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Legacy Naval Flight School Pathway vs. an Expedited Naval Helicopter Flight School Approach (COPT-R-and-CORPS)

June 2025

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Prepared for the Naval Postgraduate School, Monterey, CA 93943

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ABSTRACT

Contractor Operated Primary Training-Rotary (COPT-R), and Copter Only Replacement Pilot Syllabus (CORPS) are flight school pathways recently implemented by the Navy. The goal of COPT-R and CORPS is to produce helicopter pilots whose skill is equal to, if not more effective than, those trained in the Legacy pathway. These pathways have been designed to provide student aviators with expedited access to rotary-wing focused training compared to the Legacy pathway that begins with fixed-wing training. This research assesses the effectiveness of COPT-R, CORPS, and Legacy flight school pathways through a statistical analysis that compares student performance in Advanced Rotary training. Student capabilities are measured by examining scores from 15 shared flight events and conducting a regression analysis of performance metrics. Ultimately, COPT-R and CORPS pathways produce effective rotary-wing pilots who are equal to those in the Legacy pathway. The results indicate that, initially, COPT-R students outperformed Legacy students by at least 20.65%, whereas CORPS students underperformed by at least 11.72%. However, after examination across all 15 events, data for each of the new pathways indicates near convergence with Legacy performance metrics. COPT-R students averaged 2.22% above Legacy and CORPS students averaged 0.79% below Legacy. These findings are significant considering the reduction in time-to-train for both COPT-R and CORPS, which may correspond with reduced training costs.

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TABLE OF CONTENTS

LIST OF FIGURES

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LIST OF TABLES

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LIST OF ACRONYMS AND ABBREVIATIONS

ASTB-E	Aviation Selection Test Battery
AQR	Academic Qualifications Rating
BI	basic instrument
CBA	cost benefit analysis
CFIT	controlled flight into terrain
CNATRA	hief of Naval Air Training
COPT-R	Contractor Only Primary Training-Rotary
CORPS	Copter Only Replacement Pilot Syllabus
CTS	course training standard
DoD	Department of Defense
FAM	familiarization
FAR/AIM	Federal Aviation Regulations/Aeronautical Information Manual
FOFAR	Flight Officer Flight Aptitude Rating
FRS	Fleet Replacement Squadron
FTD	flight training device
GAO	General Accounting Office
GPS	global positioning systems
IFR	Instrument Flight Rules
ITRO	Interservice Training Review Organization
JPATS	Joint Primary Aircraft Training System
LOG	logistics
MIF	maneuver item file
MPS	mission planning systems
MPTS	Multi-Service Pilot Training System
NAS	National Airspace System
NATOPS	Naval Air Training and Operating Procedures Standardizations
NAV	navigation
NAVAIDS	navigation AIDS
NAVAIR	Naval Air Systems Command

NETC	Naval Education Training Command
NFS	Naval Flight Student
NIFE	Naval Introductory Flight Evaluation
NROTC	Naval Reserve Officer Training Corps
NSS	Naval Standard Score
OAR	Officer Aptitude Rating
OCS	Officer Candidate School
OPNAV	Office of the Chief of Naval Operations
OTD	Operational Flight Trainer
PA	proficiency advance
PFAR	Pilot Flight Aptitude Rating
PLC	Platoon Leaders Course
RI	radio instrument
RRU	ready room unsatisfactory
SGTO	small group try out
SNA	Student Naval Aviator
UHPT	undergraduate helicopter pilot training
UNSAT	unsatisfactory
UPT	undergraduate pilot training
UTD	Unit Training Device
VFR	Visual Flight Rules
VTD	Virtual Training Device

EXECUTIVE SUMMARY

This research examines two newly implemented rotary wing–only naval flight school pathways: Contractor Operated Primary Training-Rotary (COPT-R) and Copter Only Replacement Pilot Syllabus (CORPS). Both pathways significantly reduce time-to-train for Navy helicopter pilots by eliminating Primary fixed-wing training. COPT-R replaces Primary fixed-wing training with 50 contractor-instructed helicopter flight hours, increased hours in helicopter simulators, and mentorship with experienced rotary-wing aviators (Hernandez & Hulser, 2024). CORPS eliminates Primary fixed-wing training while providing students with introductory helicopter ground training within their respective Advanced Rotary training squadrons. (Chief of Naval Air Training [CNATRA], 2024b). This research evaluates whether COPT-R and CORPS produce helicopter pilots who are equal to, if not more effective than, those trained in the Legacy pathway.

Consolidation of rotary-wing flight training has been debated since 1965 and has focused on integrating Navy and Air Force students into Army helicopter programs (Webb, 1996, p. 1). While the Air Force eventually joined Army helicopter training, Naval Aviation has historically resisted consolidation due to operational and readiness concerns. Historically, the consolidation proposals made by Congress involved eliminating fixed-wing training for rotary-wing students, an approach that closely mirrors the design of the modern COPT-R and CORPS pipelines. The persistence of this debate across congressional hearings, General Accounting Office (GAO) reports, Inspector General audits, and graduate research at military colleges and universities highlights the importance of reducing time-to-train and improving cost efficiency. This study contributes to this discussion by evaluating the efficacy of COPT-R and CORPS.

Data provided by the Chief of Naval Air Training (CNATRA) is utilized to determine the performance of students in these new pathways. The data includes student demographic information, academic scores, and flight event scores from 15 shared flight events across the three flight school pathways, COPT-R, CORPS, and Legacy. These metrics are used to conduct 15 regressions using student aviator scores from each event to

evaluate performance across all three pathways. Due to the recent implementation of the CORPS pathway, the sample size is limited to 16 students, only nine of whom have progressed far enough in the syllabus to produce performance data across all 15 flight events. As a result, findings related to CORPS should be interpreted with caution as a larger sample size and further research on CORPS could provide a more definite conclusion.

Seven of the 15 regressions resulted in statistically significant COPT-R and CORPS findings. The evidence reveals that COPT-R students consistently perform at or above the level of Legacy students. Importantly, in the first flight event, COPT-R students outperformed Legacy students by at least 20.65%. COPT-R students continued to perform above Legacy students, particularly during early familiarization events, and later during night, basic instrument, and check ride events. CORPS students demonstrated more variable performance, with lower scores during early events as well as night events. In the second event, CORPS students underperformed compared to those in the Legacy pipeline by an adjusted 11.72%, showcasing an initial proficiency gap, likely due to the absence of initial flight training. However, CORPS students performed equivalently to Legacy students in check rides prior to solo flights, suggesting improved performance over the timeline of Advanced Rotary. Across all 15 flight events, the average COPT-R proficiency gain was 2.22% and the average CORPS proficiency loss was 0.79% compared to average Legacy scores.

These findings support that COPT-R effectively prepares Student Naval Aviators (SNAs) for Advanced Rotary training by showcasing measurable proficiency improvement compared to Legacy students. The findings also indicate that CORPS students demonstrate early performance deficiency but eventually close the gap during later syllabus events, achieving proficiency levels similar to Legacy students. Together, the results provide strong evidence that both COPT-R and CORPS meet CNATRA's goal of producing aviators who are equal to, if not more proficient than, Legacy-trained aviators. While COPT-R shows promising performance results, CORPS may benefit from additional early phase support to aid long term success.

This research and analysis supports CNATRA's objectives of producing equally or better trained rotary-wing aviators through alternative training pipelines, specifically without fixed-wing training. Based on the results of the analysis, continued implementation of the COPT-R program is recommended. Future adjustments could be made to address resource inefficiencies related to student overperformance. The results of the analysis indicate that adding an initial familiarization flight phase for CORPS students may increase performance. In addition, introductory helicopter flights could help decrease the initial proficiency gap seen in the CORPS results. Finally, it is recommended that no significant change be made to the traditional helicopter training at this time.

Future research could expand on the results of this research and provide valuable insight and further support for the findings. This work could focus on career impacts and career performance of helicopter pilots who complete COPT-R or CORPS compared to those who follow the Legacy pathway. Due to the nature of flight school, peer effects may influence student performance, suggesting the need for a future study regarding student collaboration. A cost benefit analysis on the implementation of the three pathways could determine which provides the greatest financial benefit. Replication of this research is also suggested, using additional data points, new flight events, simulator events, and further research on the effects of certain exams.

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I. INTRODUCTION

Historically, Naval flight school provides fixed-wing training for student aviators before they are assigned to either fixed-wing or rotary-wing aircraft. In 2023 and 2024, the U.S. Navy introduced two new programs for Naval helicopter training: Contractor Operated Primary Training-Rotary (COPT-R) and Copter Only Replacement Pilot Syllabus (CORPS) (Helicopter Institute, 2024; Thomas, 2025). The goal of these programs is to produce helicopter pilots at an accelerated, cost-effective, and high-performing rate (RADM R. Brophy, personal communication, October 29, 2024). Traditionally, all Naval aviators receive fixed-wing training prior to aircraft selection. These two new programs eliminate fixed-wing training for participating student aviators. The idea of helicopter consolidation dates to at least 1965 (Webb, 1996, p. 1). While these programs are still very new, the goal of this research is to conduct analysis to determine if COPT-R and CORPS should be modified to achieve the intended effects.

The Chief of Naval Air Training's (CNATRA) intent is for these programs "to prepare naval helicopter students with the same of improved skills needed to excel in Advanced Rotary training, while reducing the total time-to-train and monetary costs" (RADM R. Brophy, personal communication, October 29, 2024). COPT-R and CORPS should produce more proficient helicopter students as they have more helicopter flight hours than traditional helicopter students. According to training schedules, the total time-to-train will be significantly reduced by both the latest programs COPT-R and CORPS (Nash, 2025, para.22). Eliminating months of fixed-wing training could decrease flight hour costs, fuel costs, and maintenance costs accrued for each Student Naval Aviator (SNA) not attending.

A. PURPOSE

According to CNATRA, COPT-R and CORPS have been designed "to produce helicopter pilots at an accelerated and cost-effective rate while meeting and exceeding all performance standards" (RADM R. Brophy, personal communication, October 29, 2024). The focus of this research is to examine the performance rate of the Contractor Operated Primary Training-Rotary (COPT-R) and the Copter Only Replacement Syllabus

(CORPS) by performing a statistical analysis of student performance. This will provide CNATRA with insight into the effectiveness of the programs. Currently, there is no research to suggest that the two new proposed programs will be more effective than the traditional pathway. If fixed-wing training has little benefit to helicopter pilots, implementing programs like COPT-R and CORPS could save valuable resources for the Navy. With a strict focus on rotary-wing training, flight schools could produce more skilled helicopter pilots. To test this hypothesis, the research questions provided a framework for the direction of this study. The methodological approach used to analyze the effectiveness of COPT-R and CORPS compared scores of individual events across the three pathways.

B. RESEARCH QUESTIONS

- Are COPT-R/CORPS SNAs different from Legacy training SNAs, in terms of socio-demographic or professional characteristics?
- In which flight maneuvers do COPT-R/CORPS SNAs outperform Legacy training SNAs?
- In which flight maneuvers do Legacy training SNAs outperform COPT-R/ CORPS SNAs?
- Are there identifiable trends in performance across the two training channels?

C. RESULTS

The research examined data sets from Advanced Rotary training that included academic pre-scores, commissioning source, branch of service, and assigned squadron. The goal of this research is to understand how student aviators' performance differed across the three training pathways Legacy, COPT-R, and CORPS. By utilizing student aviator scores across 15 Advanced Rotary flight events, a regression analysis was used to compare student performance. The regression analysis demonstrated that the COPT-R program produced equal to, if not more effective helicopter pilots than those trained in the Legacy pathway. The CORPS student performance results demonstrated production in pilots equal to those trained in the Legacy pathway. There was no evidence to suggest that CORPS students are more effective than Legacy trained students.

D. ORGANIZATION

This thesis contains six chapters. Chapter I introduced the two new naval helicopter training programs, the purpose of this study, and the questions which the research will address. Chapter II delves into the background and training pipeline of Naval Aviation. Chapter III provides a review of over 60 years of literature that explores the history of, and discussions about, helicopter consolidation. Chapter IV describes the research methodology and explains the process of regression analysis. Chapter V presents a detailed analysis of the results. Chapter VI summarizes key findings and provides recommendations for further research.

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II. BACKGROUND

A. CNATRA

The pathway to becoming a Naval Aviator begins with Naval Introductory Flight Evaluation (NIFE) that Naval Education Training Command (NETC) oversees (Owens, 2020). The Chief of Naval Air Training (CNATRA) is in command of Primary and Advanced Rotary (Chief of Naval Air Training [CNATRA], n.d.).

B. LEGACY PIPELINE

CNATRA outlines the four phases of naval flight school. The Legacy pipeline refers to the traditional path taken by Student Naval Aviators (SNAs) where they receive fixed-wing training before selecting their aircraft platform and arriving at Intermediate or Advanced flight training (CNATRA, n.d.-b). For this study specifically, "Legacy" references the traditional helicopter pipeline. The distinct phases of flight school include NIFE, Primary, Intermediate, and Advanced depending on the aircraft platform (CNATRA, n.d.-b). Students select their platform after the completion of Primary (CNATRA, n.d.-b). Once students finish Advanced flight training, they are awarded their wings of gold and report to their Fleet Replacement Squadron (FRS) to train on their respective aircraft (CNATRA, n.d.-b). Figure 1 visualizes the traditional Naval Aviation pipelines. This research focuses on the bottom helicopter pipeline in the figure.

Figure 1. Naval Flight School Pipeline Overview. Source: CNATRA (n.d.-b)

1. NIFE

NIFE provides students with an aviation indoctrination designed to reduce attrition and prepare students for later phases of flight training (CNATRA, 2020, p. v). NIFE is split into two phases, NIFE 1 and NIFE 2. NIFE 1 is the ground phase and covers Naval Aviation history, aircraft engines, aerodynamics, air navigation, flight rules, aviation weather, flight prep, land survival, physical fitness, and water survival (CNATRA, 2020, pp. vi-ix). NIFE 2 is the flying phase and covers flight rules and flight prep (CNATRA, 2020, p. ix). NIFE 2 gives students 9.1 hours of contact flight time across seven flights (CNATRA, 2020, p. x).

2. Primary

In Primary flight training, students become proficient in the T-6B Texan aircraft, a single-engine turboprop, two-seater aircraft (CNATRA, 2021). SNAs will conduct a solo flight with the T-6 as part of the Primary training syllabus (CNATRA, 2021). This aircraft allows students to perform more advanced aerobatics and experience G-force through three dimensions of flight (CNATRA, 2021). This provides students with an idea of what platform they're best suited to fly throughout their careers. Students who handle aerobatics and G-force well might be best suited for a tail-hook aircraft. After the completion of Primary training, students receive their aircraft type assignment based on their performance and the needs of the Navy (Flight Training, n.d.). There are four aircraft types: Strike, Multi engine, Tilt, and Rotary (CNATRA, n.d.-b).

Primary is comprised by a ground training section, flight support phase, and flight training phase (CNATRA, 2024c). Ground training includes safety programs, ejection culture, systems, and course rules. The flight support phase consists of familiarization flight procedures, night procedures, aerobatics, Instrument Flight Rules (IFR), and Visual Flight Rules (CNATRA, 2024c). The support phase has no actual flying events. The flight training phase is a combination of Unit Training Device (UTD) flights, Virtual Training Device (VTD) flights, Operational Flight Trainer (OTD) flights, and 39 actual flights (CNATRA, 2024c). In total Primary students receive a minimum of 63.7 hours of simulator flight hours and 63.6 hours of actual flight time (CNATRA, 2024c). Completion time for Primary is typically between six to nine months; however, this can vary depending on variables such as weather and maintenance cancelations (Flight Training, n.d.).

3. Intermediate

Intermediate flight training is only for students selected for any tail-hook or tilt-rotor aircraft and is different depending on the platform (CNATRA, 2023b, pp. 2–1). Students selected for F/A-18E/F, EA-18G, or F-35 conduct Intermediate flight training with the T-6B Texan, whereas E-2C/D selects perform Intermediate training in the T-44 and T-54 multi-engine aircraft (CNATRA, 2023b, pp. 2–1–2-2). Tilt-rotor selects (MV-22 Osprey) receive Intermediate helicopter training before moving onto the T-44 and T-54 aircraft in the MV-22 Advanced flight training track (CNATRA, 2023b, pp. 2–1–2-2). There is no Intermediate training for P-8, E-6B, or helicopter students as they move directly to Advanced flight training (CNATRA, n.d.-b).

4. Advanced Rotary

Advanced Helicopter training is the final phase of helicopter training before qualifying as a Naval Aviator (CNATRA, n.d.-b). This study uses the Advanced Helicopter Multi-Service Pilot Training System (MPTS) CNATRAINST 1542.156G syllabus along with the TH-57 COPT-R/CORPS Small Group Try Out (SGTO) syllabus. Advanced Helicopter training will be referred to as Advanced Rotary training to include tilt-rotary pilots that will eventually fly the MV-22 Osprey. The current Advanced Rotary syllabus will be referred to as the “156G syllabus” from now on. The TH-57 COPT-R/CORPS (SGTO) syllabus will be referred to as the “COPT-R/CORPS syllabus.” The two syllabi only differ slightly. The 156G syllabus is the Legacy pipeline for Advanced Rotary training. Students completing this syllabus have all completed Primary fixed-wing training beforehand. The 156G syllabus is comprised of three sections: ground training, flight support, and flight training, similar to Primary training (CNATRA, 2023a).

Ground training prepares students with 21 hours of instruction in subjects like safety, global positioning systems (GPS), and mission planning systems (MPS) (CNATRA, 2023a, p. x). This prepares students for the flight support phase of Advanced. The flight support phase of training preps students with 103.15 hours of instruction on a broad array of subjects focused on giving students a solid foundation of helicopter knowledge (CNATRA, 2023a, p. xi). The subjects include, but are not limited to, helicopter aerodynamics, Naval Air Training and Operating Procedures Standardizations (NATOPS) exams, cockpit procedures, autorotation, emergencies, tail rotor aerodynamics, instruments, navigation, radio, shipboard operations, search and rescue, formation, and night vision (CNATRA, 2023a, pp. xi–xiii).

The flight section of the 156G syllabus has four sections within it. The first two are flight training device (FTD) events, also called flight simulators. The first is a level six FTD and the second is a level seven FTD. Level seven FTD events are the more sophisticated training involving motion (CNATRA, 2023a). SNAs receive 19.5 hours with level six FTDs covering cockpit procedures, flight lines, course rules, instruments, and emergency procedures (CNATRA, 2023a, pp. x-xiii). SNAs receive 28.6 hours with level seven FTDs covering autorotation, tail rotor maneuvers, aircraft handling, emergencies, instruments, navigation, search and rescue, formation, and night vision flying (CNATRA, 2023a, pp. xi–xiii).

The next two sections are dual flights and solo flights in the TH-57B/C helicopter. Dual flights are conducted with instructors and/or other students. SNAs receive 59 dual flights totaling 107.6 flight hours (CNATRA, 2023a, pp. xi–xiii). These flights cover topics in familiarization, solo check flights, logistics, instrument flying, day navigation, night navigation, radio instruments, low-level instrument flying, terrain navigation, formation, and night vision flying (CNATRA, 2023a, p. xxiv). These topics are called stages of training (CNATRA, 2023a, p. xxiv). Students receive three total solo flights adding up to 4.2 flight hours. In total students conduct 37 FTD flights, taking 48.1 hours, and conduct 62 actual flights, totaling 111.8 flight hours (CNATRA, 2023a).

C. COPT-R AND CORPS

In 2023 the U.S. Navy introduced a new way forward for helicopter flight training, Contractor Only Primary Training-Rotary (COPT-R) (Hernandez & Hulser, 2024). COPT-R replaces traditional fixed-wing training, Primary, with contracted introductory helicopter instruction that prepares students for Advanced Rotary training (Hernandez & Hulser, 2024). When students undergo the first phase of flight training, NIFE, they can volunteer for COPT-R if they aspire to fly helicopters (CNATRA, 2024b). COPT-R provides Student Naval Aviators (SNAs) with 50 introductory helicopter flight hours, increased hours in helicopter simulators, and interactions with experienced rotary-wing aviators (Hernandez & Hulser, 2024).

In addition to COPT-R, a different solution to consolidating helicopter flight training has also been introduced. COPTER-Only Replacement Pilot Syllabus (CORPS) is a similar pipeline but contained within Naval Aviation Training. This program, like COPT-R, allows students to skip Primary fixed-wing training but provides students with introductory helicopter flight training at their respective squadron in Advanced Rotary training (CNATRA, 2024b). This is also a voluntary program that allows students to choose helicopter flight training earlier than the Legacy pipeline. Figure 2 visualizes the three pathways for naval helicopter training.

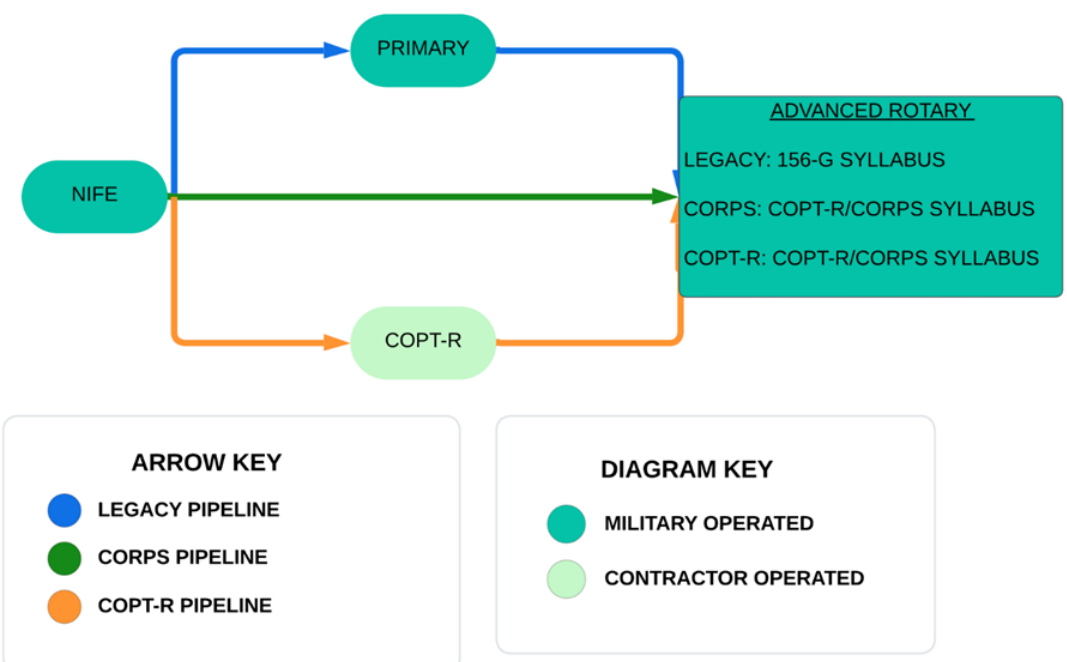

Figure 2. Pipeline Overview

COPT-R and CORPS have a specific joint Advanced Rotary syllabus called COPTER-Only Replacement Pilot Syllabus & Contractor Operated Primary Training-Rotary (CNATRA, 2024b). This syllabus is almost identical to the Legacy 156G syllabus but contains some additional instrument instruction. There are additional events that are

CORPS-specific designed to bring students to a similar familiarity level compared to the COPT-R and Legacy students. The training that COPT-R students receive at Advanced Rotary training will be referred to as "Advanced Rotary (COPT-R)." The training that CORPS students receive in Advanced Rotary training, will be referred to as "Advanced Rotary (CORPS)." The COPT-R program as a whole, refers to the students who volunteer and attend the contracted helicopter flight training, in Dallas, Texas, and then report to Advanced Rotary (COPT-R). The CORPS program as a whole refers to the students who volunteer in NIFE and go directly to their Advanced Rotary squadron for Advanced Rotary (CORPS). In Advanced Rotary training, students from all paths, whether it is Legacy, COPT-R, or CORPS, are classmates within their respective training squadrons. These pathways are very new and may seem risky to students, but CNATRA has claimed the risk on behalf of the SNAs and implemented a "do no harm policy." (CNATRA, 2024b, p. i-6). This policy allows students who volunteer for COPT-R or CORPS to drop or be removed from the program without penalizing their aviation career. Attrited students will go back through the traditional pipeline and attend T-6B Primary training (CNATRA, 2024b, p. i-6).

1. COPT-R

Contractor Operated Primary Training-Rotary, also known as COPT-R, is the primary phase of the COPT-R program. This is the only outsourced phase of the program. COPT-R is currently based in Fort Worth Texas and is where all COPT-R students report before arriving at their Advanced Rotary squadron (Hernandez & Hulser, 2024). At COPT-R, students receive about 81 hours of total ground training, 50 flight hours, and a solo helicopter flight (Helicopter Institute, 2024, p. iii). The objective of COPT-R is to provide students with skills to safely carry out day and night helicopter flight operations with Visual Flight Rules (VFR), gain familiarization with IFR, and meet helicopter Private Pilot Certificate proficiency (Helicopter Institute, 2024, p. iii). The course is broken into four stages of ground and flight training molded to fit the requirements set by the Navy's COPT-R program (Helicopter Institute, 2024, p. iii).

Private Pilot Helicopter Training Course Times by Stage										
	Ground Training and Pre/Post Flight Briefings			Flight Training						
STAGE	Required Ground Training	Pre/Post Flight Briefings	Total Ground Training	Dual Day (DD)	Dual Day Cross Country (DDXC)	Dual Night (DN)	Dual Night Cross Country (DNXC)	Solo Day Local (SD)	Dual IFR (IFR) To include 2.0 XC*	Total Flight (Cumulative) Training Times
1	17.5	11.0	28.5	14.2	0.0	0.0	0.0	0.0	0.0	14.2
2	16.5	10.0	26.5	11.1	3.1	1.0	1.0	0.0	0.0	16.2
3	6.0	3.0	9.0	3.6	0.0	0.0	0.0	1.0	0.0	4.6
4	9.0	8.0	17.0	0.0	0.0	0.0	0.0	0.0	15.0	15.0
Totals	**49.0**	**32.0**	**81.0**	**29.2**	**2.8**	**1.0**	**1.0**	**1.0**	**15.0**	**50.0**

Figure 3. Private Pilot Helicopter Training Course Times by Stage. Source: Helicopter Institute (2024)

According to the Helicopter Institute (2024), stage one of COPT-R spans 31 lessons with 11 being actual flight lessons. Homework is given to the students for the first 25 lessons and then they are directed to self-study for the remaining lessons of the phase. The phase also includes one written exam, one oral evaluation, and one flight evaluation. The lesson material includes safety practices, procedures briefing, pre-flight planning, basic flight maneuvers, helicopter systems, helicopter pre-flight, principles of flight, pilot logbooks, helicopter minimum equipment, required documents, autorotation, weight, balance, Federal Aviation Regulations/Aeronautical Information Manual (FAR/AIM) regulations, hovering flight, airport operations, communications, markings, helicopter aerodynamics, limitations, emergency procedures, ground reference maneuvers, and traffic patterns (Helicopter Institute, 2024, p. v-vi).

According to the Helicopter Institute (2024), stage two of COPT-R spans 29 lessons with 12 being actual flight lessons. Homework is given up to lesson 22 and includes one written exam, one oral evaluation, and one flight check. This stage provides students with more navigation skills and proficiency in day and night maneuvers and cross-country flights. The new lesson materials include aviation weather, aviation weather services, National Airspace System (NAS), navigational charts, pilotage, dead reckoning, decision making, lost/diversion procedures, radio/GPS navigation, cross-country flying, maintenance regulation, controlled flight into terrain (CFIT), wire strike prevention, night flying, and aeromedical factors (Helicopter Institute, 2024, p. vii-viii).

According to the Helicopter Institute (2024), stage three of COPT-R spans 12 lessons with five being actual flight events. There are three homework sets, one written exam, one oral evaluation, and one flight check. This stage intends to prepare students for their solo flight, the final lesson of stage three. The new lesson materials include pinnacle/platform operations, confined areas, scenario-based training, cross-country planning, and solo flying (Helicopter Institute, 2024, p. ix).

According to the Helicopter Institute (2024), stage four of COPT-R spans 18 lessons with eight actual flight lessons. This final stage of COPT-R is primarily instrument training with 11 homework sets, one written exam, and an instrument cross-country flight. The new lesson materials include instrument systems, instrument maneuvers, instrument cockpit checks, navigation Aids (NAVAIDS) for instrument flight, intercepting, tracking, holding, procedure turns, instrument approach procedures, and IFR emergencies (Helicopter Institute, 2024, p. x).

COPT-R completion standards require students to score 80% or higher on all exams and evaluations as well as obtain recommendations from instructor faculty to fully graduate from the course (Helicopter Institute, 2024, p. iv). The course completion time is approximately three months, to ensure students are ready to take on Advanced Rotary training in Milton Florida (Nash, 2025, para. 22). In contrast, other students receive six to nine months of fixed-wing flight training in Primary to prepare them for the Advanced Rotary curriculum.

2. TH-57 COPT-R/CORPS ADV (SGTO) SYLLABUS

The COPT-R/CORPS Small Group Try Out (SGTO) (2024) syllabus is a combined syllabus for COPT-R and CORPS students when at Advanced Rotary training (CNATRA, 2024b). This is equivalent to the Legacy pathway’s 156G syllabus. There are some slight differences between the 156G syllabus, and this combined COPT-R/CORPS syllabus. Most of the differences include additional instruction for instrument training. This is to make up for the missed instrument instruction SNAs usually receive at their fixed-wing instruction in Primary. It is important to note that CORPS SNAs receive no flight instruction, other than NIFE, before beginning the COPT-R/CORPS syllabus. Because of this, some flight instruction is waived for the COPT-R students, as they receive their introductory helicopter course from contractor instructor pilots (CNATRA, 2024b). The following is a description of the differences between the Legacy 156G syllabus and the combined COPT-R/CORPS syllabus (CNATRA, 2024b).

Ground training prepares students with 21 hours of instruction in subjects like safety, GPS, and MPS (CNATRA, 2024b, p. viii). This prepares students for the following flight support phase. This ground training is identical to the 156G Advanced Rotary syllabus. The flight support phase of training preps students with 167.95 hours of instruction on a broad array of subjects focused on giving students a solid foundation of helicopter knowledge (CNATRA, 2024b, p. viii-ix). This includes 64.8 more hours of instruction than the 156G syllabus. The areas of extra instruction include one more hour in Crew Resource Management, four more hours in Preflight and Cockpit procedures 'B', 14.9 more hours for basic instrument flight procedures, 37.1 more hours in IFR Instrument flight procedures, and 7.8 more hours in visual navigation flight procedures (CNATRA, 2024b). The subjects include all areas previously stated in the Advanced Rotary description.

The flight phase of the COPT-R/CORPS syllabus has four categories. The first two are FTD events, more commonly known as flight simulators. The first is a level six FTD and the second is a level seven FTD. Level seven FTD events are the more sophisticated training. SNAs receive 19.5 hours with level six FTDs covering cockpit procedures, flight lines, course rules, instruments, and emergency procedures (CNATRA, 2024b, p. xi). SNAs receive 28.6 hours with level 7 FTDs covering autorotation, tail rotor maneuvers, aircraft handling, emergencies, instruments, navigation, search and rescue, formation, and night vision flying (CNATRA, 2024b, p. xi).

The next two categories are dual flights and solo flights in the TH-57B/C helicopter. Dual flights are conducted with instructors and/or other students. SNAs receive 71 dual flights with 130.8 flight hours. That is 12 more flights and 23.2 more hours than the Legacy Advanced Rotary syllabus. These additional flights cover 6.6 more hours in types of familiarizations, 3.4 more hours in day navigation, 7.2 hours more in radio instruments, four more hours in instrument navigation, and two more hours in formation (CNATRA, 2024b).

Students receive three total solo flights adding up to 4.2 flight hours (CNATRA, 2024b, p. xi). In total COPT-R/CORPS students conduct 37 FTD flights, taking 48.1 hours, and conduct 64 actual flights, giving 135 flight hours (CNATRA, 2024b, p. xi). Meaning the COPT-R/CORPS syllabus provides 23.2 actual flying hours more than the 156G Advanced Rotary syllabus (CNATRA, 2024b). This observation is specifically true for CORPS students. However, because COPT-R students receive 50 hours of helicopter instruction before the COPT-R/CORPS syllabus, some flight events are waived for COPT-R students (CNATRA, 2024b, p. xii). The waived events include four hours in familiarization, 3.4 hours in day navigation, 7.2 hours in radio instruments, four hours in instrument navigation, and two hours in formation (CNATRA, 2024b). This decreases the total actual flying hours from 135 to 114.4 hours for COPT-R students. The specific waived events are FAM4104A through FAM 4106A, NAV4004A, NAV4005A, RI4005A through RI4008A, INS4005A, INS4006A, and FRM4004A (CNATRA, 2024b, p. i-9).

When looking at the COPT-R/CORPS syllabus it seems that students completing this syllabus receive more flight time than then Legacy students, however it is important to remember that Legacy students receive six to nine months of fixed-wing instruction that includes instrument training, hence the large focus on extra hours devoted to instrument instruction within the COPT-R/CORPS syllabus.

III. LITERATURE REVIEW

This chapter reviews the history of the discussions about consolidating naval helicopter training. Most of these have been focused on the Air Force and Navy joining Army helicopter training and have been ongoing since 1965 (Webb, 1996, p. 1). Despite conversation on the topic, Naval Aviation has been reluctant to pursue helicopter training consolidation with the Army. Continuous congressional hearings, U.S. General Accounting Office (GAO) investigations, graduate research, and Inspector General reports demonstrate the significance of this study.

A. HISTORICAL PROPOSALS AND REPORTS

The first discussions on helicopter consolidation for the Department of Defense can be found in a House Appropriations Committee hearing on December 31st, 1965, where Congress questions Navy officials about the possibility of eliminating fixed-wing training for helicopter pilots. They were questioned if fixed-wing training, for helicopter pilots, was wasteful and if significant savings could be made if the Navy and the Air Force joined Army helicopter training (*Operation and Maintenanc*e, 1965, p. 266). Two Navy officials testified Admiral Shinn, Commander of the Naval Air Systems Command (NAVAIR), and Admiral Gillette, a Naval Aviator from the Office of the Chief of Naval Operations (OPNAV). Both admirals explained the necessity for this additional training and opposed consolidation. Admirals Shinn and Gillette note Naval Aviation had different goals than Army Aviation that include developing aviators for the naval mission set and future career opportunities that fixed-wing training provides (*Operation and Maintenance*, 1965, pp. 266–268). This hearing shows the pride and emotional attachment to traditional Naval Aviation and the reluctancy for change. Besides this, the admirals mention costly implications that will continue to be overlooked by Congress.

Despite the Navy's opposition, on December 17th, 1969, Congress directed the Department of the Navy, as well as the Air Force, to abolish fixed-wing training for helicopter pilots by December 31st, 1970 (H.R. 15090, 1969). It is important to note the historical context of these decisions as it provides context for such an abrupt decision without more discussion. The United States was nearing peak involvement in the

Vietnam War and helicopters were proving very effective while also showing large losses. The Army alone lost about 100 helicopters in Vietnam (Lepore, 1994, p. 32). From this, it can be gathered that Congress had great pressure to act quickly and leave little time for deliberation.

While the Navy deliberated eliminating fixed-wing training, the Air Force complied with the directive and eliminated their fixed-wing training program for helicopter pilots, and joined the Army's helicopter training at Fort Rucker, Alabama (U.S. General Accounting Office [GAO], 1974, pg. 4). In a December 31st, 1970, Military Construction Appropriations House hearing, Congress questions Captain Hathaway, Office of Chief of Naval Operations (OPNAV) (AIR), on the steps taken to eliminate fixed-wing training, since the directive one year prior. They identified the need for increased helicopter trainer hours and recognized that additional training locations would be necessary. Captain Hathaway points out that operating helicopter trainers is much more costly than fixed-wing aircraft (*Military Construction Appropriations*, 1970, p. 334). He concludes by referencing a 200-hour congressional requirement to become a military aviator and declares that fixed-wing training is the most cost-effective way to meet this requirement (*Military Construction Appropriations*, 1970, p. 334). Congress provided no further directive for the Navy to follow. It is important to note the differences in arguments made by Navy officials from 1965 to 1970 where Admiral Shinn touched largely on career impacts and the specific mission requirements of Naval Aviation and Captain Hathaway claimed that eliminating fixed-wing training was completely cost ineffective. Subsequently, the latter argument sparked a variety of reports and research into cost savings and proposed training outlines.

The military was downsizing after the peak of the Vietnam War making it a suitable time to consolidate undergraduate helicopter pilot training (UHPT). A GAO report from 1974 outlines the ample capacity at Fort Rucker, AL, increased training requirements, and cost savings. (GAO, 1974, p. 5). The Navy planned to reduce the number of undergraduate pilot training (UPT) sites, and pilots trained, for an estimated savings of $9.3 million annually, with a one-time cost of $1.5 million to modify existing facilities (GAO, 1974, pp. 6–7). These savings showed initiative by the Navy to comply with reduction pressure, however, it delayed consolidation with the Army. They point out that the Navy's analysis included the Navy's TH-57 rotary aircraft operating costs, however, the Army operates the TH-55A, which is much less expensive to operate (GAO, 1974, p. 10). The report disagreed with the Navy's utilization of fixed-wing training as a screener tool arguing neither the Army nor Air Force consider actual flight screening necessary (GAO, 1974, p. 12). The question here is not whether actual flight screening is necessary but rather if it is efficient. An analysis of student jet pilot attrition between the Air Force and the Navy could help decipher this argument. The GAO acknowledged that Navy officials believed Navy-trained helicopter pilots were much more familiar with aerodynamics and meteorology and had extensive instrument training compared Army Aviators. (GAO, 1974, p. 12). The GAO suggests this training could be conducted at follow on training but provide no cost estimates (GAO, 1974, p. 13). From a cost saving perspective, consolidation in any form appears useful. However, this report did outline the first mention of secondhand effects that needed to be considered relating to a joint syllabus and program restructuring. Hence, why a study was initiated to dive deeper into proposed solutions of consolidation.

A report in 1975 by the Interservice Training Review Organization (ITRO) Helicopter Training Subcommittee proposed three different approaches to consolidation (McAuley & White, 1976, p. 32). The first approach, the Long-Range Pilot Training System (LRPTS), was an updated version of the status quo at the time (pp. 32–37). The second approach, the All-Helicopter Option, would consolidate all branches and Fort Rucker, Alabama and exclude fixed-wing training from naval helicopter pilots (pp. 38–40). The last approach included Primary fixed-wing training before joint helicopter training at Fort Rucker, Alabama (pp. 40–42). A new Proposed Consolidated Syllabus was constructed by Navy flight instructors after reviewing the Army's helicopter training program (pp. 43–45). It included a Navy specific helicopter indoctrination, five short phases of consolidated helicopter training at Fort Rucker, and then a four-week service specific training (pp. 43–45). McAuley and White (1976) note that this proposed syllabus eliminates any progress made in maritime aviation specific training (p. 47). While this consolidated syllabus aligned with the goal of cost-savings, it is presumed that Congress was hesitant to move Naval Aviation backwards in training proficiency. With previous direction from Congress, however, the DoD decided to act.

After the 1975 ITRO report, a DoD directive was issued to the Navy and the Army to begin consolidation plans using the All-Helicopter Option by October 1st, 1976, (GAO, 1976, pg. 4). Although shortly after, Congress halted consolidation in favor of more studies on the proposed syllabus. This reluctancy of Congress can come from another analysis of the geopolitical context. By 1973, the U.S. was in full withdrawal mode from Vietnam after the signing of the Paris Peace Accords (Sander & Haas, 2022). Expedited helicopter pilot output was no longer needed or heavily emphasized. However, force reduction was popular as the defense budget was shrinking. The shrinking budget puts more emphasis on upfront cost savings rather than future savings, making the helicopter consolidation idea unattractive. Although the budget was shrinking, Congress likely did not want budget cuts to affect proficiency or adaptability in aviation training. The U.S. needed to maintain its strength as it pivoted from hot conflict in Vietnam to the cold conflict with the stronger Soviet Union. This context better explains the change in attitude Congress presents towards helicopter consolidation.

McAuley and White (1976), analyzes the 1974 GAO report as well as the 1975 ITRO report. The thesis outlines some incorrect assumptions made by the GAO and the ITRO that were correctly voiced a decade prior by Admiral Shinn in the 1965 house appropriations hearing. The study suggests the Army's TH-55A could not be adjusted to include the radio-navigation system that the Navy's TH-57 offered, and the Army would not be able to conduct maintenance on the Navy's TH-57 engine system (McAuley & White, 1976, pp. 25–26). The discrepancies between the aircraft would make it difficult to consolidate. McAuley and White (1976) also note that the consolidation proposal bypasses the fixed-wing screening process possibly indirectly funneling high performers into the helicopter pipeline, therefore decreasing performance in other pipelines and possibly increasing attrition (pp. 54–58). In addition, follow on fixed-wing training would most likely be needed to reduce career impacts, like seen during the Vietnam War with Marine Corps aviators, however this would cause further cost growth later (pp. 75–76). It was concluded that the consolidation was not efficient or cost effective due to expensive helicopter training compared to fixed-wing and overtraining for Army helicopter pilots. Lastly, moving all DoD UHPT to Fort Rucker, Alabama because of excess Army helicopter trainers is not proper justification to consolidate (pp. 84–85). This study sheds light on the reluctancy of the Navy to adopt a helicopter consolidation program and provides evidence to claims made by Navy officials ten years prior.

A 1977 GAO report also analyzed the ITRO proposals and provided recommendations to Congress. The report analyzed cost savings values from the proposed all-helicopter syllabus and concluded that savings would be greater than initially stated. The GAO report did not consider the 1976 thesis. The report addressed instrument instruction as well as maritime specific training. The GAO concluded that instrument instruction could be conducted at service specific training following the joint training and that the maritime specific training was a minor part of the syllabus (GAO, 1977, pp. 4–5). The GAO does not address career implications, pipeline interference, or possible follow-on fixed-wing training.

Contradictory findings sparked a request by Congress for an objective cost comparison on February 13, 1979 (GAO, 1979). This showed their concern for possible consequences that were not addressed by the GAO. The GAO responded to Congress on September 20th, 1979, by analyzing a joint memorandum from the Navy and the Army with savings estimates (pp. 2–3). They add savings from selling the Navy's TH-57s, costs of the economic impact of helicopter training in the Pensacola Florida area, costs from activating additional Army aircraft out of storage, and reduction in retirement benefits for unneeded personnel (GAO, 1979). The report acknowledged that operating a helicopter per hour costs more than a fixed-wing trainer. However, they argued helicopter only students would have enhanced rotary-wing skills. They also suggested the costs would diminish as simulators became more prevalent for training exercises (p. 4). They backed their argument with the Secretary of the Navy's agreement for the syllabus. This agreement indicated to Congress the support behind the proposal.

The report mentions the possibility of needing extra training locations in case of conflict. Along similar lines, it outlined the increased pilot needs as the Cold War was building (GAO, 1979, p. 7). Defense spending grew in 1978 through the 1980s as tensions increased with the Soviet Union (Budget of the United States Government, 2024). This detail proves heavy given the context of international tension. It concludes, however, that there is more evidence that supports consolidating UHPT training (GAO, 1979). The report did not touch on the cost of follow-on fixed-wing training, career impacts, or other aviation pipeline attrition rates. From many reports and estimates it can be gathered that there were cost savings hidden within helicopter consolidation. That does not prove that it would improve readiness, adaptability, or pilot performance. Given the climate of the world at the time, Congress was not ready to risk any of those aspects. Helicopters changed ground warfare during Vietnam, but the Cold War shifted focus towards nuclear deterrence and nuclear strength to compete with advanced enemy technology (GAO, 1981). In an era of looming war, emergency capacity for all aviation training was most likely a concern.

A 1980 GAO report provided the same results as before but with more justification in an attempt to persuade Congress. Congress had claimed that the previous GAO reports were not fair-minded analyses and if they were, they would have concluded differently. The GAO refutes these claims by outlining the objectivity of their office and their work (GAO, 1980, p. 4). The report continues to express that fixed-wing training is not needed for proficient helicopter pilots and that the Army's cost estimates include time for naval helicopter pilots to practice carrier landings for 1.5 hours (GAO, 1980, p. 4). The most significant aspect of this report is its acknowledgement of the bias and controversy of both sides. The tensions were high, and a clear unbiased approach seemed to be lacking from all sides. Congress had continuously delayed the implementation of consolidation since 1976, claiming lack of research on unintended consequences. Conveniently for Congress, the consequences for such a program were playing out in real time inside the Air Force.

Since 1971, the Army and Air Force have conducted joint UHPT, however, beginning in 1976, the Air Force implemented follow-on fixed-wing training to select helicopter pilots to preserve career mobility in its rotary-wing community (Massey, 1985). By 1985, serious concerns were revealed about the effectiveness of this approach. (Massey, 1985) conducted a critical review and found that Air Force helicopter pilots were constrained to a predefined operational track unless selected for fixed wing undergraduate pilot training. The fixed-wing training was only available to pilots between their fourth and seventh year of service and added 15–18 months of instruction (Massey, 1985, p. 13). This was a similar approach taken by the Marine Corps to redesignate pilots after the Vietnam War (McAuley & White, 1976, pp. 75–76). Air Force helicopter pilots without fixed-wing training would be designated as helicopter-only pilots with few paths to Command and Staff positions (Massey, 1985, p. 12). The study also noted that only 4.7% of aviators in the Air Force were helicopter pilots (p. 16). The Navy, however, had a much larger percentage of helicopter pilots, meaning a program like this would have had a much greater effect on Naval Aviation. The study proposed three options to remedy these issues. The first option eliminates the fixed-wing conversion program by adding fixed-wing wing training at the beginning of a pilot's career during the undergraduate portion of training, like the naval helicopter pipeline (pp. 19–21). The second would keep the follow-on fixed wing training but remove career time requirements to enter. Massey argues this would provide more opportunities for more helicopter pilots to advance later in their career and reduce any bottleneck of applicants (pp. 21–22). Additionally, the second option incorporates a change from full UPT to a short course conversion training specific to the platform. This option would incorporate simulator training as well (p. 22). Massey concludes by recommending the Air Force adopt option two immediately and suggests more studies on helicopter to fixed-wing conversation before the implementation of alternative training methods (p. 24). From this context, the Navy's resistance to consolidation emerges not as tradition-bound thinking but as a strategic stance grounded by real informed consequences. The Air Force's own findings demonstrate that while consolidated training may present short-term cost-effectiveness, it can unintentionally constrain long term service capabilities and career progression.

The 1992 Comptroller General Audit Report detailed the similar cost savings estimates from previous GAO reports and finally addressed some possible consequences of consolidation like the reduced availability of fixed-wing T-34C instructor pilots (Lieberman, 1992, p. 24). The report, however, explains that current force reduction would reduce instructor pilot needs anyway (p. 24). This argument is only valid during times of force reduction. However, consolidation has been recommended by the GAO during times of force build up as well, like during the Vietnam War and then the Cold War. The report continues to address career implications but concludes that the percentage of helicopter pilots that transition to fixed-wing is insignificant (p. 24). The report also refutes Navy claims about needing fixed-wing training for the proposed V-22

Osprey aircraft. The audit concludes that the production of V-22s has not yet materialized and cannot be used to justify the need for fixed-wing training (p. 25). Despite this argument, the initial production for the V-22 eventually began in 1996 (Gertler, 2009, p. 7). The audit acknowledges Navy claims suggesting the Air Force is not satisfied with Army helicopter training, something largely discussed in 1985 Air Force study. The Comptroller General points out that the Air Force Chief of Staff continued with consolidated Army training even after considering reimplementing initial fixed-wing training (Lieberman, 1992, p. 25).

The audit covered the planned procurement of new joint fixed-wing training aircraft under the Joint Primary Aircraft Training System (JPATS). JPATS is an effort to reduce costs and improve interoperability by procuring a joint Air Force and Navy system. The report determines that JPATS procurement plans are premature and overestimated for both services (pp. 5–15). The purpose of the audit was to locate unnecessary expenses and better possibilities, despite this the military is not always in the business of saving money, especially if it affects mission critical capabilities. This idea was demonstrated fully when the Air Force reinstated fixed-wing training for helicopter pilots in 1993 and JPATS implementation in 1995 (Hadley, 2021; McKinley, 2000).

Even though the Air Force returned to prior fixed-wing training, many conversations regarding helicopter consolidation were still being continued in 1996. A 1996 Marine Corps student report does not mention the Air Force's 1993 decision to reimplement fixed-wing training. This is a crucial piece of information since this reimplementation further emphasizes the possible importance of fixed-wing training for rotary-wing pilots. The study, however, does mention that consolidation has been a political topic of disagreement for years. As emphasized in the McAuley and White 1976 thesis, instrument differences between training aircraft would make it impossible to consolidate, without a major change. If consolidation were to occur, technological compatibility would need to be developed across training aircraft. With the implementation of JPATS, in 1996 the DoD gave a $7 billion contract towards building fixed-wing aircraft with the purpose of joint training (Webb, 1996, p. 26). Despite the DoD investment and positive technological output of JPATS, the recommendation of the 1996 student report reverts to the original consolidation idea to have all DoD UHPT be conducted at Fort Rucker, AL (p. 36). It also mentions that initial fixed-wing training for Navy and Marine Corps pilots be removed and the investment into JPATS should be minimized (p. 36).

Similarly, as mentioned in the studies above, the 1996 study addresses the argument of distinguishing aptitude with flight simulators instead of keeping fixed-wing training. However, the study also makes a new argument that the Aviation Selection Test Battery (ASTB-E) could be used in addition to the simulations (Webb, 1996, pp. 27–28). The arguments previously have justified these screener recommendations through Air Force examples. However, these justifications have less impact as the Air Force reinstated fixed-wing training for pipeline screening. Another ITRO study outlined by Webb 1996, provides a new option of consolidation not referenced before. This option includes a shorter fixed-wing screener phase for Navy and Marine Corps students and then a transition to helicopter training with the Army and Air Force and Fort Rucker (pp. 13–14). This study concluded that the option was not economically feasible (p. 14). As the consolidation debate went on, it seems that feasibility was decreasing as pilot capacity at Fort Rucker was nearing full, and new facilities proved to be needed.

A 1999 GAO report attempts to explain why consolidation has not happened and how efficiency could improve. The report states that the Air Force has increased their needs for pilots and activating new training locations (GAO, 1999, p. 1). It claims that any effort to consolidate this training across services will likely not occur without congressional support (GAO, 1999, p. 12). Predicted pilot shortages could explain why the Air Force reinstated fixed-wing training. The report mentions that jet pipelines are most impacted (GAO, 1999, pp. 10–11). Most likely they would sacrifice helicopter pilots for the opportunity for more jet pilots. Heading into the 21st century, consolidation looked glim with attempts to increase pilot requirements.

Overall, these studies and reports demonstrate the longevity of the discussion of helicopter consolidation. For over 60 years, there have been continuous debates and discussions on the approach to implementation of helicopter consolidation. There has yet to be an effective agreement which meets the goals of training and saving efficiency in addition to mission effectiveness between political entities, the DoD, and the military branches. The United States Navy has remained steadfast since the initial discussion in their belief of fixed-wing training for rotary-wing pilots. A training method that incorporates both helicopter-only and fixed-wing pathways, could provide rapid production of naval helicopter pilots while maintaining the status quo of initial fixed-wing training for most aviators. However, the effectiveness of such a program needs to be analyzed.

IV. METHODOLOGY

A. DATA

CNATRA provided the Naval Postgraduate School with a memorandum of possible research areas for the Naval Air Training Command in May of 2024 (Brophy, 2024). From this memorandum, a research proposal on the newly implemented rotary-wing focused pathways was developed. The data set utilized for the statistical analysis in this study was received from CNATRA. CNATRA stripped the dataset of any personally identifiable information (PII) before providing us with the data. The dataset included arbitrary student numbers corresponding to important background information needed for detailed regression analysis.

This chapter provides the data description and data analysis methods used in this research. This chapter outlines the variables used for the regression analysis which include the Naval Flight Student (NFS) flight event scores, pipeline, Aviation Selection Test Battery (ASTB-E) scores, Naval Standard Score (NSS), commissioning source, branch of service, squadron, race, and sex. Additionally, this chapter provides a brief description of the flight events analyzed, summary statistics of the sample group, and limitations.

1. Flight Event Score

Every graded event, in the many pathways of Advanced Rotary training, includes graded maneuvers. The specific syllabus contains the different flight events and the graded Maneuver Item File (MIF) for each event (CNATRA, 2023a, p. xiii). The MIF contains a standard score for each maneuver that students are expected to achieve called the MIF required score (CNATRA, 2023b, p. G-2). Achieving a lower or higher score than the MIF required score is possible. A student's score in relation to a specific maneuver is called the item grade. If a student fails to reach the MIF-required score for a specific maneuver, they can achieve a higher-than-MIF-required score on a different maneuver to make up for the lost points (CNATRA, 2023a, p. 6-2).

Within a specific event, all the MIF-required scores will be added together to get the total MIF-required score. Once a student completes the event, the item grades are added to get the total item grades. Then the total item grades is divided by the MIF-required score (CNATRA, 2023b, p. G-1).

$$\frac{\text{Total Item Grades}}{\text{Total MIF Required Score}} = \text{NFS Score} \tag{0.1}$$

This is called the NFS score. If a student performs to standard in all maneuvers on the MIF, then their NFS score will be a score of one. The data provided by CNATRA contains NFS scores for each student from each event. Item grades were not provided. Figure 4 is an example of an event score sheet. In Figure 4, the course training standard (CTS) reference is "the behavior associated with each maneuver" (CNATRA, 2023b, p. 6-2).

CTS Reference	Maneuver	MIF Required	Item Grade
1	General Knowledge/Procedures	4+	4
2	Emergency Procedures	4+	4
3	Headwork/Situational Awareness	4+	4
4	Basic Airwork	4+	4
5	In-Flight Checks/Fuel management	4+	4
6	In-Flight Planning/Area Orientation	4+	4
7	Task management	4+	4
8	Communication	4+	4
9	Mission Planning	4+	4
10	Ground Operations	4+	4
11	Takeoff	4+	4
12	Departure	4+	4
68	Route Management	4+	4
69	Standard Time Corrections	3+	4
70	Standard Course Corrections	3+	4
34	Arrival/Course Rules	3+	2
35	Landing Pattern	4+	3
36	No-Flap Landing	1+	2
36	Takeoff Flap Landing	1+	2
36	LDG Flap Landing	1+	2
71	ATIS/PMSV/FSS/Weather	4+	4
	Total	72	75
	NFS Score	1.041666667	

Figure 4. Naval Flight Student Score Example. Source: C. Roche (email to author, November 4, 2024)

The NFS score was used as the output, dependent variable in the regressions. This gives us a performance metric uniform across the pipelines and instructors to compare the abilities of SNAs.

A student aviator can receive an unsatisfactory (UNSAT) performance which could render an NFS score as low as 0.5. An UNSAT can either be a regular UNSAT during a flight or a Ready Room UNSAT (RRU). Events designated RRU are subject to the same grading scale as UNSAT events. “An RRU is defined as either of the following:

(a) An NFS is inadequately prepared for the scheduled event…(b) The NFS fails a non-academic examination (e.g. NATOPS quiz)" (CNATRA, 2023b, p. 6-8). A regular UNSAT means that the proficiency of a flight was unsatisfactory. The student aviator cannot continue any training until the event is redone and passed (CNATRA, 2023b, p. 7-1).

Proficiency advance (PA) can be received by student aviators when their performance in a training block or flight event is deemed to be above the expected standards and therefore the next flight event/training block is not necessary for their training. The student aviator then advances to the next new training block (CNATRA, 2023b, p. 6-4).

2. Pipeline

The pipeline variables include the Legacy pipeline, COPT-R, and CORPS. These independent variables are the primary area of the analysis as the proficiency of student pilots are determined. The Legacy pipeline (fixed-wing training for helicopter pilots) is used as the base case for the regression analysis. This means the results express student scores in comparison to students that went through the Legacy pipeline.

It is important to note there was a small group try out (SGTO) fixed-wing syllabus contained in the Legacy pipeline (CNATRA, 2022). This alternative Primary syllabus, called Avenger, incorporated more virtual reality and mixed reality training methods (CNATRA, 2022, p. 1). The sample group contained students that received this alternative training, making it an important variable to account for in the regressions.

3. ASTB-E Scores

The Aviation Selection Test Battery (ASTB-E) is a naval aptitude test that must be taken by any individual to be considered for Naval Aviation selection. The ASTB-E was designed to create a baseline to predict how well flight students should be expected to perform in flight school. The ASTB-E is graded on a bell curve that considers the scores of every individual who took it prior. Upon completion of the ASTB-E test takers will receive five scores: OAR, AQR, PFAR, FOFAR, and LPSS. The AQR, PFAR, and FOFAR make up the 3-score combination (e.g. 4 5 5) (Campbell, 2023). The OAR is the

Officer Aptitude Rating. The AQR is the Academic Qualifications Rating which factors in all subsets of the test, but most prominently the math skills portion. The PFAR is the Pilot Flight Aptitude Rating which factors mostly the aviation and nautical info subtest, as well as the spatial apperception subtest (Campbell, 2023). Lastly, the FOFAR is the Flight Officer Flight Aptitude Rating which heavily influences everything but the math skills subtest (Campbell, 2023). The ASTB-E has changed a few times since its creation, as it is designed to accurately represent the student's predicted performance in flight school. The latest major change for the ASTB-E was in 2013 (Campbell, 2023). The same ASTB-E version was utilized to derive student data.

4. Naval Standard Score

Every flight student has an NSS. The NSS score represents the performance of a flight student over the course of flight school. Their performance during each flight event culminates in this overall score (CNATRA, 2023b, p. 2-1). The NSS is similar to a Grade Point Average (GPA) score. Each flight student represented in the data, regardless of the pathway they followed, has an NSS score providing a baseline for comparison of performance.

SNAs academic NSS score is used from NIFE as one of the input variables. This can be thought of more as a traditional GPA as there is no flight event scoring compiled within it. Using the NIFE academic NSS score will be the best benchmark to determine the knowledge level of the students when arriving at Advance Rotary training. This score is the last direct comparison students have before the program pipelines start to differ, until they reach Advanced Rotary training.

5. Commissioning Source

The sample size is made up of officers from many different commissioning sources. The input variables, for indicating commissioning source, include Naval Reserve Officer Training Corps (NROTC), Coast Guard Academy, Officer Candidate School (OCS), Platoon Leaders Course (PLC), and an "other" category. SNAs from the Naval Academy were included as the base case for the sample group. Different commissioning sources included different levels of instruction on relevant topics for Naval Aviation.

Naval Academy SNAs might be much more familiar with aviation topics compared to OCS graduates. Including these as input variables is important to account for any knowledge gaps that may exist before the area of analysis. For analysis purposes the Coast Guard Academy variable and Coast Guard service distinguisher variable are the same. This is because every Coast Guard SNA in the sample group commissioned through the Coast Guard Academy.

6. Branch of Service

The Coast Guard is participating in both the COPT-R and CORPS pathways. Some flight events in Advanced Rotary training are waived for Coast Guard students but still required for Navy and Marine Corps students. For the data analysis, Coast Guard students were included in the sample groups. Flight events scores from any waived events were not analyzed to ensure Coast Guard students were continuously part of the sample group. The waived events are minimal and very specified, making training differences between Coast Guard, Navy, and Marine Corps negligible.

The Marine Corps has not allowed any of its flight students to participate in either the COPT-R or CORPS pathways. Marine Corps Advanced Rotary students are included in the sample group for comparison. A Marine Corps Advanced Rotary student is a great example of a Legacy pipeline student. Including Marine Corps students provides a better understanding of the Legacy pipeline's strengths and weaknesses.

7. Squadron

There are three different squadrons that conduct Advanced Rotary training, HT-8, HT-18, HT-28, however only two contain the syllabi that were analyzed (CNATRA, n.d.-a). HT-8 squadron was conducting a different syllabus called Advanced Helicopter Training System Student Naval Aviator Master Curriculum Guide 2024, a syllabus not as comparable as the 156G syllabus (CNATRA, 2024). It is important to include the different squadrons in the regression to account for possible grading differences between instructors, as instructors are only assigned to a specific squadron.

8. Race and Sex

Race is also an input variable used to account for any variability. The variables include pending/unknown, other race, multi-race, African American, and Asian. White was used as the base case input. The regression analysis accounts for any discrepancies in performance based on race or sex. Therefore, strictly analyzing the effect of the programs themselves.

9. Flight Events

The following are the 15 flight events that were chosen for the regressions. Each of these has a description in the syllabus that explains what that flight event will be covering. In addition to the description, each flight event has a MIF. Familiarization (FAM) flight events cover the basics of all flight movements (CNATRA, 2023b). Logistics (LOG) flight events cover items that incorporate the use of aircraft systems to support mission operations (CNATRA, 2023b). Basic Instrument (BI) flight events develop familiarity with traditional aircraft instrumentation (CNATRA, 2023b). Navigation (NAV) flight events focus both on daytime and nighttime navigation in the aircraft (CNATRA, 2023b). Radio instrument (RI) flight events perform navigation through the use of avionics (communication and navigation equipment) (CNATRA, 2023b).

a. FAM4004A

Familiarization flight 4004A tests: "Landing criteria for emergencies, definitions, aircraft limitations (NATOPS), caution system and associated responses, single instrument indications, autorotative aerodynamics" (CNATRA, 2023a, p. II-19). The MIF for FAM4004A is available in the appendix.

b. FAM4203A

FAM4203A tests: "Vortex ring state, control feedback, any previously briefed emergency procedure or aircraft limitation, solo guidelines, RWOP/SOP" (CNATRA, 2023a, p. II-31). The MIF for FAM4203A is available in the appendix.

c. FAM4390A

FAM4390A is a checkride before solo event FAM4401A. It covers "Any previously discussed system, limitation, or emergency procedure; special VFR course rules; prohibited maneuvers (RWOP/SOP); hot seat procedures; Site Watch procedures; solo observer requirements and responsibilities; lost plane procedures; and high wind recovery procedures" (CNATRA, 2023a, p. II-34). The MIF for FAM4390A is available in the appendix.

d. FAM4502A

FAM4502A tests: "Mechanical versus virtual axis, phase lag, dissymmetry of lift, geometric imbalance, blowback, uncommanded right roll during flight below 1 G, tail rotor malfunctions." (CNATRA, 2023a, p. II-40). The MIF for FAM4502A is available in the appendix.

e. LOG4002A

Logistics flight 4002A tests: "CRM, power required exceeds power available, hover in-ground effect (HIGE)/hover out-of ground effect (HOGE), power checks, wave-off during CALs/externals, engine failure with external load, weight and balance" (CNATRA, 2023a, p. II). The MIF for LOG4002A is available in the appendix.

f. FAM4601A

FAM4601A tests: "TH-57C electrical system, trim techniques in the TH-57C, weather brief requirements, course rules, torque limitations, preflight differences between 'C' and 'B' model aircraft, abnormal starts (igniter failure, hot start, hung start), fire on start, emergency shutdown, and engine failure in flight" (CNATRA, 2023a, p. II-53). The MIF for FAM4601A is available in the appendix.

g. FAM4602A

FAM4602A tests: "AFCS failure, hydraulic system failure, hydraulic power cylinder malfunction, transmission chip light, sprag clutch slippage, and post-refuel/hot seat checklist" (CNATRA, 2023a, p. II-53). The MIF for FAM4602A is available in the appendix.

h. FAM4701A

FAM4701A is a night flight that tests: "Dark adaptation, night hover scan, night visual scan techniques, spatial disorientation, use of lights, visual approach slope indicator (VASI)/precision approach path indicator (PAPI), helicopter procedures at night, night course rules (Whiting, Santa Rosa, Duke, Choctaw), emergency procedures at night, landing site evaluation at night, engine failures at night, Landing zone lighting, use of lights, night vision, autorotations at night" (CNATRA, 2023a, p. II-62). The MIF for FAM4701A is available in the appendix.

i. BI4003A

Basic instrument flight 4003A tests: "Required equipment for IMC flight, NDZ "on top" weather briefing, and NDZ stereo-type flight plans, required voice reports, initial radio contact with ATC, modified normal approach" (CNATRA, 2023a, p. 60). The MIF for BI4003A is available in the appendix.

j. BI4103A

BI4103A tests: "Airspeed limits, standby generator minimum airspeed, altimeter error, attitude gyro malfunction (IMC), standby battery, turbulence penetration" (CNATRA, 2023a, p. II-64). The MIF for BI4103A is available in the appendix.

k. NAV4003A

Tests items in both NAV4001A, "VFR filing and flight procedures, special visual flight rules (SVFR), course rules, sectional/aeronautical charts, CRM, airspace considerations specific to planned route of flight, fuel planning/computation, lost aircraft procedures" (CNATRA, 2023a, p. II-69) and NAV4002A "Use of GPS, wake turbulence, land and hold-short operations (LAHSO), air/hover taxi, airport operations with and without control tower" (CNATRA, 2023a, p. II-69). The MIF for NAV4003A is available in the appendix.

l. NAV4101A

NAV4101A tests: “Night navigation techniques, night in-flight emergencies, night emergency landing site evaluation, airport lighting, inadvertent IMC” (CNATRA, 2023a, p. II-71). The MIF for NAV4101A is available in the appendix.

m. RI4101A

Radio instrument flight 4101A tests: “Required equipment for night flight, electrical system malfunctions while IMC, flight control malfunctions while IMC, en route/feeder routes, minimum safe altitudes/emergency safe altitudes, MOCA/MCA/MRA, DD-1801” (CNATRA, 2023a, p. II-97). The MIF for RI4101A is available in the appendix.

n. FAM4990A

FAM4990A tests: “Any aircraft system, NATOPS limit, or emergency procedure, course rules, special VFR course rules, solo weather minimums, squadron SOP, hot seat procedures, lost plane procedures, and high wind recovery procedures” (CNATRA, 2023a, p. II-100). The MIF for FAM4990A is available in the appendix.

o. RI4290A

RI4290A tests: “Any previously briefed item in the instrument syllabus with a heavy emphasis on FAR/AIM, CNAF M-3710.7, and emergency procedures” (CNATRA, 2023a, p. II-103). The MIF for RI4290A is available in the appendix.

B. DATA ANALYSIS

1. Data Cleaning

From the data received from CNATRA, demographic information for each student in conjunction with the anonymized data identification number was inputted. 15 flight events that are the same across COPT-R, CORPS, and Legacy were narrowed down. These flight events demonstrate a variety of significant skills that are crucial indicators for comparison. For each of the 15 flight events, every student aviator’s NFS score was inputted. Then 15 separate linear regressions for each flight event with the NFS scores and demographic information were conducted. Ordinary Least Squares (OLS) was utilized in the regression analysis.

2. Summary Statistics

Identifying the baseline academic and demographic characteristics of the sample group was needed to effectively compare downstream performance outcomes. Variables like prior academic scores and service representation that could affect student performance regardless of training pipeline are important to understand and account for. These summary statistics are presented in Tables 1 and 2. Table 1 represents the group summary statistics for the first flight event we analyzed, FAM4004A, and Table 2 represents the last flight event we analyzed, RI4290A. Because the sample group was completing the syllabus at the time of data extraction, the sample size decreased over time as students had not progressed far enough into the syllabus.

Table 1. Summary Statistics for First Flight Event FAM4004A

		Legacy (first event)		COPT-R (first event)		CORPS (first event)	
		Percent/Mean	(s.d.)	Percent/Mean	(s.d.)	Percent/Mean	(s.d.)
Academic Pre Scores	AVG AQR	6.43	(1.14)	6.27	(1.20)	6.69	(1.20)
	AVG PFAR	6.86	(1.14)	6.26	(1.194)	6.19	(0.91)
	AVG FOFAR	6.71	(1.00)	6.58	(0.842)	6.81	(0.83)
	AVG NIFE NSS Score	49.52	(8.72)	45.83	(10.23)	49.63	(9.51)
Sex	%Male	86.36		60.38		68.75	
	%Female	20.66		39.62		31.25	
Race	%White	69.84		29.80		68.75	
	%Black	4.13		0.00		0.00	
	%Asian	4.55		1.89		0.00	
	%Multi Race	1.65		0.00		0.00	
	%Pending	13.64		67.93		31.25	
	%Other	6.20		0.00		0.00	
Commissioning Source	%USNA Grads	27.27		49.06		43.75	
	%OCS Grads	16.12		3.77		0.00	
	%ROTC Grads	23.55		22.64		18.75	
	%PLC Grads	21.90		0.00		0.00	
	%USCG Academy Grads	7.85		24.53		37.50	
	%Other Grads	3.31		0.00		0.00	
Service	%USN	56.20		75.47		62.50	
	%USMC	35.95		0.00		0.00	
	%USCG	7.85		24.53		37.50	
	Observations	242.00		53.00		16.00	

Table 2 presents the same summary statistics for the final event analyzed, RI4290A, allowing us to observe the consistency of the sample representation.

Table 2. Summary Statistics for Final Flight Event RI4290A

		Legacy (last event)		COPT-R (last event)		CORPS (last event)	
		Percent/Mean	(s.d.)	Percent/Mean	(s.d.)	Percent/Mean	(s.d.)
Academic Pre Scores	AVG AQR	6.42	(1.17)	6.31	(1.19)	7.11	(1.27)
	AVG PFAR	6.91	(0.88)	6.31	(1.10)	6.22	(0.83)
	AVG FOFAR	6.68	(1.06)	6.64	(0.89)	7.11	(0.93)
	AVG NIFE NSS Score	49.47	(8.37)	45.42	(10.39)	55.89	(4.59)
Sex	%Male	79.26		56.76		68.75	
	%Female	20.75		43.24		31.25	
Race	%White	73.41		40.54		55.56	
	%Black	4.26		0.00		0.00	
	%Asian	4.55		2.70		0.00	
	%Multi Race	1.60		0.00		0.00	
	%Pending	6.38		56.76		44.44	
	%Other	9.57		0.00		0.00	
Commissioning Source	%USNA Grads	26.60		48.65		33.33	
	%OCS Grads	17.02		5.41		11.11	
	%ROTC Grads	21.81		13.51		22.22	
	%PLC Grads	21.81		0.00		0.00	
	%USCG Academy Grads	9.57		32.43		33.33	
	%Other Grads	3.19		0.00		0.00	
Service	%USN	54.79		67.57		66.67	
	%USMC	35.64		0.00		0.00	
	%USCG	9.57		32.43		33.33	
	Observations	188.00		37.00		9.00	

Academic Pre Scores showed minimal variation across the different groups. Some notable differences including higher average AQR and FOFAR scores for CORPS students could suggest a stronger academic baseline. However, COPT-R students had slightly lower scores in all areas, AQR, PFAR, FOFAR, and NIFE NSS. AQR, PFAR, and FOFAR range from 1 to 9 while the NIFE NSS ranges from 20 to 80 (Judy & Gollery, 2019, p. 13; United States Marine Corps, n.d.). Given the range of these academic prescores, these differences were found to be insignificant and suggesting there was negligible selection relating to Academic Pre Scores. There was a higher percentage of female students represented in COPT-R. COPT-R and CORPS were comprised of more USNA graduates and USCG graduates compared to the Legacy, but this can be explained from the absence of Marine Corps students within these pipelines. Marine Corps students make up almost 36% of Legacy students that could have graduated from USNA, OCS, ROTC, or PLC. This explains the variability between commissioning source and service representation. Excluding Marine Corps students from the sample could have provided the sample with similar characteristics but this was accepted in favor of a larger sample for Legacy students.

a. Limitations

A few limitations must be acknowledged within the sample group data. First, the "Pending" race classification represents incomplete data found during the data extraction. This issue is most likely correlated to the accelerated nature of COPT-R and CORPS students and extracting current data. The next limitation is the small size of the CORPS sample, starting with 16 students and ending with nine. This is due to the young nature of the CORPS program as it started shortly before the data retrieval. It is important to note there was non-academic attrition that slightly affected the sample size. The COPT-R sample included one removed student, and CORPS included three removed students. These students were present in the initial sample but were not present at the end of the analysis. The students who dropped then began Primary training because of the "do no harm policy" as referenced earlier (CNATRA, 2024b, p. i-6). These students do not appear again in the Legacy sample, since the timeline of their training would not cause an overlap. Furthermore, these new pipelines were voluntary, and this self-selection presents a potential bias. Students who opt into these programs may differ in confidence, motivation, and intent compared to those who choose to stay in the Legacy pipeline. These unobservable characteristics could impact performance regardless of training pipeline, making it an important limitation to note. Lastly, corrupt data including data not properly entered or missing data completely was omitted in the analysis. Occasionally, observations were omitted due to incomplete information needed for the parameters of the regressions. This limitation explains the volatile nature of the size of observations between regressions.

b. Regression

A total of 15 regressions were conducted, one regression per flight event. The independent (x-variables) included the pipeline and controlled for the ASTB-E score, the NSS score, commissioning source, branch of service, squadron, race and sex. The dependent (y variable) was the NFS score a student received for the specific flight event. In the regression equation, (β) is the slope coefficient representing the effect of the x-variables and (ε) is the error term. The regression equation is as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_{20} X_{20} + \varepsilon \qquad (0.2)$$

In the regression model, a base case was needed to serve as a reference group for the independent categorical variables. For the regression setup the base case was specifically defined as a Legacy pipeline student, who was male, white, a United States Naval Academy (USNA) graduate, a U.S. Navy service member, and assigned to Squadron HT-28. This allows for fair comparison between pipelines by controlling for any differences in aptitude prior to the start of Advanced Rotary.

In the results, percentage difference was utilized to demonstrate COPT-R and CORPS performance. The percentage proficiency gain value utilized the beta values from the regression results, specifically the COPT-R beta coefficients and CORPS beta coefficients. It also factors in the minimum possible NFS score, which was 0.50. A percentage proficiency gain was calculated for each statically significant flight event. A final average percent proficiency gain was calculated to demonstrate the impact over all 15 flight events. The average percentage proficiency gain incorporated statistical and non-statistical flight event findings. The non-statistical flight events were inputted as a zero percent proficiency gain. The percentage difference equations and average percent difference equation are as follows.

$$\text{Percent Proficiency Gain/Loss} = \left(\frac{\beta_{COPT-R}}{AVG \text{ Legacy Score} - 0.50} \right) \times 100 \qquad (0.3)$$

$$\text{Percent Proficiency Gain/Loss} = \left(\frac{\beta_{CORPS}}{AVG \text{ Legacy Score} - 0.50} \right) \times 100 \qquad (0.4)$$

$$AVG \text{ Percent Proficiency Gain/Loss} = \frac{\%\text{Gain}_1 + \%\text{Gain}_2 + \ldots + \%\text{Gain}_{15}}{15 \text{ Flight Events}} \qquad (0.5)$$

V. RESULTS

Tables 3, 4, and 5 present regression results for the 15 flight events chosen. The tables are listed in order showing flight events through time. The first flight event analyzed was FAM4004A, the fourth actual flight event in Advanced Rotary syllabi. The last event analyzed, listed on Table 5, was RI4290A, one of the last non-solo flight events before students begin advanced training skills like search and rescue, night vision flying, and formation flying. Overall, the flight events were chosen to create a timeline to determine at what point in the syllabi are students underperforming, overperforming, or the same compared to Legacy students. The results are presented in terms of NFS score.

Table 3. Regression Results Part 1

	Variable	FAM4004A	FAM4203A	FAM4390A	FAM4502A	LOG4002A
Pipeline	**COPT-R**	**0.1301*** [0.0208]	**0.0229** [0.0126]	0.0121 [0.0112]	-0.0006 [0.0021]	0.0003 [0.0069]
	CORPS	-0.0431 [0.0274]	**-0.0598*** [0.0162]	0.0160 [0.0213]	-0.0043 [0.0029]	-0.0053 [0.0095]
Academic Pre Scores	NIFE NSS	0.0002 [0.005]	0.0006 [0.0004]	-0.0003 [0.0004]	0.00004 [0.00008]	-0.0002 [0.0003]
	AQR	0.0007 [0.0083]	0.0018 [0.0047]	0.0032 [0.0043]	0.0009 [0.0008]	**0.0092*** [0.0028]
	PFAR	0.0067 [0.0083]	0.0078* [0.0048]	-0.0048 [0.0044]	0.0003 [0.0009]	-0.0029 [0.0028]
	FOFAR	0.0044 [0.0098]	0.0022 [0.0057]	-0.0048 [0.0051]	**-0.0018*** [0.0010]	-0.0031 [0.0034]
Commissioning Source	OCS	-0.019 [0.0219]	-0.0213* [0.0129]	**-0.0324*** [0.0115]	0.0021 [0.0023]	**-0.0131*** [0.0077]
	ROTC	0.0075 [0.0169]	-0.0049 [0.0096]	0.0054 [0.0090]	0.0006 [0.0017]	-0.0036 [0.0058]
	PLC	0.0180 [0.0247]	0.0076 [0.0146]	-0.0138 [0.0126]	**-0.0049*** [0.0026]	0.0021 [0.0088]
Service	Coast Guard	**0.0456** [0.0228]	0.0092 [0.0133]	-0.0104 [0.0120]	0.0003 [0.0024]	0.0019 [0.0079]
	Marine Corps	0.0117 [0.0217]	0.0003 [0.0130]	-0.0044 [0.0112]	**0.0042*** [0.0024]	-0.0067 [0.0078]
Squadron	HT-18	**-0.0574*** [0.0139]	0.0042 [0.0082]	0.011 [0.0071]	-0.0011 [0.0015]	**-0.0100*** [0.0049]
	Observations	302	310	282	305	301
	Proficiency Advance	9 COPT-R	0	0	0	1 COPT-R

***sig. at 1% **sig. at 5% *sig. at 10% std. errors in brackets

FAM4004A, FAM4203A, FAM4502A are familiarization flight events. FAM4390A is a familiarization checkride. LOG4002A is a logistics flight event.

Table 4. Regression Results Part 2

	Variable	FAM4601A	FAM4602A	FAM4701A	BI4003A	BI4103A
Pipeline	**COPT-R**	0.0034	-0.0015	-0.0008	-0.0108	**0.0127****
		[0.0036]	[0.0040]	[0.0154]	[0.0140]	[0.0056]
	CORPS	-0.0140	**-0.0108****	**-0.0337****	-0.0072	**0.0390*****
		[0.0068]	[0.0053]	[0.0203]	[0.0187]	[0.0075}
Academic Pre Scores	NIFE NSS	7.195E-05	8.989E-05	-0.0003	**0.0013******	-5.322E-05
		[0.0001]	[0.0001]	[0.0005]	[0.0005]	[0.0002]
	AQR	**0.0027****	0.0002	-0.0088	-0.0056	-0.0011
		[0.0014]	[0.0015]	[0.0059]	[0.0054]	[0.0021]
	PFAR	-0.0002	0.0001	0.0085	0.0076	**0.0039****
		[0.0014]	[0.0016]	[0.0061]	[0.0056]	[0.0023]
	FOFAR	-0.0015	-0.0004	0.0065	-0.0004	-0.0006
		[0.0016]	[0.0019]	[0.0071]	[0.0065]	[0.0026]
Commissioning Source	OCS	-0.0056	-0.0007	-0.0128	0.0033	-0.0053
		[0.0037]	[0.0041]	[0.01578]	[0.0145]	[0.0058]
	ROTC	-0.0004	0.0019	-0.0020	-0.0035	0.0021
		[0.0029]	[0.0032]	[0.0123]	[0.0112]	[0.0046]
	PLC	**-0.0073***	0.0007	0.0034	-0.0185	-0.0036
		[0.0041]	[0.0047]	[0.0179]	[0.0165]	[0.0067]
Service	Coast Guard	0.0027	-0.0007	0.0212	0.0101	-0.0014
		[0.0039]	[0.0042]	[0.0163]	[0.0150]	[0.0059]
	Marine Corps	0.0029	0.0005	-0.0070	0.0080	0.0019
		[0.0037]	[0.0041]	[0.0158]	[0.0145]	[0.0058]
Squadron	HT-18	**-0.0122*****	**-0.0098*****	**-0.0449*****	-0.0513	**-0.0069***
		[0.0023]	[0.0026]	[0.0099]	[0.0091]	[0.0038]
	Observations	277	278	279	283	260
	Proficiency Advance	0	0	0	0	14 Legacy

*****sig. at 1% **sig. at 5% *sig. at 10% std. errors in brackets**

FAM4601A and FAM4602A are familiarization flight events. FAM4701 is a night familiarization flight event. BI4003A, BI4103A are basic instrument events.

Table 5. Regression Results Part 3

	Variable	NAV4003A	NAV4101A	RI4101A	FAM4990A	RI4290A
Pipeline	**COPT-R**	-0.0006	**0.0063***	-0.0056	**0.0233****	-0.0172
		[0.0040]	[0.0036]	[0.0092]	[0.0099]	[0.0123]
	CORPS	-0.0015	0.0058	-0.0037	0.0149	0.0182
		[0.0053]	[0.0048]	[0.0133]	[0.0147]	[0.2891]
Academic Pre Scores	NIFE NSS	0.0002	0.0001	0.0004	**0.0007****	-0.0004
		[0.0001]	[0.0001]	[0.0003]	[0.0003]	[0.0004]
	AQR	0.0008	0.0019	0.0003	0.0008	0.0025
		[0.0015]	[0.0014]	[0.0034]	[0.0035]	[0.0044]
	PFAR	0.0018	0.0010	0.0011	-0.0004	**0.0093****
		[0.0016]	[0.0016]	[0.0036]	[0.0039]	[0.0048]
	FOFAR	-0.0023	-0.0022	0.0001	-0.0029	-0.0078
		[0.0018]	[0.0017]	[0.0041]	[0.0043]	[0.0054]
Commissioning Source	OCS	0.0016	-0.0012	0.0024	0.0080	-0.0078
		[0.0041]	[0.0037]	[0.0092]	[0.0098]	[0.0122]
	ROTC	0.0014	0.0007	-0.0033	0.0065	-0.0028
		[0.0032]	[0.0029]	[0.0076]	[0.0079]	[0.0098]
	PLC	0.0072	-0.0012	-0.0076	0.0060	-0.0177
		[0.0047]	[0.0043]	[0.0079]	[0.0112]	[0.0139]
Service	Coast Guard	1.864E-05	-0.0021	0.0022	**-0.0198****	-0.0074
		[0.0042]	[0.0038]	[0.0094]	[0.0097]	[0.0122]
	Marine Corps	-0.0008	-0.0005	-0.0001	0.0034	0.0008
		[0.0041]	[0.0038]	[0.0094]	[0.0099]	[0.0123]
Squadron	HT-18	0.0041	**-0.0065*****	**-0.0115****	0.0065	0.0048
		[0.0026]	[0.0024]	[0.0058]	[0.0061]	[0.0076]
	Observations	278	274	242	238	234
	Proficiency Advance	0	0	0	0	0

***sig. at 1% **sig. at 5% *sig. at 10% std. errors in brackets

NAV4003A is a day navigation flight event. NAV4101A is a night navigation flight event. RI4101A is a radio instrument flight event. FAM4990A and RI4290A are checkrides.

A. COPT-R STUDENTS

COPT-R student performance consistently matched or outperformed Legacy student performance. Specifically, early in the timeline of Advanced Rotary, COPT-R student performance was higher than Legacy student performance in familiarization flight events FAM4004A and FAM4203A. In FAM4004A, COPT-R students performed 0.1301 points, at a 99% confidence interval, higher than Legacy students, which is a 20.65% proficiency gain compared to the average Legacy score. However, it is important to note that there were nine student aviators in COPT-R who received a proficiency advance for this event. Due to this, there were nine student aviators who would most likely have contributed to increasing the COPT-R regression results creating a larger gap between Legacy and COPT-R. In FAM4203A COPT-R students performed, 0.0229 points, at a 95% confidence interval, higher than Legacy students, which is a 4.49% proficiency gain compared to the average Legacy score. There was no COPT-R proficiency advance, no UNSAT, and no RRU for this event that would affect the regression results.

In the middle of the syllabus there are seven flight events that are not statistically significant for COPT-R, however the statistical insignificance demonstrates the equivalent performance to Legacy. Three of these events are critical in the training syllabus: FAM4390A, LOG4002A, and FAM4701A. FAM4390A is a check ride before the solo event to follow. LOG4002A is the last flight event in the logistics phase of the syllabus. In addition, it had one proficiency advanced student that could have impacted the regression results meaning that if the student had completed the event, COPT-R performance could have been increased. Lastly, FAM4701A is the first night flight event in the COPT-R/CORPS syllabus, however it is important to note that COPT-R students performed night flights before Advanced Rotary at contractor training. COPT-R students in the middle of the syllabus performed at an equivalent level to Legacy students even during these crucial flight events.

COPT-R students displayed proficiency in basic instrument flight events. In BI4003A, COPT-R students performed equivalent to Legacy students. However, in BI4103A COPT-R performed 0.0127 points, at a 95% confidence interval, higher than Legacy students, which is a 2.44% proficiency gain compared to the average Legacy score. This is significant because this is the last basic instrument flight instruction before beginning regular instrument and radio instrument flight instruction. From this it is observed that COPT-R students are better prepared for advanced instrument flight instruction. However, 14 Legacy students proficiency advanced this flight event possibly impacting the regression results. This could mean that COPT-R and CORPS students performed slightly lower than what the regression presents.

Towards the end of the timeline, COPT-R students outperformed Legacy students in two flight events. In NAV4101A COPT-R students performed 0.0063 points higher, at a 90% confidence interval, than Legacy students, which is a 1.19% proficiency gain compared to the average Legacy score. This is significant because greater proficiency in night navigation flight events may indicate that COPT-R students are better prepared in this area. In FAM4990A COPT-R students performed 0.0233 points higher, at a 95%

confidence interval, than Legacy students, which is a 4.57% proficiency gain compared to the average Legacy score. This event is important because it is a check ride to prepare for the upcoming solo events. This suggests that COPT-R students are more prepared for night flights and check ride events.

At the end of syllabus, COPT-R students perform similarly to Legacy students in advanced radio instrument events. This is observed in their performance in RI4101A and RI4290A. RI4290A is a flight event that occurs before major solo events. Similar performance in radio instrument events indicates COPT-R student's high familiarity in this important area of training. Flight events not mentioned were deemed statistically insignificant, therefore presenting similar performance between Legacy and COPT-R. Overtime, COPT-R students show strong early performance with equivalent performance to Legacy during mid-syllabus events, and re-emerging with strong performance in later syllabus events.

B. CORPS STUDENTS

The CORPS generalizations in this section may not be indicative of all students due to the small sample size of CORPS students. In early and middle syllabus events CORPS students perform similarly or underperform compared to Legacy students. There are three flight events during this time that demonstrate underperformance: FAM4203A, FAM4602A and FAM4701A. In FAM4203A CORPS students performed 0.0598 points lower, at a 99% confidence interval, than the Legacy students, which is a 11.72% proficiency loss compared to the average Legacy score. In this event CORPS had 1 UNSAT and 1 RRU showing uncomfortably in the helicopter and ill preparation for the flight. In FAM4602A CORPS students performed 0.0108 points lower at a 95% confidence interval than the Legacy students, which is a 2.04% proficiency loss compared to the average Legacy score. In FAM4701A CORPS students performed 0.0337 points lower, at a 95% confidence interval, than the Legacy students, which is a 5.62% proficiency loss compared to the average Legacy score. This event is the first night flight for CORPS students, therefore, this could be a factor in their negative performance. Despite the small sample size, these flight event results could indicate the lack of training within the pathway, suggesting a negative effect.

CORPS students perform similarly to Legacy students in other flight events, during the beginning and middle of the syllabus including: FAM4390A and LOG4002A. FAM4390A is a checkride event before a solo event, similar to COPT-R. LOG4002A is the last logistics flight event in the syllabus. Similar performance in these critical events suggests equivalent pilot proficiency despite the pathway.

Similarly to COPT-R, CORPS students display proficiency in basic instrument flight events: BI4003A and BI4103A. In BI4003A the results suggest no difference in proficiency between CORPS and Legacy students. However, in BI4103A CORPS students scored 0.0390 points higher, at a 1% significance level, than Legacy students, which is a 7.50% proficiency gain compared to the average Legacy score. Similarly to the COPT-R student results, CORPS students seem more prepared than the Legacy students during this flight event. This is significant because it is the last basic instrument flight instruction before moving into more advanced flight instruction with both radio instruments and regular instruments. In addition to this, there were 14 Legacy students who received a proficiency advance that could have impacted the regression results. There is a possibility that COPT-R and CORPS student performance is overstated due to 14 high performing Legacy students who did not complete the event.

Later in the syllabus, there is no statistically significant difference between CORPS and Legacy performance. Following NAV4003A, the CORPS syllabus added two more NAV events: NAV4004A and NAV4005A. These two events were most likely added to the CORPS syllabus to develop comparable skills to Legacy students. These two events may not be necessary due to the equivalent performance of CORPS students in NAV4003A. NAV4101A is a night flight where CORPS students had similar performance to Legacy students. Their performance in this event, however, could be a result of the added NAV events. Lastly, FAM4990A and RI4290A are check rides prior to crucial solo events, where once again, CORPS performance is similar to Legacy. CORPS students underperform slightly compared to Legacy in the early and middle portions of the syllabus; however, they improve and perform similarly to Legacy in later flight events.

C. COPT-R AND CORPS

The following box plots show a visualization of the distribution of the student performance between the three pathways. These box plots do not incorporate the regression results and therefore do not account for other variables impacting the scores. A particular limitation of these box plots includes the inability to control grading differences between squadrons. This limitation might be heavily impacting NAV4101A and FAM4990A box plots where performance appears overstated for CORPS students compared to the regression results.

Figure 5 shows the extent that COPT-R outperformed Legacy, while outlining the small skill gap between CORPS and Legacy for FAM4004A.

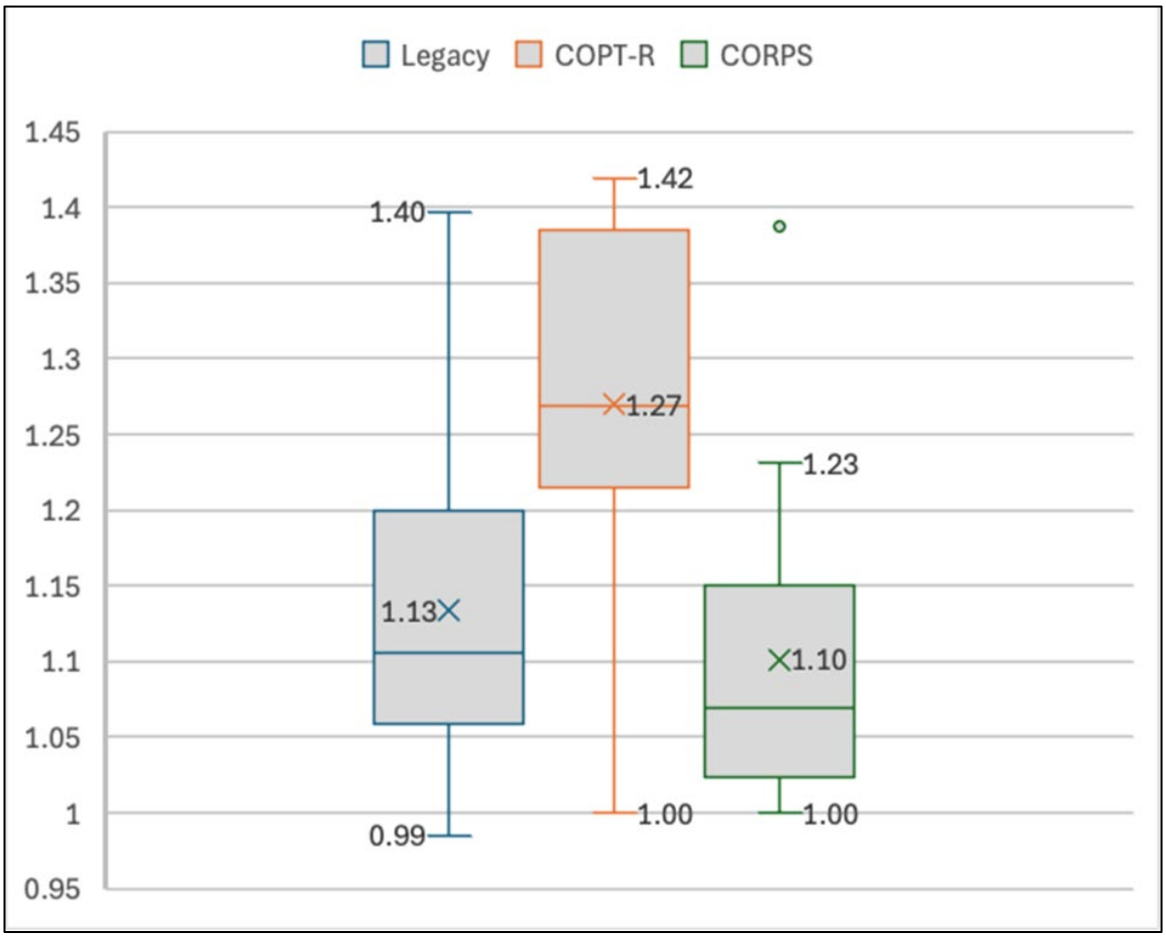

Figure 5. FAM4004A NFS Score Distribution

Figure 6 shows the extent that COPT-R outperformed Legacy. There are two outliers at 0.5 for CORPS that are not visible on this box plot, this explains the low mean for CORPS at 0.95, however it is important to note the similar distribution between Legacy and CORPS excluding the outliers.

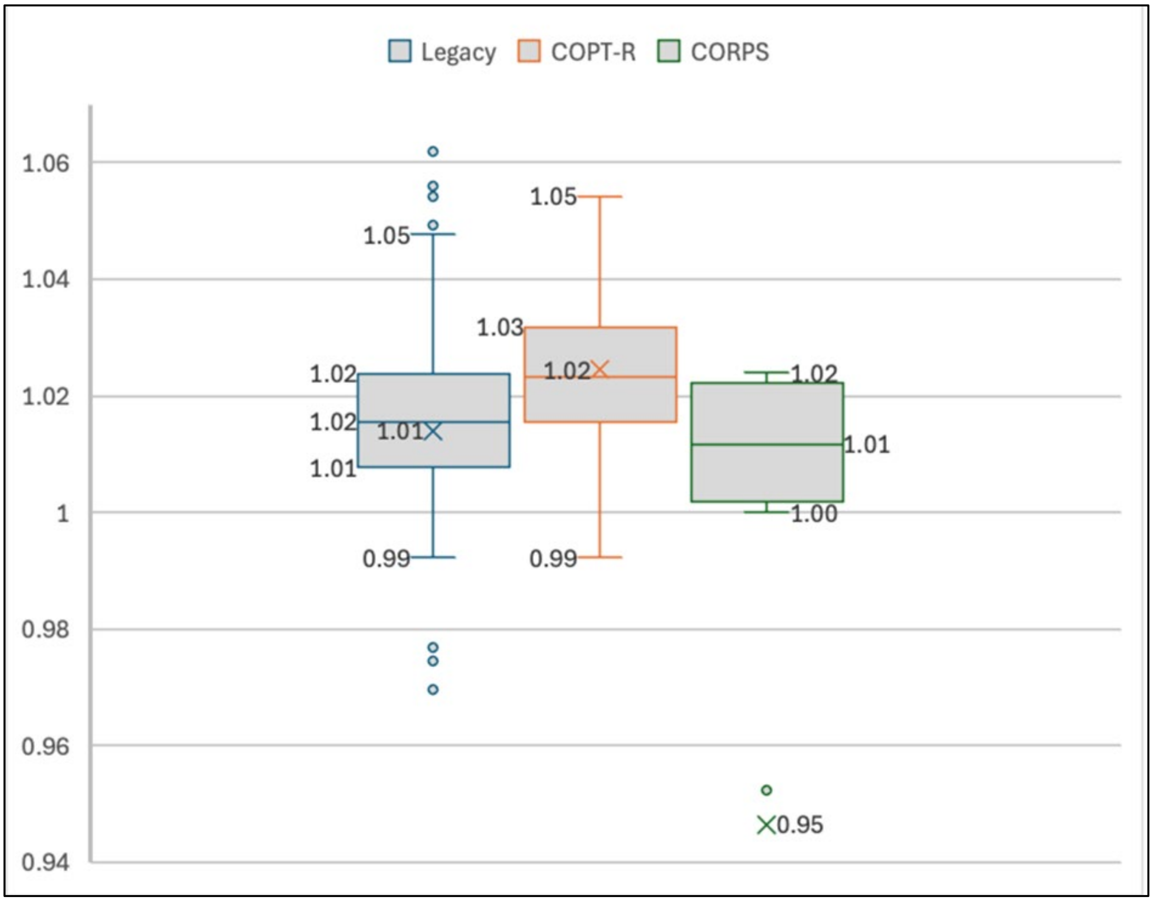

Figure 6. FAM4203A NFS Score Distribution

Figure 7 demonstrates the underperformance of CORPS in FAM4602A.

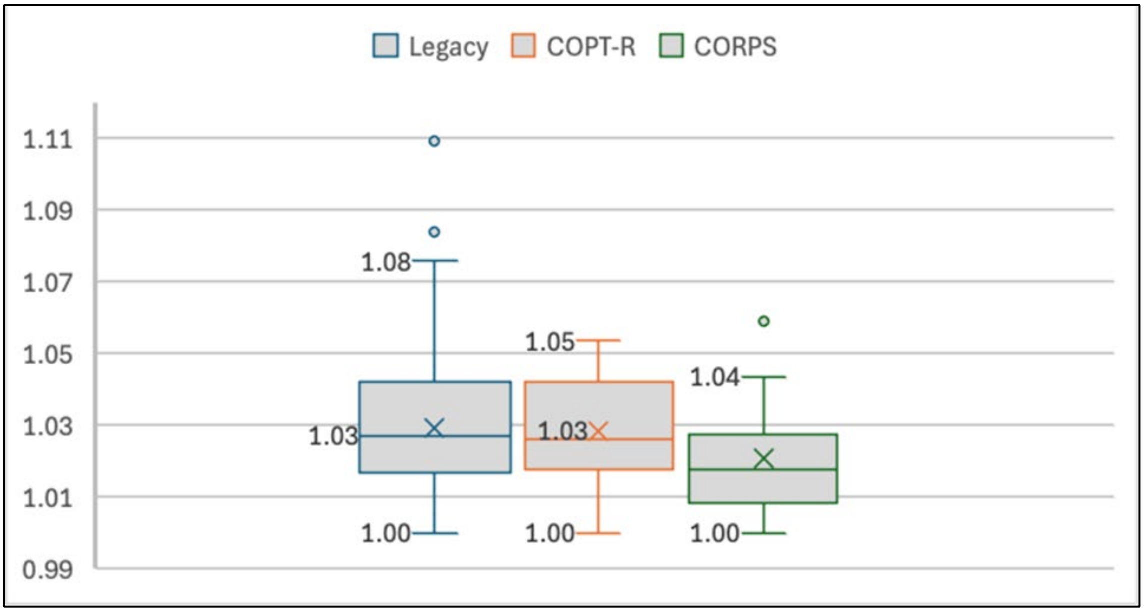

Figure 7. FAM4602A NFS Score Distribution

Figure 8 shows the underperformance of CORPS and equivalent performance of COPT-R in FAM4701A.

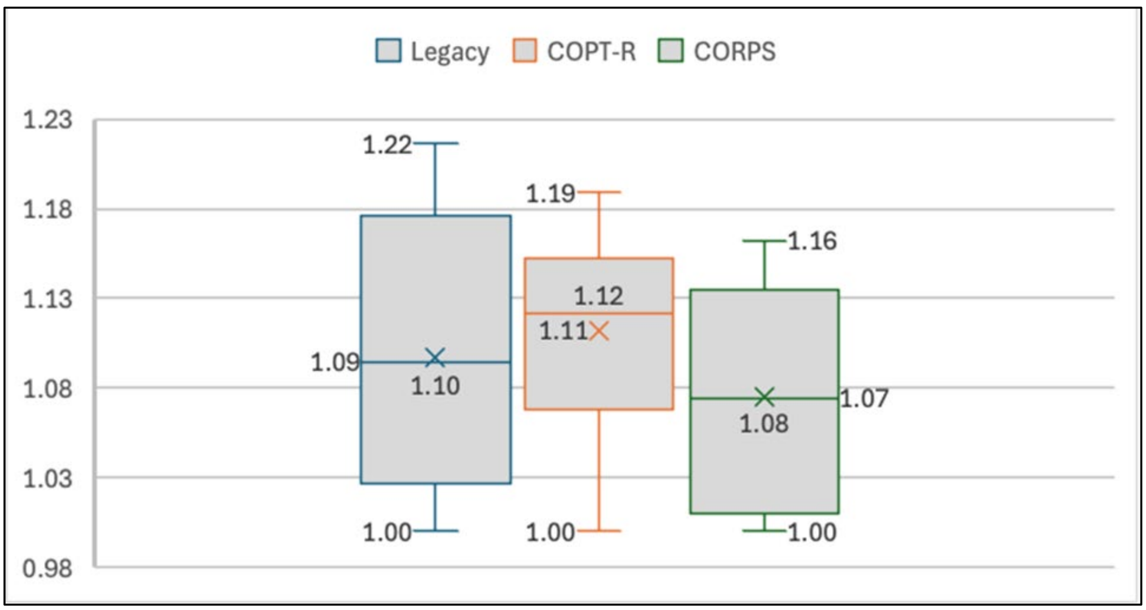

Figure 8. FAM4701A NFS Score Distribution

Figure 9 shows the extent that COPT-R and CORPS students outperformed Legacy students during event BI4103A.

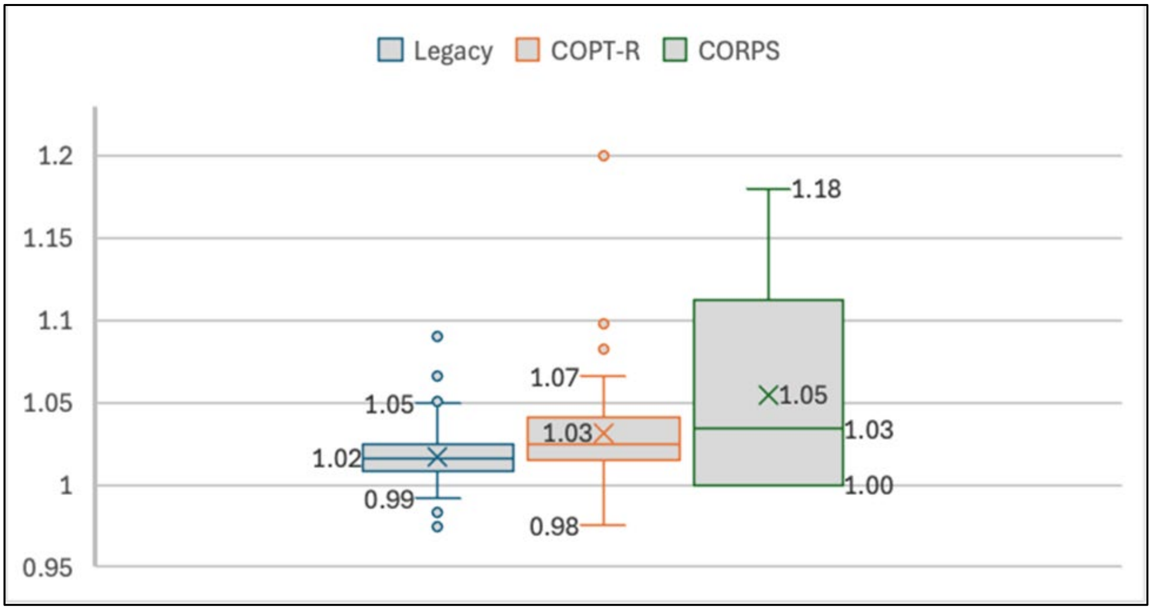

Figure 9. BI4103A NFS Score Distribution

Figure 10 represents similar performance across all pipelines for night event NAV4101. However, this does not agree with the regression results due to the limitations of the box plots.

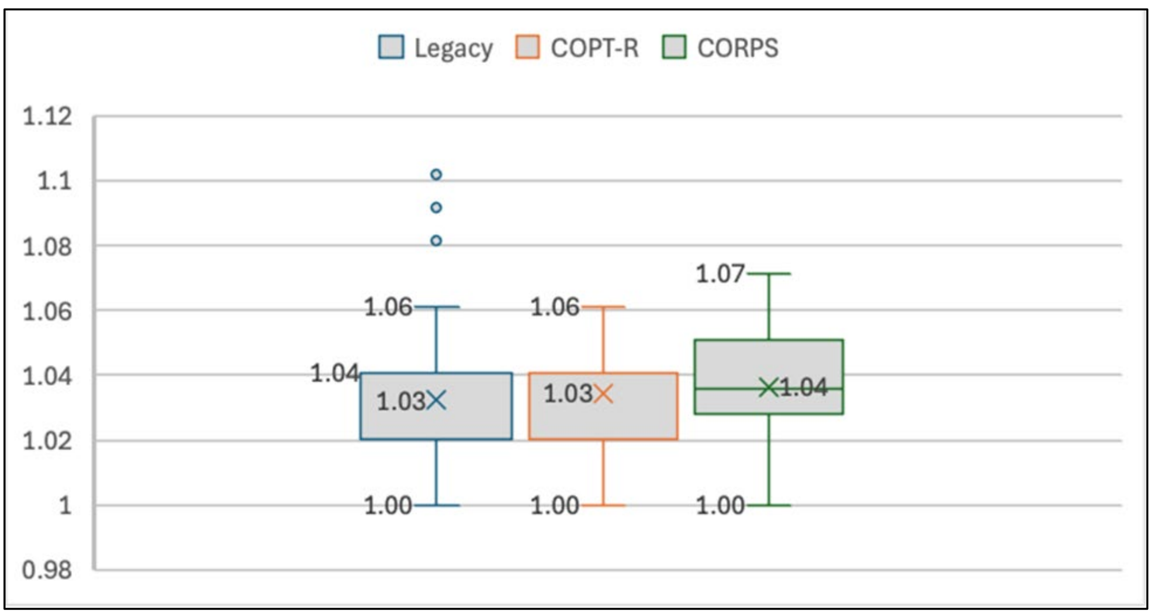

Figure 10. NAV4101A NFS Score Distribution

Figure 11 represents equivalent performance across the pipelines in FAM4990A. However, this does not agree with the regression results, highlighting the limitations of the box plots.

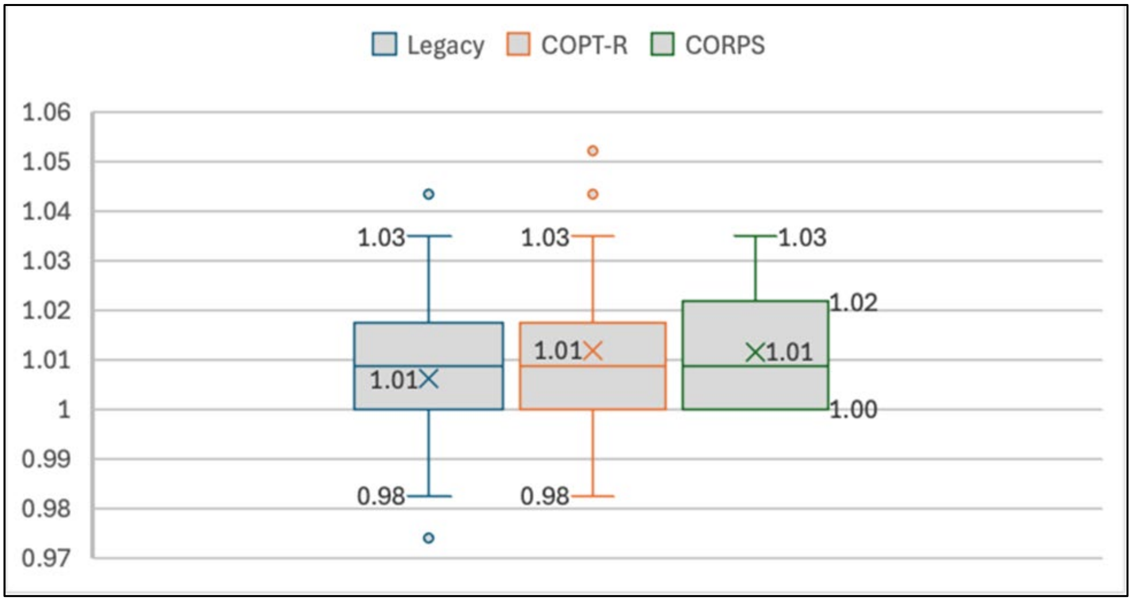

Figure 11. FAM4990A NFS Score Distribution

Figure 12 is a visual of the performance comparison of the three pathways across the 15 flight events. The marked values represent the statistically significant performance results. The statistically insignificant events assist in visualizing the overall picture. As shown from this visual, COPT-R outperforms at the beginning, performance becomes equivalent in the middle, and then once again increases at the end. The average percentage proficiency gain over all events for COPT-R is 2.22%. CORPS performance begins lower and then rises to a more equivalent performance. The average proficiency loss, over all events for CORPS, is 0.79%.

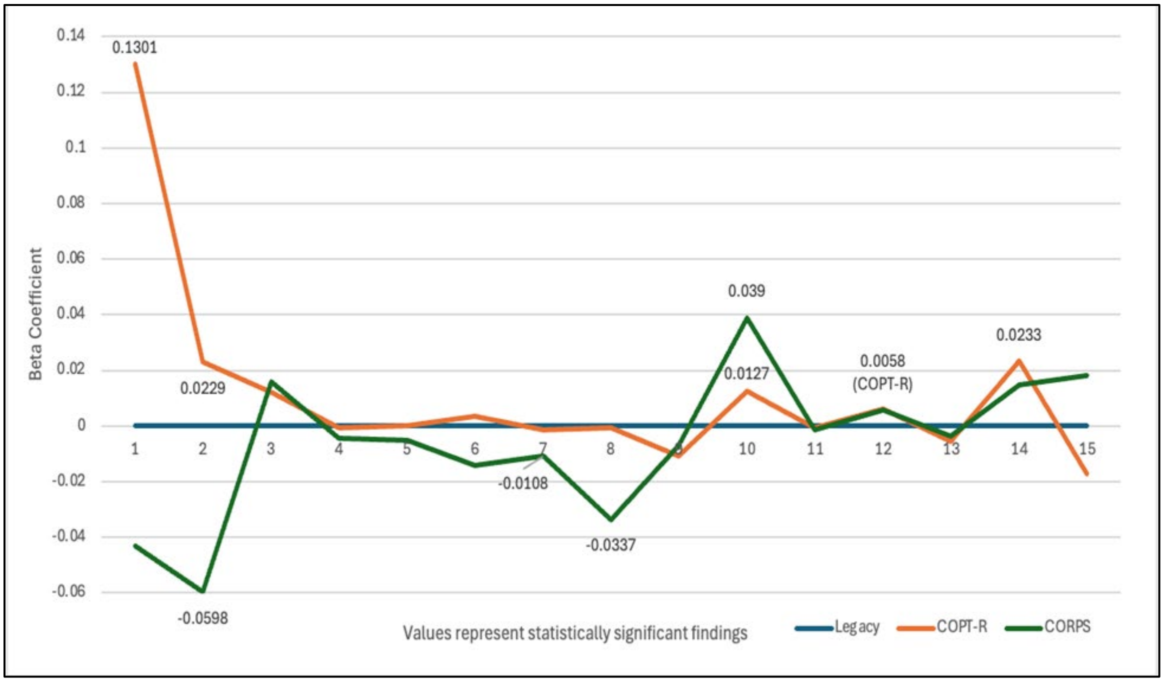

Figure 12. SNA Performance Across the 15 Flight Events

There are two Advanced Rotary squadrons in the data used: Squadron HT-28 and Squadron HT-18. The analysis indicates that students in Squadron HT-18 are either performing below their peers or are subject to more rigorous grading by instructors. Despite this, the difference in squadrons were able to be controlled and accounted for. There is no clear pattern in performance favoring or disfavoring a particular race or sex. In addition, a large portion of the students in the dataset were marked as "unknown/ pending" for the race independent variable, therefore limiting analysis regarding race.

VI. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

This study attempted to evaluate the performance of SNAs trained under the new helicopter program COPT-R and CORPS relative to SNAs trained through the traditional Legacy pipeline. In line with CNATRA's goals, produce equally or better trained pilots, in less time, and at a lower cost, this analysis offers meaningful insight into the first two objectives.

The results show strong performance from COPT-R students in the early stages of Advanced Rotary, particularly FAM4004A and FAM4203A. While performance dipped during mid-syllabus events, the regressions consistently showed COPT-R students meeting or exceeding performance of Legacy students. For example, in flight event RI4290A, COPT-R and Legacy students perform almost equally leading up to solo events. This is crucial as it adds to the argument of whether fixed-wing training is necessary and whether an expedited pathway such as COPT-R could replace the traditional helicopter training pathways. This suggests that COPT-R is effective at preparing students for rotary-wing flight and may even accelerate their readiness. It is also important to note that the results did not show any COPT-R difficulty with BI or RI events, showing the contracted introductory helicopter training paired with the extra training in Advanced Rotary was successful in substituting the instrument familiarity students receive at Primary fixed-wing training.

CORPS students initially underperform compared to Legacy students, specifically in FAM4004A and FAM4203A. This early deficit likely reflects the lack of any primary training whether it be fixed-wing or rotary-wing training. However, CORPS students did overperform in BI4103A compared to Legacy students and maintained equal performance to Legacy for the final five events. This is a significant finding as it suggests the extra instrument ground training was effective as CORPS students were able to achieve similar performance without introductory flight time. However, this large learning curve could have negative implications such as decreasing motivation and confidence, possibly increasing dropout rates. Supplementing more training may be needed to eliminate the large learning curve. Despite the limited sample size, CORPS appears to meet CNATRA's goal of producing equally proficient rotary-wing pilots compared to the Legacy pathway, while significantly reducing time-to-train and most likely monetary cost. From the research, COPT-R and CORPS efficiently produce effective rotary-wing pilots that are nearly equal if not better than the Legacy pathway.

B. RECOMMENDATIONS FOR FUTURE STUDIES

Given the recent implementation of these two new pathways and the limitations of data availability, it is recommended that future studies be conducted for further analysis and to solidify the findings of this study.

1. Study on Effectiveness

A study could further this research as the data and age of these pathways grow. In addition, a new study could observe student aviator performance in different flight events in Advanced Rotary, other than the events utilized in this research. Performance in Advanced Rotary simulator events could be added into the analysis in conjunction with the flight events. In addition, examining tests and event scores such as Naval Air Training and Operating Procedures Standardization (NATOPS) exam scores, prior to flights in Advanced Rotary could be a useful measure of comparison. This study could outline areas of overperformance by COPT-R to make resource allocation decisions. Observations of these results could help critique the COPT-R/CORPS syllabus and change to more efficient instruction.

2. Study on Peer Effects

As found through this research, students in COPT-R perform just as well as Legacy students in Advanced Rotary and CORPS students achieve similar outcomes as training progresses. Students often study, brief, and debrief together in small groups creating a dynamic mentorship and a peer teaching environment. COPT-R students may be more familiar with helicopter flight compared to Legacy students; however, Legacy students may be more well versed in aviation as a whole. Students with different training backgrounds working together create possible peer effects in the sample. This might explain how CORPS students eventually perform just as well as Legacy students by the end of the syllabus. This research suggests a future econometric study on peer effects relating to the following research questions: During Advanced Rotary do COPT-R, CORPS, and Legacy students help each other and is that a factor in their performance? To what extent do peer effects impact flight scores? What pipelines are most impacted by possible peer effects?

3. Study on Career Performance

This research only encompasses performance during flight school. A future study could analyze COPT-R, CORPS, and Legacy student performance throughout their careers. A study could specifically focus on a comparative analysis of their performance at their FRS. A study could also focus on their performance at following squadrons and in command positions. A study similar to the latter, would have to be executed well into the future to allow time for graduates to reach career milestones.

4. Cost Benefit Analysis

In conjunction with this research, a study could be conducted analyzing the costs of these three pathways. A cost benefit analysis (CBA) could help further the recommendations of this study on the future of COPT-R and CORPS. It could also assist in determining if fixed-wing training should be a baseline for all pilots, or if rotary-wing pilots could do without.

5. Study on Career Impacts

Through the literature review, concerns about the secondhand effects of permanent all helicopter programs were raised. A future study could investigate whether fixed-wing training for flight school instructors and air wing commanders remains efficient and cost-effective later in the career pipeline, or whether it would be more beneficial for all naval pilots to build a fixed-wing foundation during flight school. This study could also research the potential impact of these programs on recruitment and retention.

C. RECOMMENDATIONS FOR CNATRA

Based on the goal of producing equal to or if not more effective pilots from these programs, it can be concluded that CNATRA's objectives are being met. COPT-R proves to be an effective method to train rotary-wing specific aviators. From the research and with the limitations considered, it is recommended that the COPT-R program continue as implemented. Later changes to the contracted instruction could possibly be made to address overperformance of the COPT-R students in Advanced Rotary to reduce inefficient resource allocation. The CORPS data utilized in this research was limited, however, from the results it is recommended that specialized introductory familiarization flight training for CORPS students be added into the training pathway before they are introduced into the Advanced Rotary training with Legacy and COPT-R students. This introductory familiarization could be provided through a helicopter orientation or a shortened fixed-wing syllabus.

This research does not provide sufficient support to transition the entire naval helicopter pipeline to a rotary-wing only model, by eliminating fixed-wing training, as done in the Army. The suggested studies could assist with this decision.

APPENDIX

Table 6. MIF for FAM4004A. Source: CNATRA (2023a)

CTS REF	MANEUVER	FAM4004A
1	General Knowledge/Procedures	3+
2	Headwork/Situational Awareness	2+
3	Crew Resource Management	3+
4	Cockpit Management	3+
5	Checklist Management	3+
6	Radio Procedures	3+
7	Basic Air Work, Scan, and Trim	3+
8	NATOPS Procedures and Limits	3+
9	Emergency Procedures/System Failures	3+
10	Flight Planning	3+
11	NATOPS/Mission Brief	3+
12	Ground Operations	3+
17	Wave-off (Power-On)	3+
21	Course Rules	3+
22	Vertical Takeoff	3+
24	Hover	3+
25	Clearing Turn	3+
26	Hover Taxi	3+
27	Transition to Forward Flight	3+
28	Level Speed Change (LSC) - FAM	1
29	Turn Pattern - FAM	1
31	Square Patterns	3+
32	Normal Approach	2+
34	Vertical Landing	3+
35	Sliding Landing	1

CTS REF	MANEUVER	FAM4004A
36	No-Hover Landing	1
37	Maximum Load Takeoff	1
38	Level Speed Change From a Hover	1
42	Simulated Engine Failure in a Hover (Hover Cut Gun)	2+
43	Simulated Engine Failure in a Hover Taxi (Taxi Cut Gun)	2+
44	Power Recovery Autorotations	1
45	Full Autorotation	1
	Special Syllabus Requirements	1

FAM4004A is a familiarization flight event that tests the maneuvers in the MIF.

Table 7. MIF for FAM4203A. Source: CNATRA (2023a)

CTS REF	MANEUVER	FAM4203A
1	General Knowledge/Procedures	4+
2	Headwork/Situational Awareness	4+
3	Crew Resource Management	4+
4	Cockpit Management	4+
5	Checklist Management	4+
6	Radio Procedures	4+
7	Basic Air Work, Scan, and Trim	4+
8	NATOPS Procedures and Limits	4+
9	Emergency Procedures/System Failures	4+
10	Flight Planning	4+
11	NATOPS/Mission Brief	4+
12	Ground Operations	4+
17	Wave-off (Power-On)	4+
18	Wave-off (Power-Off)	4+
21	Course Rules	4+
22	Vertical Takeoff	4+
24	Hover	4+
25	Clearing Turn	4+
26	Hover Taxi	4+
27	Transition to Forward Flight	4+
30	Low Work	4+
32	Normal Approach	4+
34	Vertical Landing	4+
35	Sliding Landing	4+
36	No-Hover Landing	3+
37	Maximum Load Takeoff	3+
38	Level Speed Change From a Hover	4+
CTS REF	MANEUVER	FAM4203A
41	Hydraulic Boost Off Approach	4+
42	Simulated Engine Failure in a Hover (Hover Cut Gun)	4+
43	Simulated Engine Failure in a Hover Taxi (Taxi Cut Gun)	4+
44	Power Recovery Autorotations	4+
45	Full Autorotation	3+
46	Simulated Engine Failure at Altitude	4+
	Special Syllabus Requirements	1

FAM4203A is a familiarization flight event that tests the maneuvers in the MIF.

Table 8. MIF for FAM4390A. Source: CNATRA (2023a)

CTS REF	MANEUVER	FAM4390A
1	General Knowledge/Procedures	4+
2	Headwork/Situational Awareness	4+
3	Crew Resource Management	4+
4	Cockpit Management	4+
5	Checklist Management	4+
6	Radio Procedures	4+
7	Basic Air Work, Scan, and Trim	4+
8	NATOPS Procedures and Limits	4+
9	Emergency Procedures/System Failures	4+
10	Flight Planning	4+
11	NATOPS/Mission Brief	4+
12	Ground Operations	4+
17	Wave-off (Power-On)	4+
18	Wave-off (Power-Off)	4+
21	Course Rules	4+
22	Vertical Takeoff	4+
27	Transition to Forward Flight	4+
30	Low Work	4+
32	Normal Approach	4+
34	Vertical Landing	4+
35	Sliding Landing	1
36	No-Hover Landing	1
37	Maximum Load Takeoff	1
38	Level Speed Change From a Hover	4+
41	Hydraulic Boost Off Approach	1

CTS REF	MANEUVER	FAM4390A
42	Simulated Engine Failure in a Hover (Hover Cut Gun)	4+
43	Simulated Engine Failure in a Hover Taxi (Taxi Cut Gun)	4+
44	Power Recovery Autorotations	4+
45	Full Autorotation	3+
46	Simulated Engine Failure at Altitude	4+

FAM4390A is a familiarization flight event and a checkride before a solo event. It tests the maneuvers in the MIF.

Table 9. MIF for FAM4502A. Source: CNATRA (2023a)

CTS REF	MANEUVER	FAM4502A
1	General Knowledge/Procedures	4+
2	Headwork/Situational Awareness	4+
3	Crew Resource Management	4+
4	Cockpit Management	4+
5	Checklist Management	4+
6	Radio Procedures	4+
7	Basic Air Work, Scan, and Trim	4+
8	NATOPS Procedures and Limits	4+
9	Emergency Procedures/System Failures	4+
10	Flight Planning	4+
11	NATOPS/Mission Brief	4+
12	Ground Operations	4+
17	Wave-off (Power-On)	4+
18	Wave-off (Power-Off)	4+
21	Course Rules	4+
22	Vertical Takeoff	4+
23	No-Hover Takeoff	3+
27	Transition to Forward Flight	4+
30	Low Work	4+
32	Normal Approach	4+
33	Steep Approach	4+
34	Vertical Landing	4+
35	Sliding Landing	4+
36	No-Hover Landing	4+
37	Maximum Load Takeoff	4+
38	Level Speed Change From a Hover	1
39	Quick Stop	1
40	High-Speed Approach	1
41	Hydraulic Boost Off Approach	1
42	Simulated Engine Failure in a Hover (Hover Cut Gun)	4+
43	Simulated Engine Failure in a Hover Taxi (Taxi Cut Gun)	4+
44	Power Recovery Autorotations	1
45	Full Autorotation	1
46	Simulated Engine Failure at Altitude	4+

FAM4502A is a familiarization flight event that tests the maneuvers in the MIF.

Table 10. MIF for LOG4002A. Source: CNATRA (2023a)

CTS REF	MANEUVER	LOG4002A
1	General Knowledge/Procedures	4+
2	Headwork/Situational Awareness	4+
3	Crew Resource Management	4+
4	Cockpit Management	4+
5	Checklist Management	4+
7	Basic Air Work, Scan, and Trim	4+
8	NATOPS Procedures and Limits	4+
9	Emergency Procedures/System Failures	4+
10	Flight Planning	4+
11	NATOPS/Mission Brief	3+
21	Course Rules	4+
23	No-Hover Takeoff	3+
27	Transition to Forward Flight	3+
30	Low Work	4+
32	Normal Approach	4+
33	Steep Approach	4+
34	Vertical Landing	4+
36	No-Hover Landing	4+
39	Quick Stop	3+
40	High-Speed Approach	3+
51	Power Checks	3+
52	Landing Zone (LZ) Evaluation	3+
53	Confined Area Operations	3+
54	Pinnacle Operations	3+
55	Dynamic Landing Approaches	3+
56	External Load Operations	3+
	Special Syllabus Requirements	1

LOG4002A is a logistics flight event that tests the maneuvers in the MIF.

Table 11. MIF for FAM4601A and FAM4602A. Source: CNATRA (2023a)

CTS REF	MANEUVER	FAM4602A
1	General Knowledge/Procedures	4+
2	Headwork/Situational Awareness	4+
3	Crew Resource Management	3+
4	Cockpit Management	4+
5	Checklist Management	4+
6	Radio Procedures	4+
7	Basic Air Work, Scan, and Trim	4+
8	NATOPS Procedures and Limits	4+
8	Comm/Nav Checklist	4+
9	Emergency Procedures/System Failures	4+
10	Flight Planning	4+
11	NATOPS/Mission Brief	4+
12	Ground Operations	4+
12	Preflight Inspection	4+
16	Stab-Off Flight	3+
17	Wave-off (Power-On)	4+
18	Wave-off (Power-Off)	4+
21	Course Rules	4+
22	Vertical Takeoff	4+
27	Transition to Forward Flight	4+
30	Low Work	4+
32	Normal Approach	4+
33	Steep Approach	3+
34	Vertical Landing	4+
35	Sliding Landing	3+
CTS REF	MANEUVER	FAM4602A
36	No-Hover Landing	4+
37	Maximum Load Takeoff	4+
41	Hydraulic Boost Off Approach	1
42	Simulated Engine Failure in a Hover (Hover Cut Gun)	4+
43	Simulated Engine Failure in a Hover Taxi (Taxi Cut Gun)	4+
44	Power Recovery Autorotations	3+
46	Simulated Engine Failure at Altitude	4+

FAM4601A and FAM4602A are familiarization flight events that are both tested on the maneuvers that are in the FAM4602A MIF.

Table 12. MIF for FAM4701A. Source: CNATRA (2023a)

CTS REF	MANEUVER	FAM4701A
1	General Knowledge/Procedures	4+
2	Headwork/Situational Awareness	4+
3	Crew Resource Management	3+
4	Cockpit Management	3+
5	Checklist Management	4+
6	Radio Procedures	4+
7	Basic Air Work, Scan, and Trim	3+
8	NATOPS Procedures and Limits	4+
9	Emergency Procedures/System Failures	4+
10	Flight Planning	3+
11	NATOPS/Mission Brief	4+
12	Ground Operations	3+
21	Course Rules	3+
22	Vertical Takeoff	3+
24	Hover	3+
26	Hover Taxi	3+
27	Transition to Forward Flight	4+
30	Low Work	3+
32	Normal Approach	3+
33	Steep Approach	3+
34	Vertical Landing	3+
36	No-Hover Landing	3+

FAM4701A is a familiarization night flight event that tests the maneuvers in the MIF.

Table 13. MIF for BI4003A. Source: CNATRA (2023a)

CTS REF	MANEUVER	BI4003A
1	General Knowledge/Procedures	4+
2	Headwork/Situational Awareness	3+
3	Crew Resource Management	3+
4	Cockpit Management	3+
5	Checklist Management	3+
6	Radio Procedures	4+
7	Basic Air Work, Scan, and Trim	3+
7	Straight and Level	4+
7	Level Standard-Rate Turns	3+
8	NATOPS Procedures and Limits	4+
9	Emergency Procedures/System Failures	3+
10	Flight Planning	4+
11	NATOPS/Mission Brief	4+
12	Ground Operations	4+
13	Departure Procedures	3+
19	Spatial Disorientation Recognition and Recovery	3+
57	Instrument Takeoff	3+
58	Level Speed Change (LSC) – Instruments	3+
59	Vertical S-1 Pattern	3+
60	Turn Pattern - Instruments	3+
61	Oscar Pattern	3+
62	Partial Panel, Directional Gyro Failure	3+
63	Partial Panel, Attitude Gyro Failure	3+
64	Unusual Attitude Recovery	3+
65	Unusual Attitude Recovery-Partial Panel	3+
67	TACAN Point-to-Point Navigation	3+
69	Non-Precision Approach	3+
73	Modified Normal Approach	4+
	Special Syllabus Requirements	1

BI4003A is a basic instrument flight event that tests the maneuvers in the MIF.

Table 14. MIF for BI4103A. Source: CNATRA (2023a)

CTS REF	MANEUVER	BI4103A
1	General Knowledge/Procedures	4+
2	Headwork/Situational Awareness	4+
3	Crew Resource Management	4+
4	Cockpit Management	3+
5	Checklist Management	4+
6	Radio Procedures	4+
7	Basic Air Work, Scan, and Trim	4+
7	Straight and Level	4+
7	Level Standard-Rate Turns	4+
8	NATOPS Procedures and Limits	4+
8	Instrument Flight Checklist	4+
8	Level-Off Checklist	4+
9	Emergency Procedures/System Failures	4+
10	Flight Planning	4+
11	NATOPS/Mission Brief	4+
12	Ground Operations	4+
13	Departure Procedures	4+
16	Stab-Off Flight	4+
19	Spatial Disorientation Recognition and Recovery	4+
57	Instrument Takeoff	4+
58	Level Speed Change (LSC) – Instruments	4+
59	Vertical S-1 Pattern	4+
60	Turn Pattern - Instruments	4+
61	Oscar Pattern	4+
62	Partial Panel, Directional Gyro Failure	4+
63	Partial Panel, Attitude Gyro Failure	4+
64	Unusual Attitude Recovery	4+
65	Unusual Attitude Recovery-Partial Panel	4+
67	TACAN Point-to-Point Navigation	4+
69	Non-Precision Approach	3+
73	Modified Normal Approach	4+

BI4103A is a basic instrument flight event that tests the maneuvers in the MIF.

Table 15. MIF for NAV4003A. Source: CNATRA (2023a)

CTS REF	MANEUVER	NAV4003A
1	General Knowledge/Procedures	4+
2	Headwork/Situational Awareness	4+
3	Crew Resource Management	4+
4	Cockpit Management	4+
5	Checklist Management	4+
6	Radio Procedures	4+
7	Basic Air Work, Scan, and Trim	4+
8	NATOPS Procedures and Limits	4+
9	Emergency Procedures/System Failures	4+
10	Flight Planning	4+
11	NATOPS/Mission Brief	4+
12	Ground Operations	4+
12	Preflight/Post-flight	4+
12	Filing/Closing Flight Plans	4+
13	Departure Procedures	4+
14	En route Procedures	4+
14	Lost Aircraft Procedures	4+
14	Groundspeed/Fuel Checks	4+
14	Use of Flight Watch/Metro/FSS	4+
15	Terminal Procedures	4+
27	Transition to Forward Flight	4+
73	Modified Normal Approach	4+
75	VFR Navigation	4+
75	Flight Rules and Regulations	4+
75	Sectional Symbology	4+

NAV4003A is a navigation flight event that tests the maneuvers in the MIF, which include items from both NAV4001A and NAV4002A.

Table 16. MIF for NAV4101A. Source: CNATRA (2023a)

CTS REF	MANEUVER	NAV4101A
1	General Knowledge/Procedures	4+
2	Headwork/Situational Awareness	4+
3	Crew Resource Management	4+
4	Cockpit Management	4+
5	Checklist Management	4+
6	Radio Procedures	4+
7	Basic Air Work, Scan, and Trim	4+
8	NATOPS Procedures and Limits	4+
9	Emergency Procedures/System Failures	4+
10	Flight Planning	4+
11	NATOPS/Mission Brief	4+
12	Ground Operations	4+
12	Preflight/Post-flight	4+
12	Filing/Closing Flight Plans	4+
13	Departure Procedures	4+
14	En route Procedures	4+
14	Lost Aircraft Procedures	4+
14	Groundspeed/Fuel Checks	4+
14	Use of Flight Watch/Metro/FSS	4+
15	Terminal Procedures	4+
27	Transition to Forward Flight	4+
73	Modified Normal Approach	3+
75	VFR Navigation	3+
75	Flight Rules and Regulations	4+
75	Sectional Symbology	4+

NAV4101A is a night navigation flight event that tests the maneuvers in the MIF.

Table 17. MIF for RI4101A and RI4104A. Source: CNATRA (2023a)

CTS REF	MANEUVER	RI4104A
1	General Knowledge/Procedures	4+
2	Headwork/Situational Awareness	4+
3	Crew Resource Management	4+
4	Cockpit Management	4+
5	Checklist Management	4+
6	Radio Procedures	4+
7	Basic Air Work, Scan, and Trim	4+
8	NATOPS Procedures and Limits	4+
8	Instrument Flight Checklist	4+
9	Emergency Procedures/System Failures	4+
10	Flight Planning	4+
11	NATOPS/Mission Brief	4+
12	Ground Operations	4+
13	Departure Procedures	4+
14	En route Procedures	4+
15	Terminal Procedures	4+
27	Transition to Forward Flight	4+

CTS REF	MANEUVER	RI4104A
57	Instrument Takeoff	4+
67	TACAN Point-to-Point Navigation	4+
68	Holding	4+
69	Non-Precision Approach	4+
70	Precision Approach	4+
71	Failed Directional Gyro Approaches	3+
72	Missed Approach	4+
73	Modified Normal Approach	4+

RI4101A is a radio instrument flight event that tests maneuvers in the RI4104A MIF.

Table 18. MIF for FAM4990A. Source: CNATRA (2023a)

CTS REF	MANEUVER	FAM4990A
1	General Knowledge/Procedures	4+
2	Headwork/Situational Awareness	4+
3	Crew Resource Management	4+
4	Cockpit Management	4+
5	Checklist Management	4+
6	Radio Procedures	4+
7	Basic Air Work, Scan, and Trim	4+
8	NATOPS Procedures and Limits	4+
9	Emergency Procedures/System Failures	4+
10	Flight Planning	4+
11	NATOPS/Mission Brief	4+
12	Ground Operations	4+
16	Stab-Off Flight	3+
17	Wave-off (Power-On)	4+
18	Wave-off (Power-Off)	4+
21	Course Rules	4+
22	Vertical Takeoff	4+
27	Transition to Forward Flight	4+
30	Low Work	4+
32	Normal Approach	4+
33	Steep Approach	4+
34	Vertical Landing	4+
35	Sliding Landing	4+
36	No-Hover Landing	4+
37	Maximum Load Takeoff	4+

CTS REF	MANEUVER	FAM4990A
41	Hydraulic Boost Off Approach	1
42	Simulated Engine Failure in a Hover (Hover Cut Gun)	4+
43	Simulated Engine Failure in a Hover Taxi (Taxi Cut Gun)	4+
44	Power Recovery Autorotations	4+
46	Simulated Engine Failure at Altitude	4+

FAM4990A is a familiarization flight event and a checkride before solo events. It tests maneuvers in the MIF.

Table 19. MIF for RI4290A. Source: CNATRA (2023a)

CTS REF	MANEUVER	RI4290A
1	General Knowledge/Procedures	4+
2	Headwork/Situational Awareness	4+
3	Crew Resource Management	4+
4	Cockpit Management	4+
5	Checklist Management	4+
6	Radio Procedures	4+
7	Basic Air Work, Scan, and Trim	4+
8	NATOPS Procedures and Limits	4+
8	Instrument Flight Checklist	4+
9	Emergency Procedures/System Failures	4+
10	Flight Planning	4+
11	NATOPS/Mission Brief	4+
12	Ground Operations	4+
13	Departure Procedures	4+
14	En route Procedures	4+
15	Terminal Procedures	4+
27	Transition to Forward Flight	4+
57	Instrument Takeoff	4+
68	Holding	4+
69	Non-Precision Approach	4+
70	Precision Approach	4+
72	Missed Approach	4+
73	Modified Normal Approach	4+

RI4290A is a radio instrument flight event and a checkride before solo events. It tests maneuvers in the MIF.

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