 2015 through September 30th, 2016. From the data obtained from TIMS during this time, the average time to train for students was 33.50 weeks. The data indicated that HT-18 on average, exceeded the time to train per the MPTS by 5.5 weeks. In Figure 1, a frequency distribution histogram was constructed to provide a visual representation of the number of students who completed the syllabus within a certain number of weeks.
Figure 1. A frequency distribution histogram for HT-18 students who have completed the MPTS from September 1st, 2015 through September 30th, 2016.

The mean for the data was 33.5 with a standard deviation of 5.37. The data tended to follow a normal distribution. In Figure 2, a normal distribution of HT-18’s time to train is depicted.
Figure 2. A normal distribution of the time to train for HT-18 students who have completed the MPTS from September 1st, 2015 through September 30th, 2016.

In Figure 2, with the data modeled as a normal distribution, HT-18 finished students within one standard deviation of the mean, from 27.95 weeks to 38.7 weeks, 68% of the time. Conversely, the probability that HT-18 would finish a student within the MPTS at 28 weeks or less was approximately 15.38%. From the actual time to train data, only five students were able to complete the syllabus within approximately 28 weeks out of the 159 students resulting in approximately 3% of the student population.

Days Per Stage. Within the MPTS, each event is allocated a prescribe number of hours. For each stage of flight training, a certain number of events is also prescribed. In Table 2, there are seven stages of flight training each with their own number of flight events within each stage. For example, the Basic Instrument (BI) stage is comprised of 31.5 events. Simulator and class events were not analyzed for each stage because they were considered fixed variables and do not vary for weather, asset availability or other factors. An Ad Hoc Report was run from TIMS which identified the average number of weeks/days that HT-18 students have taken to complete each stage and is also depicted in Table 2. From the data, a comparison was made by taking the number of flight events and subtracting the average number of days it took HT-18 flight students to complete the stage, this was depicted in the variance column of the table. Stages with a negative variance indicated the MPTS events were completed in less time than prescribed by MPTS, this conveyed efficiency.
Conversely, variance resulting in a higher positive number conveyed time in excess of that prescribed by MPTS was required for students to complete the stage resulting in inefficiency. Lastly, an efficiency column was established by taking the variance and dividing by the number of flight events for the respective stage to obtain a percentage. The lower the efficiency percentage to include a negative number, the more efficient the stage when compared to MPTS. Conversely, the higher the positive percentage, the less efficient the stage. A variance of zero would indicate that the stage is in line with the allotted time for the specific stage per MPTS.

Table 2

*Actual training days versus days allocated per MPTS and efficiency*

<table>
<thead>
<tr>
<th>Flight Stage</th>
<th>Number of flight events</th>
<th>Average Weeks</th>
<th>Average Days</th>
<th>Variance (days-events)</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>B Contact</td>
<td>31.5</td>
<td>3.45</td>
<td>24.15</td>
<td>-7.35</td>
<td>-23%</td>
</tr>
<tr>
<td>BI Stage</td>
<td>16</td>
<td>5.09</td>
<td>35.61</td>
<td>19.61</td>
<td>123%</td>
</tr>
<tr>
<td>RI Stage</td>
<td>32</td>
<td>8.12</td>
<td>56.84</td>
<td>24.84</td>
<td>78%</td>
</tr>
<tr>
<td>LL Stage</td>
<td>7</td>
<td>1.14</td>
<td>8.01</td>
<td>1.01</td>
<td>14%</td>
</tr>
<tr>
<td>Form Stage</td>
<td>4</td>
<td>0.86</td>
<td>6.05</td>
<td>2.05</td>
<td>51%</td>
</tr>
<tr>
<td>NVG Stage</td>
<td>6</td>
<td>1.15</td>
<td>8.02</td>
<td>2.02</td>
<td>34%</td>
</tr>
<tr>
<td>SAR Stage</td>
<td>3</td>
<td>0.61</td>
<td>4.25</td>
<td>1.25</td>
<td>42%</td>
</tr>
</tbody>
</table>
In Table 2, the Bravo (B) Contact stage of the syllabus is extremely efficient, indicating that students from this stage were able to complete the stage less than what is afforded in the MPTS by seven days resulting in an efficiency of -23%. Other stages that required more time to complete students on average were Low Level, NVG, Form and SAR stages with an efficiency less than 60%.

However, the BI stage of flight training was least efficient, requiring more than 19 additional days for students to complete this stage resulting in an efficiency of 123%, meaning the BI stage required 123% more time than allotted per MPTS for students to complete the stage. It is important to emphasize that the BI stage required nearly double the amount of time per stage than the Radio Instrument (RI) stage and was identified as a significant indicator of inefficiency. The second highest inefficient stage within the flight training syllabus was the Radio Instrument (RI) stage, resulting in an average of over 24 additional days. When compared to the number of events within the RI stage, the efficiency resulted in 78%.

The remaining stages indicated inefficiencies however, not to the extent that BIs or RIs indicated. The Form stage indicated a 51% efficiency, the events within the form stage require an additional aircraft and crew, the highest constraints in terms of asset allocation. The SAR stage is comprised of only three events and indicated a 42% efficiency followed by the NVG stage indicating 34%.

**Weather.** The average historical weather data was amassed over the mean period of record from January 1st 1973 through June 30th 2016 for Naval Air Station Whiting field in
Milton, Florida. The weather data derived from observed weather at the airfield is depicted in Table 3.

Table 3

*Observed Historical Weather for NAS Whiting Field from 01/01/1973 Through 01/01/2005*

<table>
<thead>
<tr>
<th>Month</th>
<th>Mean wind speed (kts)</th>
<th>Max gust speed (kts)</th>
<th>% Freq. fog/mist</th>
<th>% Freq. thunderstorms</th>
<th>% Freq. of less than VMC</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>12.4</td>
<td>46.0</td>
<td>25.0</td>
<td>1.2</td>
<td>17.4</td>
</tr>
<tr>
<td>February</td>
<td>11.8</td>
<td>46.0</td>
<td>27.2</td>
<td>1.7</td>
<td>18.2</td>
</tr>
<tr>
<td>March</td>
<td>12.2</td>
<td>49.9</td>
<td>24.7</td>
<td>2.6</td>
<td>13.7</td>
</tr>
<tr>
<td>April</td>
<td>11.5</td>
<td>52.1</td>
<td>24.4</td>
<td>2.8</td>
<td>13.0</td>
</tr>
<tr>
<td>May</td>
<td>11.5</td>
<td>39.0</td>
<td>25.3</td>
<td>3.7</td>
<td>8.6</td>
</tr>
<tr>
<td>June</td>
<td>10.1</td>
<td>59.1</td>
<td>19.4</td>
<td>7.7</td>
<td>2.9</td>
</tr>
<tr>
<td>July</td>
<td>8.9</td>
<td>49.0</td>
<td>21.3</td>
<td>9.0</td>
<td>3.1</td>
</tr>
<tr>
<td>August</td>
<td>11.8</td>
<td>57.9</td>
<td>23.5</td>
<td>6.9</td>
<td>4.1</td>
</tr>
<tr>
<td>September</td>
<td>9.1</td>
<td>50.9</td>
<td>24.0</td>
<td>4.1</td>
<td>5.3</td>
</tr>
<tr>
<td>October</td>
<td>9.3</td>
<td>49.0</td>
<td>18.6</td>
<td>1.1</td>
<td>6.1</td>
</tr>
<tr>
<td>November</td>
<td>9.1</td>
<td>38.1</td>
<td>21.4</td>
<td>1.0</td>
<td>9.1</td>
</tr>
<tr>
<td>December</td>
<td>10.5</td>
<td>49.9</td>
<td>25.5</td>
<td>0.8</td>
<td>17.4</td>
</tr>
</tbody>
</table>

Mean wind speed was obtained from the mean wind direction observed at the weather station on NAS Whiting field and averaged throughout the reporting period. Similarly, max wind gust speed was obtained as a mean gust from each respective month over the reporting period. All wind speeds were measured in knots. From the historical data, the months with the highest mean wind speeds were observed over January, March and February with the highest max gust
speed occurring in June. Depending on the type of event, the Rotary-Wing Operating Procedures Manual (RWOP) delineates wind limitations for each type of flight event (COMTRA/WINGFIVEINST 3710.85, 2012). When comparing the observed mean wind speeds to the RWOP limitations, there was no appreciable impact to flight operations.

The percent frequency of fog or mist is taken when weather at the station indicated a temperature/dew point spread of less than 5 degrees with calm winds, severely restricting visibility and was measured in statute miles. On average, the historical data indicated that February had the highest percent frequency of observed fog/mist of 27.2% frequency followed by December with 25.5% frequency. May and January totaled 25% frequency respectively. Additionally, the data indicated several averages that were significant to efficiency (see Table 4).

Table 4

Percent Frequency of Fog or Mist Observed at NAS Whiting Field

<table>
<thead>
<tr>
<th>Time</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>17-19 LST</td>
<td>17.7</td>
<td>18.8</td>
<td>12.6</td>
<td>9.3</td>
<td>7.2</td>
<td>7.2</td>
<td>10.6</td>
<td>10.7</td>
<td>11.8</td>
<td>7.3</td>
<td>12.2</td>
<td>18.9</td>
</tr>
<tr>
<td>20-22 LST</td>
<td>23.6</td>
<td>24.9</td>
<td>21.3</td>
<td>20.9</td>
<td>19.5</td>
<td>12.6</td>
<td>18.4</td>
<td>21.6</td>
<td>17.5</td>
<td>14.9</td>
<td>21.2</td>
<td>25.9</td>
</tr>
<tr>
<td>23-01 LST</td>
<td>30.8</td>
<td>30.4</td>
<td>33.4</td>
<td>36.2</td>
<td>42.4</td>
<td>25.6</td>
<td>30.0</td>
<td>31.9</td>
<td>33.5</td>
<td>22.1</td>
<td>28.7</td>
<td>31.3</td>
</tr>
<tr>
<td>02-04 LST</td>
<td>32.5</td>
<td>34.2</td>
<td>40.5</td>
<td>46.4</td>
<td>58.1</td>
<td>47.0</td>
<td>46.2</td>
<td>50.3</td>
<td>47.2</td>
<td>32.0</td>
<td>29.8</td>
<td>36.1</td>
</tr>
<tr>
<td>05-07 LST</td>
<td>38.6</td>
<td>44.6</td>
<td>47.1</td>
<td>51.3</td>
<td>58.2</td>
<td>49.9</td>
<td>53.3</td>
<td>59.2</td>
<td>56.7</td>
<td>41.9</td>
<td>39.4</td>
<td>39.9</td>
</tr>
<tr>
<td>08-10 LST</td>
<td>33.1</td>
<td>35.1</td>
<td>26.2</td>
<td>18.3</td>
<td>12.5</td>
<td>8.2</td>
<td>8.7</td>
<td>10.1</td>
<td>15.5</td>
<td>17.5</td>
<td>23.7</td>
<td>31.5</td>
</tr>
</tbody>
</table>
In the month of February, the highest average for fog or mist occurred between 0200 and 1000 local standard time. Similarly, December and January reported the highest percent frequency during the same hours. During the month of May, the duration of fog and mist was less when compared to previous months, with highest percentages occurring between 0200 and 0700. NAS Whiting Field operations typically start at 0800 and terminate at 2400 local standard time. During the month of February, the duration of fog or mist extended past the beginning of field operations up to 1000. In situations where fog or mist restricts visibility, flight operations ceased, causing delays and/or weather cancelations.

The percent frequency of thunderstorms was measured by determining the number of thunderstorms encompassing the local flying area compared to the total observed. For NAS Whiting Field, July experienced the highest percent frequency of all months resulting in 9% followed by 7.7% in June and 6.9% in August. From the historical weather data, the months of June, July and August were on average, the months with the highest number of thunderstorms in the local area.

Additionally, during the highest percent frequency of thunderstorms for June, July and August, the data further detailed the average time of day in which the frequency of thunderstorms occurred (see Table 5).
Table 5

Percent Frequency of Thunderstorms Observed at NAS Whiting Field

<table>
<thead>
<tr>
<th>Time</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>17-19 LST</td>
<td>1.0</td>
<td>1.9</td>
<td>2.4</td>
<td>3.2</td>
<td>5.1</td>
<td>9.2</td>
<td>13.2</td>
<td>9.6</td>
<td>5.5</td>
<td>0.8</td>
<td>0.6</td>
<td>0.4</td>
</tr>
<tr>
<td>20-22 LST</td>
<td>1.2</td>
<td>1.1</td>
<td>1.6</td>
<td>2.4</td>
<td>2.2</td>
<td>3.2</td>
<td>3.4</td>
<td>2.1</td>
<td>1.3</td>
<td>0.9</td>
<td>0.9</td>
<td>1.0</td>
</tr>
<tr>
<td>23-01 LST</td>
<td>2.3</td>
<td>0.8</td>
<td>2.3</td>
<td>1.6</td>
<td>0.9</td>
<td>2.5</td>
<td>1.8</td>
<td>0.8</td>
<td>1.0</td>
<td>1.7</td>
<td>1.7</td>
<td>1.4</td>
</tr>
<tr>
<td>02-04 LST</td>
<td>1.4</td>
<td>3.1</td>
<td>3.3</td>
<td>2.4</td>
<td>1.8</td>
<td>2.4</td>
<td>2.7</td>
<td>2.0</td>
<td>2.4</td>
<td>0.9</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>05-07 LST</td>
<td>0.8</td>
<td>2.3</td>
<td>2.6</td>
<td>3.1</td>
<td>1.8</td>
<td>2.9</td>
<td>2.1</td>
<td>1.9</td>
<td>2.0</td>
<td>0.4</td>
<td>1.0</td>
<td>0.8</td>
</tr>
<tr>
<td>08-10 LST</td>
<td>1.6</td>
<td>2.0</td>
<td>2.9</td>
<td>2.3</td>
<td>4.0</td>
<td>7.8</td>
<td>5.7</td>
<td>3.6</td>
<td>2.4</td>
<td>1.1</td>
<td>0.4</td>
<td>1.1</td>
</tr>
<tr>
<td>11-13 LST</td>
<td>1.2</td>
<td>1.4</td>
<td>2.7</td>
<td>2.7</td>
<td>6.5</td>
<td>14.7</td>
<td>15.6</td>
<td>12.8</td>
<td>7.5</td>
<td>1.5</td>
<td>1.5</td>
<td>0.6</td>
</tr>
<tr>
<td>14-16 LST</td>
<td>1.0</td>
<td>1.1</td>
<td>2.7</td>
<td>4.1</td>
<td>6.4</td>
<td>14.8</td>
<td>21.8</td>
<td>17.5</td>
<td>9.3</td>
<td>1.2</td>
<td>0.9</td>
<td>0.4</td>
</tr>
</tbody>
</table>

When analyzing the month of June, the highest percentage frequency of thunderstorms occurred between 1100 and 1600 local standard time. Similarly, July and August followed suit. The data indicated that not only the highest percentage frequency of thunderstorms occurred in the months of June, July and August, the mean time in which the highest percentage occurred was experienced from 1100 to 1600 local standard time. Of the 64 syllabus flight events, 25% of the flights cannot be conducted in or around convective activity resulting in weather cancelations. Additionally, due to other dangers associated with thunderstorms and convective activity, other flight syllabus events cannot normally be safely conducted and therefore would also be canceled.
Visual Meteorological Conditions are those conditions in which a natural visible horizon is easily identifiable and cloud clearances can be maintained for the prescribed airspace in which the aircraft is operating (Federal Aviation Administration, 2016). In terms of observed weather at a station, percent frequency when ceiling and visibility are less than 1,000 feet and 3 statute miles (less than VMC) are detailed in Table 6. The data indicated that February had a higher percent frequency of weather below 1,000 feet and 3 statute miles resulting in less than VMC 18.2% of the month. December and January had the second highest percent frequency of 17.4%.

In addition to the historical weather data, weather-related cancelations were obtained from HT-18’s Operation Unit Events Report. This report obtained data from TIMS for all HT-18 flight events. From this data, total number of scheduled events as compared to what was actually executed is depicted in Table 6. When scheduled events were compared to executed events, a completion rate was derived. Of the total cancelations, the number of weather cancelations were totaled in the remaining column of Table 6.

Table 6

*HT-18 Operational Unit Events Report for 2016*

<table>
<thead>
<tr>
<th></th>
<th>Scheduled events</th>
<th>Executed events</th>
<th>Completion rate</th>
<th>Weather cancellations</th>
</tr>
</thead>
<tbody>
<tr>
<td>September</td>
<td>1262</td>
<td>1066</td>
<td>84.47%</td>
<td>123</td>
</tr>
<tr>
<td>October</td>
<td>1287</td>
<td>1161</td>
<td>90.21%</td>
<td>115</td>
</tr>
<tr>
<td>November</td>
<td>1377</td>
<td>950</td>
<td>68.99%</td>
<td>197</td>
</tr>
</tbody>
</table>
Every flight event on HT-18’s flight schedule was entered into the TIMS. Every flight event that was canceled was rendered a cancelation within the TIMS. Additionally, a code was assigned to the canceled event in several categories. One of the categories was a cancelation due to weather meaning, the flight event experienced weather constraints that prevented the flight from either completing or launching. For each month the total cancelations were reported in the Operations Unit Event Report. Analyzing each respective month for the number of weather cancelations, March experienced the highest number of cancelations due to weather, indicating a total number of weather cancelations of 279 flight events or 12.5% of the total number of
cancelations for the month. The second highest number of weather cancelations was January with a total of 268 weather cancelations or 12% of the total. August was also a higher weather cancelation month with a total of 231 weather cancelations or 10.3%. Figure 3 is a graphical representation of the total number of weather cancelations per month from September of 2015 to September of 2016.

**Figure 3.** HT-18 annual weather cancelations by month for September 2015 through September of 2016.

**Operation Unit Event Report.** The Operation Unit Event Report is a report that derives data from TIMS which separated cancelation codes from executed flight schedules over a period
of time. The data collected spans September 2015 through September 2016. Flight schedules flown by HT-18 were maintained and operated within the TIMS interface, every flight event was either indicated in TIMS as having been completed, incompletely or canceled. For the events that were canceled, the FDO assigned a code. Within the Operation Unit Event Report there were several categories of cancelation codes that could be assigned to a canceled event (see Table 7). Additionally, a visual representation of cancelation by category was derived from the Operation Unit Event Report in Figure 4. The largest category, representing 61% of cancelations was weather followed by the next highest category of Other resulting in 13%, followed by “IP NA” and “CM” resulting in 8% for each.

Table 7

*HT-18 Operation Unit Event Report Cancelations by Category for September 2015 through September 2016*

<table>
<thead>
<tr>
<th></th>
<th>Scheduled</th>
<th>Executed</th>
<th>Completion Rate</th>
<th>Weather</th>
<th>ANA</th>
<th>CM</th>
<th>IP</th>
<th>SNA</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sep</td>
<td>1262</td>
<td>1066</td>
<td>84.47%</td>
<td>123</td>
<td>2</td>
<td>23</td>
<td>9</td>
<td>16</td>
<td>13</td>
</tr>
<tr>
<td>Oct</td>
<td>1287</td>
<td>1161</td>
<td>90.21%</td>
<td>115</td>
<td>19</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>16</td>
</tr>
<tr>
<td>Nov</td>
<td>1377</td>
<td>950</td>
<td>68.99%</td>
<td>197</td>
<td>4</td>
<td>13</td>
<td>25</td>
<td>29</td>
<td>14</td>
</tr>
<tr>
<td>Dec</td>
<td>1287</td>
<td>860</td>
<td>66.82%</td>
<td>207</td>
<td>0</td>
<td>14</td>
<td>19</td>
<td>21</td>
<td>16</td>
</tr>
<tr>
<td>Jan</td>
<td>1596</td>
<td>952</td>
<td>59.65%</td>
<td>268</td>
<td>15</td>
<td>9</td>
<td>22</td>
<td>17</td>
<td>36</td>
</tr>
<tr>
<td>Feb</td>
<td>1608</td>
<td>1111</td>
<td>69.09%</td>
<td>200</td>
<td>9</td>
<td>23</td>
<td>20</td>
<td>28</td>
<td>38</td>
</tr>
<tr>
<td>Month</td>
<td>Total</td>
<td>Completed</td>
<td>Completion Rate</td>
<td>Cancel</td>
<td>DNK</td>
<td>DNK</td>
<td>DNK</td>
<td>DNK</td>
<td>DNK</td>
</tr>
<tr>
<td>-------</td>
<td>-------</td>
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<td>--------</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>Mar</td>
<td>1643</td>
<td>996</td>
<td>60.62%</td>
<td>279</td>
<td>17</td>
<td>24</td>
<td>17</td>
<td>21</td>
<td>74</td>
</tr>
<tr>
<td>Apr</td>
<td>1542</td>
<td>1067</td>
<td>69.20%</td>
<td>181</td>
<td>2</td>
<td>29</td>
<td>33</td>
<td>31</td>
<td>45</td>
</tr>
<tr>
<td>May</td>
<td>1405</td>
<td>1030</td>
<td>73.31%</td>
<td>98</td>
<td>4</td>
<td>35</td>
<td>20</td>
<td>23</td>
<td>42</td>
</tr>
<tr>
<td>Jun</td>
<td>1535</td>
<td>1110</td>
<td>72.31%</td>
<td>121</td>
<td>21</td>
<td>26</td>
<td>36</td>
<td>8</td>
<td>57</td>
</tr>
<tr>
<td>Jul</td>
<td>1459</td>
<td>1004</td>
<td>68.81%</td>
<td>162</td>
<td>13</td>
<td>42</td>
<td>19</td>
<td>12</td>
<td>30</td>
</tr>
<tr>
<td>Aug</td>
<td>1777</td>
<td>1200</td>
<td>67.53%</td>
<td>231</td>
<td>28</td>
<td>30</td>
<td>24</td>
<td>20</td>
<td>29</td>
</tr>
<tr>
<td>Sep</td>
<td>1472</td>
<td>1146</td>
<td>77.85%</td>
<td>45</td>
<td>5</td>
<td>22</td>
<td>33</td>
<td>13</td>
<td>55</td>
</tr>
</tbody>
</table>

Figure 4. A pie chart of cancelation by category for the Operation Unit Event Report.

Of the scheduled flight events in Table 7, as compared to the number of completed events resulting in completion rate, the data identified October as the month with the highest completion rate.
rate totaling 90.21% followed by 84.47% for the month of September. However, August was the highest month in terms of events executed, resulting in 1200 flight events completed for the month.

The first type of cancelation code was weather. Flights may be canceled for weather when observed or forecasted weather is outside the limits delineated in the RWOP for the prescribed type of flight or in the judgement of the instructor pilot, the flight could not be conducted due to weather posing a risk to safety. During the span of data collected, March was identified as having the highest number of weather cancelations. Additionally, December, January and February all indicated 200 or more cancelations. The data also identified August as a month in which 231 weather cancelations were made representing the highest weather cancelation month for the summer season.

The “ANA” column of the Operation Unit Event Report was a code that indicated an aircraft was not available for the given event. Aircraft are maintained and scheduled for flights by an outside company named L3. This company is contractually bound to provide 37 aircraft a day per training squadron. A scheduled line for an instructor may consist of two to three events. This line would then indicate the time in which L3 would issue an aircraft. There were four times in the day aircraft were issued; 0800, 1100, 1400 and 1800. The ‘ANA’ portion of the report referred to “Aircraft Not Available” and indicated that an aircraft should have been made available to support the flight events however, due to L3’s maintenance status with the number of aircraft and the type of event to be supported, they were unable to deliver an aircraft at the prescribed time as delineated in the maintenance contract. This type of cancelation results in
financial implications for L3 when they are unable to deliver an aircraft in a ready status. Per the Operation Unit Report, the months of June and August resulted in over 20 ‘ANA’ cancelations.

The next type of cancelation was coded ‘CM’ and identified flight events that were canceled due to maintenance. Similar to the ‘ANA’ code, ‘CM’ code denoted that an aircraft was issued to a flight crew however, due to a maintenance issue, the aircraft could not be utilized for the flight. Some reasons why an aircraft could be canceled due to maintenance may have been oil leaks out of limits, a preflight component damaged that could not be repaired or a piece of equipment that did not function within prescribed limits and was required for that type of flight event. From the data, the months with the highest maintenance cancelations were May and July, both exceeding 30 cancelations.

“IP” and “SNA” cancelations were coded for situations in which the instructor pilot or student for the flight event was not available due to another scheduling constraint or they had an ORM issue. An ORM issue is a type of cancelation that is described in the ORM section. For instructor pilots, the months of April, June and September resulted in the highest months in which flight events were canceled for unavailable instructors, totaling over 30 cancelations. For students, November and April totaled over 30 cancelations, the highest of all months for student cancelations.

The “Other” cancelation category was assigned when a specific cancelation was made however, it did not fit any other category as prescribed within the Operation Unit Report. Within this category the characteristics that identified a cancelation as “other” were relatively ambiguous and susceptible to different interpretations by the different FDOs standing watch for
that day’s flight schedule. Additionally, an FDO could assign a category cancelation code incorrectly because no two situations are alike. For these reasons, the “Other” category naturally has the largest amount of error of all the different cancelation categories. Of the data collected, the “Other” cancelations that took place in March far exceeded those of any other month, indicating a total of 74 cancelations. The second closest month in terms of “Other” cancelations occurred in June and resulted in 57 cancelations.

**Operational Risk Management.** Operational Risk Management data is tracked by HT-18’s safety department by two separate processes. The first area of data was derived from the TIMS, specifically from the Operation Unit Event Report. For every flight event in TIMS that is canceled due to “IP-NA” or “S-NA”, the report totaled each of these coded cancelations and supplied the total number of cancelations within a given month (see Table 8).

Table 8

<table>
<thead>
<tr>
<th></th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructor</td>
<td>9</td>
<td>12</td>
<td>25</td>
<td>19</td>
<td>22</td>
<td>20</td>
<td>17</td>
<td>33</td>
<td>20</td>
<td>36</td>
<td>19</td>
<td>24</td>
<td>33</td>
</tr>
<tr>
<td>Student</td>
<td>16</td>
<td>13</td>
<td>29</td>
<td>21</td>
<td>17</td>
<td>28</td>
<td>21</td>
<td>31</td>
<td>23</td>
<td>8</td>
<td>12</td>
<td>20</td>
<td>13</td>
</tr>
</tbody>
</table>

A code of “IP-NA” indicated the instructor was not available and therefore canceled the flight event. Similarly, a code of “S NA” indicated the student was not available and therefore canceled the flight event. It is important to make the distinction that within this category of coded
cancelations, it was possible that an alternative reason for cancelation could have also been a scheduling conflict and therefore canceled because the instructor or student was previously scheduled for an event that conflicted with the following event or another obligation that was incorrectly scheduled. The total number of instructor and student cancelations embody both scheduling and ORM cancelations and therefore do not directly identify solely issues of ORM.

Another source of Operational Risk Management data was obtained from HT-18’s safety department. For every instructor or student who determined, that due to human factors like personal, fatigue or medical reasons, could not perform the duties and responsibilities required to fly the scheduled event they withdrew themselves from the flight schedule as an ORM cancelation. At which point, the safety department then recorded the specific cancelation and reason. This was not enacted as a punitive measure, simply a process to track ongoing trends for specific individuals to determine if additional services were required by the individual to help them with their personal lives. The data collected from the safety department was totaled by category and depicted in Table 9.

Table 9

HT-18 ORM Cancelations by Category for Fiscal Year 2016

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Personal</th>
<th>Fatigue</th>
<th>Medical</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quarter 1</td>
<td>6</td>
<td>10</td>
<td>15</td>
<td>31</td>
</tr>
<tr>
<td>Quarter 2</td>
<td>9</td>
<td>8</td>
<td>17</td>
<td>34</td>
</tr>
<tr>
<td>Quarter</td>
<td>Personal</td>
<td>Fatigue</td>
<td>Medical</td>
<td>Total</td>
</tr>
<tr>
<td>--------------</td>
<td>----------</td>
<td>---------</td>
<td>---------</td>
<td>-------</td>
</tr>
<tr>
<td>Quarter 3</td>
<td>12</td>
<td>8</td>
<td>15</td>
<td>35</td>
</tr>
<tr>
<td>Quarter 4</td>
<td>6</td>
<td>13</td>
<td>10</td>
<td>29</td>
</tr>
<tr>
<td>FY Totals</td>
<td>33</td>
<td>39</td>
<td>57</td>
<td>129</td>
</tr>
</tbody>
</table>

The data supplied by the safety department was organized by fiscal year quarters. Medical issues were the highest category with regard to instructor and student flight event cancelations totaling 57 occurrences. Second to medical, cancelations due to fatigue totaled 39 occurrences, the highest of all categories, followed by 33 occurrences of personal issues. Depicted in a visual format, Figure 5 identifies the number of ORM cancelations by category in the form of a pie chart.

*Figure 5. HT-18 ORM cancelations by category for fiscal year 2016.*
**Student survey.** Data was also obtained from HT-18 students who had completed the syllabus. The student survey was administered over the course of two months. Originally the response rate was thought to be higher however, the number of respondents were far less than anticipated. Some of the hardships experienced were largely due to how the survey was administered. After students completed the syllabus, they were expected to start the check-out process in which a litany of administrative requirements were required to be completed. Amongst the administrative requirements, there was a different mandatory out-processing survey. When HT-18 students were asked to complete the survey used in this research, many of the students were confused and didn’t realize that there was an additional survey. Additionally, due to the workload experienced as soon as the student finished their last flight, the non-mandatory administrative requirements were reprioritized and many students did not submit their responses for the survey.

In addition to some of the administrative hardships associated with administering the survey, the rate at which students completed their syllabus was not consistent. During the survey period the total population was 26 students. Meaning in the time the survey data was collected, there were only 26 students who had completed the syllabus and were eligible to complete the survey. Of these 26 students, only eight of them completed the survey resulting in a 30.8% response rate, higher than the instructor response rate. The number of respondents did not accurately reflect the total population of students who completed the syllabus. If the data sampling occurred over a longer period of time, for example six months, the sample size would have been substantially larger and would have more adequately represented the view of the population.
Due to the length of time students required to complete the syllabus, of the eight that completed the survey, the time in which they were an active student only accounted for approximately seven months. This is important to note because the training environment can change based on time of year and local environmental influences. For example, during the summer months, there were a higher percentage of pilot induced precautionary landings and cancelations due to environmental conditions which may have impacted a student’s perception of efficiency and aircraft limitations if they conducted the majority of their flight events through the summer months.

The survey consisted of 13 questions, the majority of the questions were Likert-scaled responses where a value of one indicated that the respondent strongly disagreed and spanned a range to five, indicating that the respondent strongly agreed. The last two questions were open-ended response questions. Of the eight student respondents, the survey data indicated that only one student had a medical issue through the course of training and the issue resulted in less than one week removed from the syllabus before they returned to training.

Question four indicated a mixed opinion amongst the student population surveyed. Of the responses for question four, the mean of 4.25 indicated that generally students either agreed or strongly agreed that their personal human factors were not an area of inefficiency however, this question resulted in a variance of 2.21, the highest variance of all survey questions. The variance indicated mixed feelings on the issue. Table 10 shows the data derived from student respondents for several of the survey questions.

Table 10: Student Survey Data
n=8 respondents
### Questions

<table>
<thead>
<tr>
<th>Questions</th>
<th>% Strongly Disagree (1)</th>
<th>% Disagree (2)</th>
<th>% Undecided (3)</th>
<th>% Agree (4)</th>
<th>% Strongly Agree (5)</th>
<th>MEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. My personal human factors were rarely an issue in completing events.</td>
<td>12.5%</td>
<td>0%</td>
<td>12.5%</td>
<td>0%</td>
<td>75.5%</td>
<td>4.25</td>
</tr>
<tr>
<td>6. Scheduling errors hindered my ability to complete events.</td>
<td>25%</td>
<td>50%</td>
<td>12.5%</td>
<td>12.5%</td>
<td>0%</td>
<td>2.13</td>
</tr>
<tr>
<td>8. The squadron efficiently scheduled events.</td>
<td>0%</td>
<td>0%</td>
<td>12.5%</td>
<td>50%</td>
<td>37.5%</td>
<td>4.25</td>
</tr>
<tr>
<td>11. The way in which I was scheduled afforded me time to prepare for every event.</td>
<td>0%</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>3.5</td>
</tr>
</tbody>
</table>

Additionally, the data indicated that students’ opinion of the squadron’s ability to accurately schedule syllabus events was held in high regard where the mean was 2.13, indicating students generally disagreed or strongly disagreed with scheduling errors negatively impacting their ability to complete events.

Question eight pertained to scheduling efficiency, the respondents indicated that they either agreed or strongly agreed that the squadron efficiently scheduled events. When comparing responses across question four, six and eight, the means indicated that from the respondents’ perspective, elements of efficiency as it relates to scheduling is regarded as efficient.
Question eleven had the second highest variance of 1.27 and a mean of 3.13, indicating that students’ opinion of how they were scheduled and the time afforded to them between events to prepare for each consecutive event were generally undecided. Of all survey questions asked, this question was the most subjective. Two respondents indicated that they disagreed with the statement conveying that they felt they were not afforded an adequate amount of time to prepare for each event. Conversely, the remaining six respondents were either undecided or agreed that they were afforded enough time in between events to prepare. Preparation for events also included having enough time to maintain a balanced diet and obtain an adequate amount of sleep.

Lastly, respondents were provided the opportunity to construct a free response to questions 12 and 13. In question 12, students were asked what they thought was the largest contributor to inefficiency concerning Advanced Flight Training. Conversely, question 13 asked, what the students felt was the largest contributor to inefficiency concerning Advanced Flight Training. The responses from both question 12 and 13 are summarized in the frequency tables, Tables 11 and 12.

Table 11

*Frequency Table for Question 12 of the Student Survey*

<table>
<thead>
<tr>
<th>Topic/Issue</th>
<th>Number of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aircraft maintenance related issues</td>
<td>3</td>
</tr>
<tr>
<td>Length of the BI Syllabus</td>
<td>1</td>
</tr>
</tbody>
</table>
Table 12

*Frequency Table for Question 13 of the Student Survey*

<table>
<thead>
<tr>
<th>Topic/Issue</th>
<th>Number of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predictable and Efficient Scheduling</td>
<td>4</td>
</tr>
<tr>
<td>Instructors committed to completing the events</td>
<td>1</td>
</tr>
</tbody>
</table>

For the free response questions, of the eight respondents, there were only six responses for question 12 and five responses for question 13. One of the reasons the number of responses was not equitable to the number of respondents could have been that some students attempted to take the survey from their smartphone device rather than sit down at a computer and therefore did not want to spend the additional time preparing a response to questions 12 and 13. The alternative explanation could have also been that some respondents did not feel that they had input for questions 12 and/or 13.
From the responses collected, there were a high frequency of students who stated that they thought that the scheduling and execution of events was efficient. One respondent stated that the instructor pilots were committed to completing events despite the many hardships experienced for flight events to include weather, aircraft issues and delays.

Conversely, there were five comments that indicated areas of inefficiencies within the syllabus. The highest frequency of respondents identified aircraft/maintenance issues as being an area of inefficiency, inhibiting event completion either due to aircraft not being available or issued for the flight event or actual maintenance issues with the aircraft itself. Two of the responses received, indicated a high frequency of maintenance issues concerning navigation instruments which prevented a certain type of flight event from being completed frequently.

**Instructor Survey.** Instructors were also surveyed. Of the 61 instructors attached to HT-18, only nine instructors completed the survey resulting in a 14.8% response rate. The nine instructor responses did not adequately represent the entire population as a sample size. Of the nine instructors who responded, on average, the instructors had been attached to the command for 2 years, instructed just over two categories of flight events and had approximately two collateral duties in addition to flight instruction. In Table 13, some of the instructor survey questions and results are depicted.

<table>
<thead>
<tr>
<th>Questions</th>
<th>% Strongly Disagree (1)</th>
<th>% Disagree (2)</th>
<th>% Undecided (3)</th>
<th>% Agree (4)</th>
<th>% Strongly Agree (5)</th>
<th>MEAN</th>
</tr>
</thead>
</table>

Table 13: Instructor Survey Data
n=9 respondents
<table>
<thead>
<tr>
<th>Question</th>
<th>Statement</th>
<th>11%</th>
<th>0%</th>
<th>0%</th>
<th>33%</th>
<th>56%</th>
<th>4.22</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.</td>
<td>My personal human factors were rarely an issue in completing events.</td>
<td>11%</td>
<td>0%</td>
<td>0%</td>
<td>33%</td>
<td>56%</td>
<td>4.22</td>
</tr>
<tr>
<td>5.</td>
<td>Scheduling conflicts frequently hinder my ability to complete events.</td>
<td>22%</td>
<td>33%</td>
<td>22%</td>
<td>22%</td>
<td>0%</td>
<td>2.44</td>
</tr>
<tr>
<td>6.</td>
<td>Maintenance issues frequently hinder my ability to complete events.</td>
<td>33%</td>
<td>22%</td>
<td>33%</td>
<td>11%</td>
<td>0%</td>
<td>2.22</td>
</tr>
<tr>
<td>9.</td>
<td>When I do cancel a flight, it is often for fatigue.</td>
<td>44%</td>
<td>44%</td>
<td>0%</td>
<td>0%</td>
<td>11%</td>
<td>1.89</td>
</tr>
<tr>
<td>10.</td>
<td>I am able to maintain a healthy lifestyle as an instructor pilot to</td>
<td>11%</td>
<td>22%</td>
<td>33%</td>
<td>22%</td>
<td>11%</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>include nutrition and physical fitness.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>The squadron is appropriately manned with the right number of instructor pilots and support personnel.</td>
<td>11%</td>
<td>56%</td>
<td>22%</td>
<td>11%</td>
<td>0%</td>
<td>2.33</td>
</tr>
</tbody>
</table>

Question 4 responses indicated a mean of 4.22, conveying that personal factors do not play a significant role in the completion of flight events. However, the variance was slightly higher than normal resulting in a value of 1.69, indicating that there may have been some difference in opinion.

Question five responses indicated that instructors did not feel that scheduling conflicts inhibited their ability to complete flight events, resulting in a mean of 2.44. Additionally,
question five resulted in a variance of 1.28, conveying that there was some variance in their responses. Question five responses were also consistent with the student responses concerning the same question.

Question six responses identified maintenance issues as not having a large impact on flight event completion with a mean of 2.22 and a relatively low variance of 1.19. 33% of respondents went so far as to say that they strongly disagreed with maintenance as a factor for event completion. The consensus about maintenance issues amongst instructor pilots conflicted with the consensus amongst students.

Questions nine and ten pertained to physiological elements of efficiency. Question nine polled respondents about fatigue as a factor for cancelation and respondents answered that fatigue was not a significant factor resulting in a mean of 1.89 ranging from strongly disagree to disagree. There was a slight uptick in the mean for question ten, indicating that on average, instructors are somewhat undecided as to their workload allowing them to lead healthy lifestyles as it related to nutrition and physical fitness, resulting in a mean of 3.0. In terms of physiological factors, fatigue did not seem to be a factor however, it was generally undecided as to the instructors’ ability to lead a healthy lifestyle due to workload. The disagreement with the consistency of answers between question nine and ten may indicate that instructors may not have an issue with fatigue however, may not lead the type of healthy lifestyles they are longing for due to involvement with their job-related duties and workload.

Of all questions, question 12 responses were most profound. The survey results indicated that instructors disagreed with the statement that the squadron is appropriately manned with the
proper number of instructors and support personnel. Over 56% disagreed with this statement and 11% strongly disagreed. Additionally, the results to question 12 indicated a variance of 0.75, one of the smallest variances achieved when compared to all survey questions. It is apparent that of the nine respondents, most indicated an area of inefficiency for HT-18 was manning/personnel related.

Table 14

*Frequency Table for Question 13 of the Instructor Survey*

<table>
<thead>
<tr>
<th>Topic/Issue</th>
<th>Number of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control the number of students gained so that a more even influx of students is obtained</td>
<td>3</td>
</tr>
<tr>
<td>Maintenance contractual limitations</td>
<td>1</td>
</tr>
<tr>
<td>Instructor Availability</td>
<td>1</td>
</tr>
<tr>
<td>Changing the definition of student time to train to stop at the point in which the student completes the last flight event of the syllabus</td>
<td>1</td>
</tr>
<tr>
<td>Number of collateral duties should be decreased to facilitate training events</td>
<td>1</td>
</tr>
<tr>
<td>Weather requirements for BI flights as well as too many overhead flights that do not contribute to advancing flight events for students</td>
<td>1</td>
</tr>
</tbody>
</table>

Within Table 14, the highest frequency of responses for question 13 pertained to the source of inefficiency within the squadron. There were three responses that indicated an issue
with the number of students gained to the command for each class. Every two weeks the
command gains a class of students where numbers vary, the instructors’ comments pertained to
keeping the influx of students constant and predictable so that student load through the syllabus
was even and more easily managed. There were other comments provided, indicating issues of
too great of number of collateral duties for instructors, instructor availability to include taking
leave during inopportune times and weather requirements for BI flights.

In question 14, respondents were asked what factors contributed to efficiency for HT-18.
A frequency table of their responses is featured in Table 15.

Table 15

Frequency Table for Question 14 of the Instructor Survey

<table>
<thead>
<tr>
<th>Topic/Issue</th>
<th>Number of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predictable/Efficient/Adaptive Scheduling</td>
<td>7</td>
</tr>
<tr>
<td>Understanding the areas of the syllabus that aren’t efficient and scheduling that directly combats those areas</td>
<td>1</td>
</tr>
<tr>
<td>Instructors that are willing to go the extra mile to complete the events in the face of adversity, be it weather, maintenance or other</td>
<td>1</td>
</tr>
</tbody>
</table>

Of the highest frequency of like-responses obtained from the instructors, seven respondents
stated that smart scheduling that was predictable, efficient and adaptive to changes for weather,
personnel or maintenance cancelations was thought to be the significant factor in HT-18’s
methods of efficiency. Other factors were also mentioned by instructors pertaining to knowing the inefficiencies within MPTS and scheduling to directly combat those areas to help them become more efficient. Additionally, a comment was made about the environment at HT-18 indicating that instructors often go above and beyond to overcome constraints in order to complete the flight events, this contributes to a marked increase in efficiency.

**Data Analysis Summary**

Data was obtained from TIMS, observed historical weather, Ad Hoc Reports and surveys. Of all flight students whom have completed the syllabus from September 1st, 2015 through September 30th, 2016, the average time to train for HT-18 was 33.5 weeks. MPTS indicates students should finish the syllabus within 28 weeks. Currently, on average, students require an addition 5.5 weeks to complete the syllabus indicating inefficiency and the probability HT-18 will finish a student at 28 weeks or less is approximately 15% when modeled as a normal distribution.

Weather played a significant role in cancelations, contributing to scheduling inefficiencies within the squadron. The data indicated that March had the highest number of cancelations followed by January and August. Some of the weather phenomena’s that plagued NAS Whiting Field flight events included fog, thunderstorms and conditions less than VMC. The highest frequency of fog occurred during the months of December, January, February and May lasting from 0200 through 1000 local standard time which resulted in weather cancelations. The highest percent frequency of thunderstorms occurred during the months of June, July and August impacting a total of 25% of the flights within MPTS and typically occurred between 1100
through 1600 local standard time. The highest frequencies where weather was less than VMC conditions occurred during December, January and February.

In regard to scheduling inefficiencies, both students and instructors alike indicated that they were pleased with scheduling. Both populations indicated that HT-18’s scheduling process was efficient and reacted well to time-critical changes.

In terms of maintenance and aircraft availability as it related to inefficiencies, there was a difference in opinion between instructors and students when surveyed about the topic. Students indicated some maintenance issues impacted their ability to complete their events while instructors disagreed, resulting in a mean of 2.22. The highest cancelations due to maintenance issues identified both May and June as the highest contributors, both exceeding 30 maintenance cancelations. Additionally, August was the highest month for “Aircraft Not Available” cancellations totaling 28. June was the second highest cancelation month for “Aircraft Not Available”, totaling 21.

In terms of curriculum inefficiencies, the instructor respondents identified the non-constant influx of student accessions to the command as an area of inefficiency. This issue was further analyzed when a comparison was made between the actual time on average students took to complete a stage versus what MPTS allotted. The Basic Instruments stage data identified a substantial inefficiency, the stage required 123% more time than what was previously allotted by MPTS for students to complete the stage. The BI stage was the highest of all stages, requiring the highest number of training days and was nearly double that of the second highest inefficient stage, Radio Instruments. The RI stage required 78% more time than what was allotted for per
the MPTS. Additionally, the BI stage required the most restrictive weather in terms of ceiling and visibility imposing additional constraints.

Issues of human factors as it related to inefficiency was not substantial. For human factors related cancelations, over fiscal year 16, only 57 cancelations were due to medical issues, 39 due to fatigue and 33 for personal reasons. Instructor respondents identified that fatigue was not one of the primary reasons they had canceled previous events and disagreed as indicated by a mean of 1.89 for the question. Student respondents also identified that personal factors were not a large contributor in completing flight events. Instructor respondents did vary in opinion when asked about their ability to lead healthy lifestyles as it related to nutrition and physical fitness indicating that due to workload they were undecided as to whether they were afforded time to be healthy, resulting in a mean of 3.0.

One of the largest factors identified on the instructor survey was that many instructors disagreed with the statement that the squadron is appropriately manned with the proper number of instructors and support personnel resulting in 56% who disagreed and 11% who strongly disagreed. Additionally, the variance was 0.75 which indicated that the respondents where predominantly in agreement. This issue was also identified in the free response for the survey where the same issue was specifically identified as an area of inefficiency.
Chapter 5: Summary, Conclusions, and Recommendations

Overview

A program evaluation was conducted to determine areas of inefficiency within the MPTS. Additionally, a comprehensive literary review was performed to determine the current research and concepts concerning the aviation industry. Firsthand data was obtained from survey respondents, Ad Hoc Reports were utilized from TIMS and historical weather data were all analyzed to identify areas of inefficiency and the extent by which these areas impacted operations at HT-18. Furthermore, recommendations are provided to curtail and/or correct inefficiencies within the syllabus as it relates to the MPTS as well as squadron operations.

Summary

In terms of scheduling inefficiencies, much of the literature identified the necessity of controlling the scheduling constraints and variables in order to optimize a squadron’s flight schedule. There were many references to optimization software which help squadrons write schedules that efficiently utilize assets, students and syllabus constraints. Currently, the schedule writing process can take up to 12 hours daily; however, with the implementation of optimization software, the time required to produce the flight schedule can be drastically reduced, not only decreasing the amount of time required to write an efficient flight schedule but also reduce the amount of manpower required to produce the flight schedule daily. The literature indicated that other squadrons currently implementing said software are seeing improved efficiency in both optimization of assets and workload.

HT-18 utilizes TIMS to help improve upon this process. TIMS is able to identify scheduling constraints, asset usage and personnel issues on a near real-time basis. However,
there are some features of TIMS that are not currently used which will help improve scheduling efficiency. For example, TIMS has a feature where historical weather information can be implemented so that a schedule can be optimized based on forecasted conditions for the following day.

Analyzing the historical data obtained for the local area, the data indicated that weather accounted for 61% of total cancelations for HT-18. Specifically, the months of January, March and August were the months in which weather was the most significant inhibitor to completing flight events, resulting in the highest number of cancelations. The data further indicated that there were specific weather phenomena that were significant contributors to weather cancelations, that if flight events were deliberately scheduled around or optimized for, could improve event completion and ultimately time to train.

For the months of December, January and February, the data indicated that fog in the local area was a significant weather factor during the times of 0200 through 1000 local. The airfield operating hours are normally 0800 through 2400 local standard time. If this weather phenomenon was implemented within the scheduling constraints to TIMS for the aforementioned months, TIMS could then optimize flight events during these months by prioritizing flights that had a higher probability of being executed outside the times that fog was known to impact the local area and therefore provide the higher probability of flight event completion to those higher priority flights. Additionally, the other known weather phenomena would be incorporated into the optimization software within TIMS similarly to the constraints that fog posed. In addition to fog, less than VMC was experienced in excess of 17% of the month for December, January and
February, which typically prevents several types of flight events from being conducted during times of less than VMC.

Thunderstorms were another known inhibitor to flight events in June, July and August, impacting over 25% of the type of flight events that could be conducted if weather was not progressing as forecasted. The data indicated that thunderstorms within the local area typically occurred between 1100 and 1600 local standard time. If the weather forecasting portion of TIMS was utilized to optimize high priority flights either before 1100 or after 1600, then the higher priority events would have a higher probability of being completed, keeping students progressing through their respective stages of flights and lowering the time to train for each stage.

Both instructor pilots and students alike indicated that HT-18 scheduled efficiently. When asked what their opinion was about scheduling conflicts frequently hindering their ability to complete events, both instructor pilots and students disagreed with the statement. Additionally, when both the instructors and students were asked what the most significant contributor to efficiency within the squadron was, comments of adaptive and efficient scheduling appeared as the highest frequency of responses provided within the survey.

In terms of aircraft availability and maintenance issues, the literature indicated simulator based training (SBT) as a way to efficiently and effectively improve pilot training, while at the same time decreasing costs and wear and tear on aircraft. In much of the aircraft industry, simulator fidelity is pushing the envelope of technological innovation and development, which is why it is at the forefront of many flight training programs for both military and general aviation. SBT creates a training environment in which the student can be placed into situations,
unmatched by the actual aircraft, where students can work through their decision-making processes and work through procedures without detriment to safety or the aircraft.

Placing more emphasis on simulator use and potentially replacing aircraft events with high fidelity simulator events would reduce aircraft usage and therefore costs of operating aircraft. In the near-term, simulator usage saves costs per flight hour in the aircraft, in the long-term, simulator usage could substantially reduce flight hours logged on each aircraft improving asset longevity and long-term aircraft maintenance costs.

From the Operation Unit Event Report, the data indicated that May and June were the highest months for aircraft maintenance, both exceeding 30 maintenance cancelations per month. Additionally, August and June were the months that the data identified as having the highest “Aircraft Not Available” cancelations. In general, May through August were months in which aircraft maintenance were highest, as well as months where L3 could not issue aircraft as frequently, resulting in an uptick in maintenance cancelations. From the Operation Unit Event Report, less than 12% of total cancelations for the year of 2016 were due to both “Aircraft Not Available” and “Cancelation Maintenance” combined.

Although no direct correlation was established between both the “Aircraft Not Available” and “Cancelation Maintenance” cancelation rates, May through August were the months that contained the highest number of scheduled events. August was the highest of all months for scheduled events, totaling 1,777. Due to the heightened demand for scheduled events during these months, the data reflected a corresponding increase in maintenance related cancelations which conveyed L3 experienced hardships keeping up with the high number of scheduled events.
In terms of curriculum constraints, current literature identified the necessity of a syllabus with appropriate metrics to determine performance. Further, there were many literature sources identifying skillsets and aptitudes for candidates to be successful throughout a flight curriculum, even going so far as to identify specific skillset requirements unique to rotary-wing operators. The literature also discussed how to isolate these very specific skillsets and aptitudes so that candidates can be screened for those specific skillsets, placing only the individuals with the highest aptitude and most desirable skillsets into the flight curriculum. Other elements of efficiency related to these type of individuals excelling in the curriculum, the cost of placing individuals who do not possess the prerequisite skills then becomes additional cost in attrition. A point of efficiency then became placing the correct candidates in the curriculum and identifying the candidates that would not be successful in the curriculum early so as to minimize sunk costs in training individuals who would attrite from the program.

While there was no data collected specifically on attrition rates or basic skill/aptitude for candidates, curriculum structure was analyzed. Student influx was identified as an issue on the instructor survey with multiple comments from the free response question portion of the survey identifying the necessity of controlling the influx of student accessions to the command currently thought to be a point of inefficiency. The goal would be to control the number of students within each stage so that the time to train is not driven higher based solely on too many students within a particular flight stage.

Another issue from the data collected was the time per each stage of flight. On average, the total time to train was 33.5 weeks, resulting in 5.5 weeks over the prescribed 28 weeks per
the MPTS. When broken down into flight stages, the Basic Instrument stage required, on average, 123% more time to complete students, followed by the Radio Instrument stage which required 78% more time than what is afforded by the MPTS. Both BI and RI stages indicated significant inefficiencies in terms of time to train.

Physiological considerations were determined to be important within flight training, both for reasons of safety and individual performance. Fatigue was largely discussed within the literature for aviation as a significant factor to performance. Understanding circadian rhythm, scheduling instructors and students in a way that does not alter their sleep and wake time, has been identified as being critically important. Basic sleep hygiene to include the sleep environment, stimulus within the room and duration of sleep, play a pivotal role in fatigue. When instructors were asked about fatigue as a factor when they do cancel, they largely disagreed indicating that instructors generally do not feel fatigued. However, when instructors were asked their opinion of their ability to maintain a healthy lifestyle to include nutrition and physical fitness, the average response was that they were generally undecided, resulting in a variance of 1.5 indicating that answers varied.

ORM cancelations due to medical issues accounted for 57 cancelations over fiscal year 16. Fatigue was the next largest contributor resulting in 39 annual cancelations and personal issues accounted for 33 annual cancelations. In general, the literature indicated taking a holistic approach to health, living lifestyles in which proper nutrition, sleep and physical exercise is achieved, directly influencing performance and overall health issues. Physiological factors were
identified as a point of inefficiency within the flight training program if not well respected and maintained.

**Conclusions**

For students completing the syllabus, the average time to train within HT-18 was 33.5 weeks, requiring 5.5 weeks in additional training time to complete a student. When every student’s time to train was analyzed between September 2015 and September 2016, a standard deviation was derived and resulted in 5.7 weeks. However, the highest frequency of 47 students completed the syllabus at 32 weeks. This study identified several areas of inefficiencies and the extent by which they impacted the squadron’s production were analyzed.

The extent to which scheduling inefficiencies contributed to increasing the time required for students to complete the curriculum was determined by several sources of data. Survey data from both instructors and students alike indicated their opinion of HT-18’s scheduling was thought of as efficient. For areas of efficiency, both instructors and students made comments pertaining to scheduling being able to quickly adapt and make efficient time-critical changes.

Scheduling conflicts due to both instructors and students, indicated by the “IP NA” and “S NA” codes, consisted of 8% and 7% respectively. Cancelations by category when compared to total cancelations for the 2016 year, indicated that personal schedule conflicts are adequately managed and kept to a relative minimum.

Weather was one of the largest contributors to scheduling inefficiency and event completion. Based on scheduling constraints with aircraft issue times, event weather
requirements per the RWOP and historical weather for the local area, weather accounted for 2,227 cancelations, 61% of all cancelations for 2016.

The extent of aircraft- and maintenance-related issues’ impact on the time required for students to complete the curriculum was derived from cancelations within the Operation Unit Event Report. The report indicated that of the different categories of cancelations, “ANA” and “CM” cancelations, which pertained to aircraft not being available or an event being canceled due to a maintenance issue, resulted in a combined 12% of total cancelations for the year of 2016.

From survey data, when instructor pilots were asked their opinion on maintenance issues frequently hindering their ability to complete events, the instructors indicated that they disagreed with the statement and indicated agreement amongst the instructors as evidenced by a low variance. Students were also asked the same question, and their response followed that of the instructors.

The extent of curriculum constraints or inefficiencies contributing to the time required for students to complete the syllabus was determined by the average time to train for each flight stage. The flight syllabus was comprised of seven flight stages, each with their own number of events per stage. Of all seven stages, average time to train per stage, was derived. The BI stage was found to be the most inefficient, requiring 123% more time to complete the prescribed amount of training. The second least efficient stage, the RI stage, required 78% more time than what was prescribed by the MPTS and was nearly half of that required by BIs. Additionally, BIs
require the most restrictive weather minimums per the RWOP, contributing to an added difficulty when completing these types of flights.

Each of the seven stages are sequential, meaning that the first stage must be completed before the student is able to progress to the next. Due to the inefficiencies indicated by the data for BIs and subsequently RIs, students become stockpiled within these stages, contributing to longer time to train for the BI stage and every subsequent stage. This creates throughput inefficiencies with larger than normal students per stage, while subsequent stages don’t have enough students. Steady and manageable throughput is desired to keep training times low. There were several instructor respondents who indicated that student influx and throughput was a point of inefficiency which directly impacted students’ time to train.

The extent to which human factors decreased efficiency as well as manning issues contributing to additional inefficiencies was derived from survey data, a comprehensive literature review, ORM data and Operation Unit Event Report data. Much of the current literature attributes heightened performance to elements of sleep, nutrition and physical exercise. The literature indicated a direct link between the aforementioned physiological factors and performance in terms of reaction times, cognitive skills and alertness. From the survey data, instructor respondents indicated that fatigue was not a significant factor when they had to cancel an event. However, the instructor respondents also indicated variability in their answers when asked whether they agree with the statement that instructors are able to lead a healthy lifestyle, the mean indicated that they were undecided.
ORM data indicated that cancelations due to personal, medical or fatigue issues were relatively low, with medical issues ranking at the top for ORM cancelations, totaling 57 cancelations for the 2016 fiscal year. Fatigue and personal cancelations ranked just under 40 cancelations for the fiscal year 2016. From the Operation Unit Event Report data, cancelations due to instructor pilot or student unavailability, either due to issues not captured under ORM or last minute schedule changes, resulted in a total of 15% cancelations for 2016.

In terms of manning issues, instructor respondents indicated that on average, the respondents were responsible for two or more collateral duties, in addition to their flight instruction duties. Additionally, for the free response when instructors were asked to identify contributors to inefficiency, there were a higher frequency of respondents who submitted responses pertaining to inadequate squadron manning to support the workload. Additionally, for question 12 of the instructor survey, instructor respondents disagreed with the statement that the squadron is appropriately manned with the right number of instructor pilots and support personnel. Resulting in a mean of 2.33 and the lowest variance of all survey questions resulting in a variance of 0.75, indicating agreement amongst all respondents.

Lastly, the actions that can be taken to improve curriculum completion time included a vast array of changes to schedule writing, curriculum and software optimization. Weather was one of the largest categories for cancelations. Running optimization software in accordance with forecasted weather constraints will improve efficiency. Also, the BI stage was determined to be the most inefficient stage within the curriculum, scheduling BI events as frequently as possible will also improve efficiency. Regulating the number of accessions and controlling the number of
students within each stage so that influx and throughput is more consistent will improve efficiency within each stage. Finally, creating an environment that fosters healthy lifestyles to include nutrition, sleep and exercise was indicated by the literature as being critically important to performance. Although the data obtained did not identify these types of physiological factors as significant contributors to inefficiency, these factors can and will become significant contributors to inefficiency if students and instructors do not maintain healthy lifestyles.

**Recommendations**

From the data collected and analyzed, a number of inefficiencies were identified. Three recommendations were provided to directly combat the inefficiencies found within the MPTS. The recommendations range from immediate implementation to more involved curriculum changes requiring a formal approval process. All recommendations made, directly isolate and improve upon inefficiency, resulting in a marked decrease in time to train, as well as other second order benefits gained as a byproduct of implementation.

**Optimize TIMS to include weather forecasting and monthly weather phenomena.** In 2016, 61% of cancelations were attributed to weather. In aviation, weather is a significant constraint. From the historical data obtained and analyzed, the weather phenomena were relatively predictable. Optimizing the flight schedule to assign priority to flights that have a higher probability of being completed within the constraints of the forecasted weather, improves efficiency. Even during the months in which the known weather phenomena occur, students’ ability to complete flight events consistently improve, enabling them to continue to move through each respective stage more efficiently.
TIMS possesses the capability to incorporate forecasted weather within its software however, it is a feature that is not currently utilized. If the schedulers enabled the weather portion of the optimization software to prioritize the flight schedule, efficiencies would be immediately improved upon. Additionally, operators could refine software inputs by taking creative liberties by scheduling events so that impacts from a particular weather phenomena would minimally impact the flight schedule.

An example of this concept would be if a scheduler, during the summer months, scheduled a higher percentage of BI and RI flights earlier in the morning. This would provide an opportunity to complete said events prior to afternoon thunderstorms encompassing the area. If the weather trends are known, it is possible to more efficiently schedule events to maximize the times before or after the weather effects the flight schedule. Additionally, the squadron could forecast upcoming cancelation rates prior to the months in which the weather is expected to occur, thus ramping up flight event prior to and after, improving efficiency on more of a long-range projection.

**Alter the curriculum for more BI events to be completed in the simulator.** It is recommended a curriculum change be implemented to change several Basic Instrument flights to simulator events because of the improved simulator fidelity and efficiency. This change to the curriculum is not ideal in terms of timeline and would not be a recommendation that would quickly result in an immediate implementation. However, the benefits from reducing the number of flight events, particularly within the BI stage, would translate to efficiencies gained long-term in several different areas.
The first efficiency gained would be in time to train, because simulator events do not have weather constraints and are extremely predictable. Reducing the number of flight events within the stage would result in a marked decrease in time to train, especially during the months in which it is difficult to execute BIs in the aircraft due to less than ideal weather. If a shift is made to complete more of these events in the simulator, the litany of constraints to include weather and aircraft issues would be reduced.

The second efficiency gained would result in a long-term reduction in asset fatigue within the fleet of aircraft as well as a decrease in maintenance costs for every flight hour flown. If more events were conducted in the simulator, the hours that would originally be flown in the aircraft, would be flown in the simulator where costs to operate the simulator are substantially lower. Savings in flight hours, fuel and maintenance would be felt long-term as a reduction in flight hours accumulated on the aircraft, ultimately reducing asset fatigue and costly high-time maintenance repairs.

**Schedule BI and RI events frequently during the weekends.** MPTS is predicated on a five-day flight schedule week, meaning that per MPTS, training time incorporates a Monday through Friday workweek. In an effort to decrease the amount of time required to complete both the Basic Instrument and Radio Instrument stages, scheduling these type of flights more frequently over Saturday and Sundays, take advantage of currently unused training days and would result in a marked decrease in time to train for both stages. This recommendation can be implemented immediately without any administrative change or approval from the higher echelons of the command, it simply requires some additional work to schedule these flights over
the weekend and assign instructors to these events. Over a month’s time, the squadron would gain eight additional fly days, extrapolated over several month’s time, a substantial advantage against the time to train for MPTS within the stages are realized. It is also recommended that only the BI and RI flights be scheduled over the Saturday and Sunday fly days in order to aggressively work on the most inefficient stages in the curriculum first, establishing these flights as a priority.

This practice becomes especially important for BIs during December and January, when weather is frequently less than VMC and precludes BI flight event completion. Additionally, it is recommended that prior to these months, the squadron forecast out several months ahead to determine anticipated student loading within these stages. The squadron can then work on controlling and decreasing the number of students within these stages prior to experiencing the months in which inclement weather is expected. If a more concerted effort to manage student loading is made within each respective stage and the rate at which students are gained is comparable to the rate at which students graduate to the next stage, a constant flow of students is achieved with relatively lower time to train for each student. When student loading is not managed, the number of students per each stage will increase, increasing the difficulty to keep each respective student within the stage moving through to the next stage and an increase of time to train is experienced resulting in inefficiency.

**Future Research Suggestions**

Throughout the data collection process, it was evident that several issues require further investigation in terms of data collection and analysis. One of the issues that requires additional
research is the issue of manning within the organization. Data collection required to fully understand the manning issue would entail determining the number of positions assigned to the command as compared to what the Training Air Wing’s desired goal for student completion from HT-18 would be. Understanding the output first, the analysis can than work backwards to identify what type of student load this would equate to within the syllabus and then a determination could be made as to how many instructor pilots would be required to support this student load. However, manning is just one constraint to a certain number output, other constraints would again include some of the constraints discussed within this report namely, aircraft fatigue, maintenance contractual limitations and additional scheduling constraints.

Another issue that requires further research and analysis is to determine, based on the MPTS, what is the ideal number of students per each flight stage is. It became evident throughout this research that the curriculum resembles elements to a factory assembly line. The first stage can be loaded heavily with students however, the following stages will see inefficiencies due to the first stage not being able to accommodate such a student workload and a rippling effect of inefficiency would ensue through each respective stage. The research could then analyze potential inefficiencies between stages and provide recommendations to help the squadron match the ideal number of students per stage. Understanding key elements of throughput will inevitably be a source of inefficiency if not completely understood and proactively managed.

Lastly, further research strengthening the elements of this study would be to specifically analyze the curriculum itself in terms of course flow, duration of events and number of events. Some useful data to help determine some of these areas for analysis might include obtaining data
for every syllabus event. If each event’s data was obtained and analyzed for the amount of flight
time that was logged in order to complete the event, an average of flight time per event could be
obtained. On average, flight events that are completed in less than what MPTS prescribes would
be an indicator that the event’s duration should be changed. Conversely, events that consistently
require longer time than prescribed by MPTS, should also be changed to what is realistically
required to complete the event. This would provide a better understanding about the curriculum,
its events and would provide necessary updates to MPTS to reflect the actual training required to
complete each event. Other inefficiencies could be determined from the same procedure based on
the number of warmup events and classes as well.
References


http://search.proquest.com.cmich.idm.oclc.org/docview/1399262968?accountid=10181


doi:http://dx.doi.org.cmich.idm.oclc.org/10.1080/08995605.2010.492701
Appendices

Appendix A  Permission Letter
Appendix B  Student Consent Form
Appendix C  Student Survey
Appendix D  Instructor Pilot Consent Form
Appendix E  Instructor Survey
Appendix F  Maintenance Consent Form
Appendix G  Maintenance Survey
Appendix A
Permission Letter

DEPARTMENT OF THE NAVY
COMMANDER
TRAINING AIR WING FIVE
7480 USS ENTERPRISE STREET SUITE 205
MILTON, FLORIDA 32570-6017

IN REPLY REFER TO:
1000
Ser N00/1034
29 Sep 16

Lieutenant Zachary Templin
5551 Huntington Street
Milton, FL 32570

Dear Lieutenant Templin:

I have reviewed your request to conduct a research project involving Helicopter Training Squadron EIGHTEEN and the program evaluation of efficiency as it pertains to the advanced flight training curriculum and the student, instructor and maintenance data that will be used. I feel that this project will be beneficial to all helicopter training squadrons along with training wing operations. You have my permission to collect data on students who have completed the curriculum as well as operational data from TIMS and to collect surveys from students, instructors and maintainers for this project.

The following stipulations should be observed: If any portion of personally identifiable information is used, the personally identifiable information shall be removed from the data itself. Additionally, findings and recommendations shall be debriefed to both the Commanding Officer of HT-18 and Wing Commodore.

If you have any questions regarding this letter of approval, please call 850-623-7555.

Sincerely,

M. T. MURRAY
Appendix B

Survey Consent Form and Cover letter

Date: 30SEP16

Dear Participant:

My name is Zachary Templin and I am a graduate student at Central Michigan University. For my final project, I am examining training inefficiencies in the advanced flight training curriculum. Because you are a former student who has completed the curriculum, I am inviting you to participate in this research study by completing the attached survey. Although I supervise some of you, please note that your position is not in jeopardy if you decide not to participate in this study as I will have no way of knowing who participated and who did not.

The following questionnaire will require approximately 20 minutes to complete. There is no compensation for responding nor is there any known risk. In order to ensure that all information will remain confidential, SurveyPlanet will not forward any personal information from your submitted survey to include name and IP address, all completed surveys are completely anonymous. Copies of the project will be provided to my Central Michigan University instructor, HT-18’s Commanding Officer and Training Wing Five Commodore. If you choose to participate in this project, please copy and paste the following link into your browser and follow the directions to complete the survey: https://surveyplanet.com/57d9fe6c6c6e5370d2b147f2. Participation is strictly voluntary and you may refuse to participate at any time.

Thank you for taking the time to assist me in my educational endeavors. The data collected will provide useful information regarding the efficiencies of scheduling and operations from the perspective of a student. If you would like a summary copy of this study please email me at the email address listed below with your request. Completion and return of the questionnaire will indicate your willingness to participate in this study. If you require additional information or have questions, please contact me at the number listed below.

Please note that if you are not satisfied with the manner in which this study is being conducted, you may report (anonymously if you so choose) any complaints to the MSA Program by calling 989-774-6525 or addressing a letter to the MSA Program, Rowe 222, Central Michigan University, Mt. Pleasant, MI 48859.
Sincerely,

Lieutenant Zachary Templin
Zachary.templin@navy.mil
Professor Gordon Elwell
elwellgr@cmich.edu
Appendix C

Student Survey

Directions: Please fill out the survey to the best of your ability. Once completed, please return the survey to the location provided at the bottom of the survey.

1. How many months did it take you to complete Advanced Flight Training?
   a. less than 7 months
   b. 7 months
   c. 8 months
   d. 9 or more months

2. Did you ever go med-down?
   a. Yes
   b. No

3. If you did go med-down, how long was the med-down period?
   a. less than or equal to 1 week
   b. 2 weeks
   c. 3 weeks or more
   d. does not apply

Directions

For each of the following questions below, circle the response that best characterizes how you feel about the statement:

<table>
<thead>
<tr>
<th>1-Strongly Disagree</th>
<th>2-Disagree</th>
<th>3-Undecided</th>
<th>4-Agree</th>
<th>5-Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. My personal human factors were rarely an issue in completing events.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Instructors positively contributed to my ability to complete events either by being available or simply willing to go the extra mile to complete.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6. Scheduling errors hindered my ability to complete events.  
7. Maintenance issues with the aircraft hindered my ability to complete events.  
8. The squadron efficiently scheduled events.  
9. I clearly communicated scheduling constraints/conflicts to the schedulers.  
10. The flight training curriculum is efficient.  
11. The way in which I was scheduled afforded me time to prepare for every event.  
12. What was the largest contributor to **inefficiency** concerning advanced flight training that could be improved?  
13. What was the largest contributor to **efficiency** concerning advanced flight training?
Appendix D

Date: 30SEP16

Dear Participant:

My name is Zachary Templin and I am a graduate student at Central Michigan University. For my final project, I am examining training inefficiencies in the advanced flight training curriculum. Because you are currently employed as an Instructor Pilot, I am inviting you to participate in this research study by completing the attached survey.

The following questionnaire will require approximately 20 minutes to complete. There is no compensation for responding nor is there any known risk. In order to ensure that all information will remain confidential, SurveyPlanet will not forward any personal information from your submitted survey to include name and IP address, all completed surveys are completely anonymous. Copies of the project will be provided to my Central Michigan University instructor, HT-18’s Commanding Officer and Training Wing Five Commodore. If you choose to participate in this project, please copy and paste the following link into your browser and follow the directions to complete the survey: [https://surveyplanet.com/57da04ed3db87a70cdde5ffe](https://surveyplanet.com/57da04ed3db87a70cdde5ffe). Participation is strictly voluntary and you may refuse to participate at any time.

Thank you for taking the time to assist me in my educational endeavors. The data collected will provide useful information regarding the efficiencies of scheduling and operations from the perspective of an Instructor Pilot. If you would like a summary copy of this study please email me at the email address listed below with your request. Completion and return of the questionnaire will indicate your willingness to participate in this study. If you require additional information or have questions, please contact me at the number listed below.

Please note that if you are not satisfied with the manner in which this study is being conducted, you may report (anonymously if you so choose) any complaints to the MSA Program by calling 989-774-6525 or addressing a letter to the MSA Program, Rowe 222, Central Michigan University, Mt. Pleasant, MI 48859.
Sincerely,

Lieutenant Zachary Templin
Zachary.templin@navy.mil
Professor Gordon Elwell
elwellgr@cmich.edu
Appendix E

Instructor Pilot Survey

Directions: Please fill out the survey to the best of your ability. Once completed, please return the survey to the location provided at the bottom of the survey.

1. How many years have you been assigned to this command?
   a. less than 1 year
   b. 1-2 years
   c. between 2 to 3 years
   d. greater than 3 years

2. How many different categories do you instruct?
   a. 1
   b. 2
   c. 3
   d. 4

3. How many collateral duties are you responsible for outside of flight instruction?
   a. 1
   b. 2
   c. 3
   d. 4 or more

Directions

For each of the following questions below, circle the response that best characterizes how you feel about the statement:

<table>
<thead>
<tr>
<th>1-Strongly Disagree</th>
<th>2-Disagree</th>
<th>3-Undecided</th>
<th>4-Agree</th>
<th>5-Strongly Agree</th>
</tr>
</thead>
</table>

4. My personal human factors are rarely an issue in completing events.  

5. Scheduling issues frequently hinder my ability to complete events.
6. Maintenance issues frequently hinder my ability to complete events.  
7. Students’ frequency of human factors are rare and do not currently impact our squadron’s time-to-train.  
8. The squadron efficiently schedules events.  
9. When I do cancel a flight, it is often for fatigue.  
10. I am able to maintain a healthy lifestyle as an instructor pilot at HT-18 to include nutrition and physical fitness.  
11. Weather requirements for events are appropriate and do not translate to event completion inefficiencies.  
12. The squadron is appropriately manned with the right number of instructor pilots and support personnel.  
13. What is the largest contributor to inefficiency concerning syllabus event completion and students’ time-to-train?  
14. What is the largest contributor to efficiency concerning advanced flight training?

Return surveys to: Zachary Templin 5551 Huntingdon Street Milton, FL 32570. Do not include a return address.
Date: 30SEP16

Dear Participant:

My name is Zachary Templin and I am a graduate student at Central Michigan University. For my final project, I am examining training inefficiencies in the advanced flight training curriculum. Because you are currently employed by L3 as a maintainer, I am inviting you to participate in this research study by completing the attached survey.

The following questionnaire will require approximately 20 minutes to complete. There is no compensation for responding nor is there any known risk. In order to ensure that all information will remain confidential, SurveyPlanet will not forward any personal information from your submitted survey to include name and IP address, all completed surveys are completely anonymous. Copies of the project will be provided to my Central Michigan University instructor, HT-18’s Commanding Officer and Training Wing Five Commodore. If you choose to participate in this project, please copy and paste the following link into your browser and follow the directions to complete the survey: https://surveyplanet.com/57da0b0b3db87a70cddc6027. Participation is strictly voluntary and you may refuse to participate at any time.

Thank you for taking the time to assist me in my educational endeavors. The data collected will provide useful information regarding the efficiencies of L3 maintenance as it pertains to the TH-57B/D airframe. If you would like a summary copy of this study please email me at the email address listed below with your request. Completion and return of the questionnaire will indicate your willingness to participate in this study. If you require additional information or have questions, please contact me at the number listed below.

Please note that if you are not satisfied with the manner in which this study is being conducted, you may report (anonymously if you so choose) any complaints to the MSA Program by calling 989-774-6525 or addressing a letter to the MSA Program, Rowe 222, Central Michigan University, Mt. Pleasant, MI 48859.

Sincerely,
Lieutenant Zachary Templin
Zachary.templin@navy.mil
Professor Gordon Elwell
elwellgr@cmich.edu
Appendix G

Maintenance Survey

Directions: Please fill out the survey to the best of your ability. Once completed, please return the survey to the location provided at the bottom of the survey.

1. How long have you worked for L3 Maintenance on TH-57B/C aircraft?
   a. 0-5 years
   b. 6-10 years
   c. 11-15 years
   d. 16 or greater years

2. Where do you work within L3 Maintenance?
   a. On the line as a maintainer
   b. In administration
   c. In aircraft issue
   d. Logistics

Directions

For each of the following questions below, circle the response that best characterizes how you feel about the statement:

<table>
<thead>
<tr>
<th>1-Strongly Disagree</th>
<th>2-Disagree</th>
<th>3-Undecided</th>
<th>4-Agree</th>
<th>5-Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. I am satisfied working for L3 Maintenance at NAS Whiting Field. 1 2 3 4 5
4. Maintenance is properly manned to support the workload. 1 2 3 4 5
5. It is rare that maintenance cannot provide an aircraft to an aircrew for daily events. 1 2 3 4 5
6. The time required for L3 to repair the TH-57 airframe is becoming longer/more frequent due to aging components.

7. There are known maintenance problems with the TH-57 airframe that make it difficult to efficiently maintain.

8. Aircraft Issue efficiently handles and allocates aircraft for each squadron’s schedule.

9. There are many areas of improvement that could be changed to improve efficiency.

10. What is the largest contributor of **inefficiency** concerning L3 Maintenance on TH-57 aircraft at NAS Whiting Field?

11. What is the largest contributor of **efficiency** concerning L3 Maintenance on TH-57 aircraft at NAS Whiting Field?

Return surveys to: Zachary Templin 5551 Huntingdon Street Milton, FL 32570. Do not include a return address.