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ARMY INITIAL ACQUISITION TRAINING: AN ANALYSIS OF COSTS AND BENEFITS

December 2015

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ABSTRACT

This research estimates the costs of training and educating Army Acquisition officers using three different courses of action. We analyze the most cost effective means for an officer to earn a graduate degree, complete military education level four and satisfy technical training requirements of the Defense Acquisition Workforce Improvement Act. The most cost-effective alternative is to accomplish these concurrently while attending the Naval Postgraduate School (NPS). We also informally assess that, relative to the alternative courses of action, the NPS alternative has more benefits due to the defense focus of the degree and because all of the educational requirements are completed in the shortest amount of time, which benefits the Army. Our research provides senior leaders' recommendations for the least costly way of developing a highly trained Acquisition Corps.

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LIST OF ACRONYMS AND ABBREVIATIONS

AAFC	Army Acquisition Foundation Course
ABCC	Army Basic Contracting Course
AC	Acquisition Corps
ACE	Acquisition Center of Excellence
ACF	Acquisition Career Field
ACS	Advanced Civil Schooling
ADSO	Active Duty Service Obligation
AICC	Army Intermediate Contracting Course
AIPM	Acquisition Intermediate Program
AMB	Acquisition Management Branch
AOA	Analysis of Alternatives
ASALT	Assistant Secretary of the Army Acquisition Logistics and Technology
ASAFMC	Assistant Secretary of the Army Financial Management and Comptroller
ATTRS	Army Training Requirements and Resource System
BAH	Basic Allowance for Housing
BAS	Basic Allowance for Subsistence
CBA	Cost Benefit Analysis
CGCS	Command General Staff College
CJCS	Chairman of Joint Chiefs of Staff
COA	Course of Action
CPT	Captain (O-3)
DACM	Director for Acquisition Career Management
DASACE	Deputy Assistant Secretary of the Army for Cost and Economics
DAU	Defense Acquisition University
DAWIA	Defense Acquisition Workforce Improvement Act
DL	Distance Learning
DOD	Department of Defense
FY	Fiscal Year
HRC	Human Resources Command
ILE	Intermediate Level Education
IQC	Intermediate Qualification Course
JPME	Joint Professional Military Education
LTC	Lieutenant Colonel (O-5)

MAJ	Major (O-4)
MEL 4	Military Education Level Four
NH 3	Business Management and Technical Management Professional Level Three
NWC	Naval War College
OJT	On-the-job Training
OMB	Office of Management and Budget
PM	Program Management
ROTC	Reserve Officer Training Corps
TA	Tuition Assistance
TDY	Temporary Duty
TIS	Time in Service
USA	United States Army
USN	United States Navy

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I. INTRODUCTION

The Department of Defense (DOD) has multiple training and educational paths to accomplish initial training for newly accessed Army Acquisition officers. This study identifies the most cost-effective course of action (COA) for an Army Acquisition Corps officer to complete a graduate degree, accomplish Military Education Level Four (MEL-4) and achieve DAWIA Level III technical training. We conclude that attending the Naval Postgraduate School (NPS) to achieve all three requirements concurrently in an 18-month program is the most cost-effective COA for the typical officer. Due to the rising personnel costs in a significantly constrained resources environment, many services are re-visiting their multiple training and educational paths. The legislation that gave rise to DAWIA requires that all services seek the same technical training certifications for their Acquisition workforce, both military and civilian. This training can take place at a variety of locations and at different times in an officer's career. The Army, in particular, has multiple paths for its acquisition officers to become fully qualified. By adjusting multiple assumptions and variables across three COAs, this project analyzes which paths accomplish the required training, providing a low, typical and high estimate for each COA. As military officers and qualified Acquisition professionals, it is our duty to be good stewards of taxpayer money.

The OMB Circular No. A-94 was used as the guiding framework to conduct a thorough data comparison of the different COAs available for training newly accessed Army Acquisition officers. COA 1 accomplishes all three initial training requirements at NPS in 18 months at a typical cost of $239,542. COA 2 assumes the typical officer attends a civilian institution through the Advanced Civil Schooling (ACS) program to obtain an MBA in 18 months and completes satellite ILE, the Intermediate Qualification Course (IQC) and DAWIA technical training requirements at Redstone Arsenal, AL in a total of 25.7 months at a cost of $426,010. The last COA assumes the officer uses TA for two-and-a-half years to help offset the cost of an MBA at a popular online school, and completes satellite ILE, IQC and DAWIA technical training requirements at Redstone Arsenal, AL in a total of 31.7 months at a typical cost of $281,203.

Quantifying the costs for these COAs involves a number of variables that may create considerable variation. We assessed these using a sensitivity analysis. Perhaps the most relevant one for the Army is the cost and impact of an officer working his assigned position while attending graduate school in his free time. Calculating the total cost for TA includes the cost of the impact to the officer's work performance calculated as a percent degradation and the opportunity cost of after-hours schooling. Percent work degradation was calculated at 10% for the typical officer, meaning the officer only works at a 90% efficiency rate compared to his normal 100% if he were not taking classes. The assumption is that an officer has too many competing priorities to provide maximum effort at work. The other critical variable for a TA student is the value of his free time, or opportunity cost for lack of free time because of class. The opportunity costs are calculated based on the officer's total compensation for the number of hours the officer is in class.

This study also recognizes qualitative difference between each COA. While factual data augmented by assumptions allow us to place a dollar amount on the costs for each COA, it is much more difficult to quantify the benefits that vary across the COAs. The NPS course of action immerses a newly assessed officer in an intense 18-month Acquisition-focused curriculum, better preparing them for their initial assignment compared to their peers who attend the ACE for only six weeks before beginning their Acquisition career. The payback period defined by the Active Duty Service Obligation (ADSO) varies across the COAs, providing different lengths of benefit to the Army. COAs 1 and 2 provide the same ADSO, however COA 1 returns a fully qualified Acquisition officer to the force about eight months quicker than COA 2. COA 3 takes the longest to complete and returns the shortest ADSO. It is challenging to place a dollar amount on the benefit of a defense-focused degree earned at NPS where officers are getting not just an MBA, but one that has future and immediate value to the military after graduation. This study recognizes and qualitatively defines benefits achieved by completing each COA.

There is potential for this Cost Benefit Analysis (CBA) to affect future Army policy on how Acquisition officers are trained and educated. Currently a mix of all COAs

is available for officers and is considered comparable and acceptable alternatives to educate Acquisition professionals. This analysis suggests allowing officers to accomplish initial Acquisition training, MEL-4 certification and DAWIA level III technical training through a route other than attending NPS creates additional costs that could be avoided. Each COA has its place in fulfilling the Acquisition Corps' (AC) training needs, but senior Acquisition leaders may use this analysis to reprioritize training options for their officers. While this study focuses on Army Acquisition professionals, the other DOD services may also benefit by re-evaluating their Acquisition training programs to identify the optimal path to achieve initial training requirements.

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II. BACKGROUND

The objective of this research is to identify the most cost effective COA for an Army Acquisition Corps (AC) officer to achieve required education and training. We quantify the different means of obtaining a master's degree, Level III Defense Acquisition Workforce Improvement Act (DAWIA) technical training certification, and Military Education Level Four (MEL-4) in order to identify the most cost effective COA for the Army to educate newly accessed AC officers. While the costs of the COAs are easily quantified, the benefits gained are not easily quantifiable. Different COAs present varying opportunities for professional networking and graduate degrees that provide substantially diverse returns on investment, while others vary the pace at which these certifications are achieved, and impact the length of obligated service required to "payback" the Army's investment. By weighing all of the different tangible and intangible costs and benefits, we determine the best way ahead for training and educating the future AC.

To give a thorough understanding of the COAs analyzed, it is necessary to explain some of the details behind each of the three main certifications varied across the COAs. We discuss why a specified level of DAWIA technical training is important and the three routes through which it can be accomplished by an Acquisition professional. We also present the three options AC officers can take to complete their fourth course in professional military education to earn Military Education Level Four (MEL-4) and remain competitive for promotion to lieutenant colonel. Finally, we present the various routes an AC officer can earn an advanced degree through either a partially or fully funded, Army-sponsored education program.

A. DAWIA REQUIREMENTS

The Defense Authorization Act of 1991 mandated the DOD establish a program to professionalize the acquisition workforce through certification based on education, experience, and technical training (Garcia, Keyner, Robillard, & VanMullekom, 1997, p. 295). This provision of the act is known as DAWIA. These certification standards are

governed by the Defense Acquisition University (DAU) and published annually for each Acquisition Career Field (ACF). The Assistant Secretary of the Army for Acquisition Logistics and Technology (ASALT) published policy guidance in August 2014 requiring all Acquisition work force civilians and service members to obtain the appropriate certification level commensurate with their current position in their designated ACF within 24 months of being assigned (Department of Defense, 2014). This policy also stipulates officers should achieve the highest level of certification, Level III, and be a member of the Defense Acquisition Corps before promotion to lieutenant colonel (Department of Defense, 2014).

All AC officers must be certified in one of two primary ACFs: Program Management and Contract Management. The Program Management career field is responsible for managing every aspect of the complete life cycle for complex acquisitions. Contract Management career field officers are the only individuals in the Army warranted by the DOD to obligate money to purchase goods or services on contract. To obtain DAWIA Level III certification, the officer must complete four years of Acquisition experience in addition to completing the technical training requirements. There are vast training and educational requirements for contracting (see Table 1) and program management (see Table 2) in order to be considered Level III certified. Because the experience requirements are accomplished when the officer is assigned to an operational billet, the analysis concerning DAWIA certification focuses only on the technical training requirements for DAWIA Level III certification. There are three training options to achieve DAWAI Level III technical training certification, all of which satisfy DAU standards: equivalency through NPS, equivalency through the Army Acquisition Center of Excellence (ACE), or completion of a combination of resident and non-resident DAU courses.

DAU offers equivalency for many of the courses completed in the MBA degree program at NPS. According to the DAU Equivalent Course Listing for DOD Schools published September 25, 2015, the 815 Acquisition and Contract Management curriculum at NPS requires the completion of courses that satisfy Level III technical training certification for contracting and Level II certification for program management.

The 816 Systems Acquisition Management curriculum satisfies Level III technical training certification for program management and Level II certification for contracting.

DAU also recognizes completion of select courses at certain universities or DOD schools as equivalent to completing many of the courses required for Level III technical training. The ACE completes initial training of acquisition professionals newly accessed into the AC. As part of initial training, all officers who do not complete equivalency training at NPS complete the three-week Army Acquisition Foundation Course. Contracting officers complete the four-week Army Basic Contracting Course and four-week Army Acquisition Intermediate Contracting Course. Program management officers complete the three-week Army Intermediate Program Management Course. These courses are collectively referred to throughout this analysis as the Acquisition Basic Course (ABC). These courses satisfy DAU requirements for only Level II technical training certification in either the CM or PM career field. To reach Level III technical training, the officer must then complete the remaining courses (detailed in Figures 1 and 2) under DAWIA III after their initial training at the ACE.

Finally, DAU requires officers to complete the courses outlined in Figure 1 to achieve technical training for Level III certification in contract management. Figure 2 shows the courses necessary for Level III technical training for program management. Many of these courses can be completed online; however, some must be accomplished in person; these are referred to as resident courses. Resident DAU courses are offered at various locations around the United States, and the agency the individual is assigned to is responsible for paying temporary duty costs to attend the course.

Figure 1. DAWIA Required Training for Contracting

Course number	Course Title	Resident or online	# Days
DAWAI I			
ACQ 101	Fundamentals of Systems Acquisition Management	Online	3.1
ENG 101	Fundamentals of Systems Engineering	Online	4.4
CLB 007	Cost Analysis	Online	0.5
CLV 016	Introduction to Earned Value Management	Online	0.1
			8.1
DAWAI II			
ACQ 202	Intermediate Systems Acquisition, Part A	Online	4.4
ACQ 203	Intermediate Systems Acquisition, Part B	Resident	4.5
PMT 251	Program Management Tools Course, Part I	Online	2.5
PMT 257	Program Management Tools Course, Part II	Online	4.5
CON 121	Contract Planning	Online	1.5
CON 124	Contract Execution	Online	1.6
CON 127	Contract Management	Online	1.3
EVM 101	Fundamentals of Earned Value Management	Online	2.3
ISA 101	Basic Information Systems Acquisition	Online	3.1
			25.6
DAWAI III			
ACQ 315	Understanding Industry	Resident	4.5
BCF 103	Fundamentals of Business Financial Management	Online	3.25
EVM 263	Principles of Schedule Management	Resident	3
LOG 103	Reliability, Availability, and Maintainability	Online	2.75
PMT 352A	Program Management Office Course, Part A	Online	2.75
PMT 352B	Program Management Office Course, Part B	Resident	18.5
SYS 202	Intermediate Systems Planning, Research, Development, and Engineering, Part 1	Online	1
			35.75
Time computed in days. If online course assumed 8 hour work day to calculate number of days.		**Total**	**69.5**

Figure 2. DAWIA Required Training for Program Management

Course number	Course Title	Resident or online	# Days
DAWAI I			
CON 090	Federal Acquisition Regulation (FAR) Fundamentals	Resident	28.0
CON 100	Shaping Smart Business Arrangements	Online	2.5
CON 121	Contract Planning	Online	1.5
CON 124	Contract Execution	Online	1.6
CON 127	Contract Management	Online	1.3
CON 170	Fundamentals of Cost and Price Analysis	Resident	10.0
CLC 025	Small Business Program for Contracting Officers	Online	0.5
CLC 033	Contract Format and Structure for DoD e-Business Environment	Online	0.4
CLC 057	Performance Based Payments and Value of Cash Flow	Online	0.5
CLC 058	Introduction to Contract Pricing	Online	0.3
			46.5
DAWAI II			
ACQ 101	Fundamentals of Systems Acquisition Management	Online	3.1
CON 200	Business Decisions for Contracting	Online	2.4
CON 216	Legal Considerations in Contracting	Online	2.9
CON 270	Intermediate Cost and Price Analysis	Resident	9.5
CON 280	Source Selection and Administration of Service Contracts	Resident	9.5
CON 290	Contract Administration and Negotiation Techniques in a Supply Environment	Resident	9.5
CLC 051	Managing Government Property in the Possession of Contractors	Online	0.2
CLC 056	Analyzing Contract Costs	Online	2.1
HBS 428	Negotiating	Online	0.3
			39.4
DAWAI III			
ACQ 202	Intermediate Systems Acquisition, Part A	Online	4.4
CON 360	Contracting for Decision Makers	Resident	9.5
HB	Harvard Business Elective (estimated based on average)	Online	1.0
ELECTIVE	Select ONE of the below electives (estimated based on average elective course length for courses below)	Resident	6.4
ACQ 315	Understanding Industry	Resident	4.5
ACQ 370	Acquisition Law	Resident	4.5
CON 232	Overhead Management of Defense Contracts	Resident	10.0
CON 244	Construction Contracting	Resident	4.5
CON 252	Fundamentals of Cost Accounting Standards	Resident	8.0
CON 334	Advanced Contingency Contracting Offier's Course	Resident	4.0
CON 370	Advanced Contract Pricing	Resident	9.5
			21.3
**24 semester hours in business related courses			
**Bachelor's Degree required			
Time computed in days. If online course assumed 8 hour work day to calculate number of days.		**Total**	107.2

B. MEL-4 REQUIREMENTS

Army Directive 2012–21 issued by Secretary of the Army John McHugh transformed Intermediate Level Education (ILE) from a non-competitive system where all Captains selected for promotion attended resident ILE training, to a merit-based selection board coinciding with an officer's Major's promotion board (Department of Defense, 2012). Strength of the officer's performance file is the basis for selecting whether the officer completes ILE through a resident course (highest performers), satellite campus course, or distance learning (lowest performers) (Department of Defense, 2012). Completing ILE earns the officer Military Education Level Four (MEL-4). MEL-4 is required to remain competitive for promotion to LTC (United States Army Human Resources Command, 2015b). Attendance at the resident or satellite course incurs a two year Active Duty Service Obligation (ADSO), which runs concurrently with any existing ADSOs (Department of the Army, 2009).

The names of the officers selected for distance learning ILE are not published when board results are released. Since there is a selection process to become an Acquisition Corps officer, it is reasonable to assume very few, if any, acquisition officers are selected for this venue. Therefore, this analysis only considers the resident, satellite, and JPME courses.

There are three training options to achieve MEL-4: resident ILE, satellite ILE, and completion of JPME through the Naval War College at NPS. These are the only three options analyzed to achieve MEL-4. Each course is designed to prepare the officer to succeed as a Major serving on a brigade or battalion staff.

The majority of officers selected for resident ILE will complete the 10-month course at the Command and General Staff College (CGSC) in Fort Leavenworth, Kansas. Officers in specific branches can compete to attend resident ILE at a foreign military school, but AC officers are not permitted to compete for these schools. Therefore, all AC officers selected for resident ILE will complete the course at Fort Leavenworth (United States Army Human Resources Command, 2015b). The results of the 2014 ILE selection board revealed 24% of Acquisition Captains were selected for the resident course (United States Army Human Resources Command, 2014).

The remaining 76% of Acquisition captains selected for promotion and ILE on the 2014 board will attend a satellite campus course. These campuses are located at Fort Lee, VA; Fort Belvoir, VA; Redstone Arsenal, AL; and Fort Gordon, GA. According to MAJ Ernesto Perez, the Acquisition Branch Major's Assignment Officer, every attempt is made to send the officer to satellite ILE at the closest campus in route to their next duty assignment. Some officers will have to complete the course in a TDY and return status while still assigned to a duty position. Because AC branch does not track how many officers attend in a TDY and return or TDY in route status, TDY expenses are assumed to be zero in calculating the low-cost estimate, which means the officer is assigned to the location they are attending satellite ILE. TDY expenses are included in computing the typical cost with the assumptions all satellite campus course selectees will attend the course at Redstone Arsenal, AL. Additionally, all AC officers who attend satellite ILE

must also attend the 21-day Intermediate Qualification Course (IQC) at Redstone Arsenal to receive full MEL-4 credit.

The third option for completing MEL-4 training is to complete JPME while attending NPS. The JPME curriculum offered at NPS through the Naval War College is accomplished through completion of these four courses: NW3230 Strategy and War, NW3275 Joint Maritime Operations part 1, NW3276 Joint Maritime Operations part 2 and NW3285 Theater Security Decision Making (Naval War College Partnership & JPME, n.d.). A May 2014 policy letter from Craig Spisak, the deputy Director of Acquisition Career Management, formalized granting MEL-4 credit to Acquisition officers who complete JPME while assigned to NPS (Department of Defense, 2015). This option is available for any Acquisition officer who attends NPS regardless of the ILE venue for which they were selected. However, the officer must be at least a Captain (O-3) already selected for promotion to Major (O-4) in order to take the JPME courses at NPS (Department of Defense, 2015). The policy was amended in August 2015 to give credit for the IQC to any Acquisition officer who graduates from NPS, regardless of whether they complete JPME or attend ILE through another venue (Department of Defense, 2015). This alleviates the need for newly accessed Acquisition officers who graduate from NPS to attend any resident course at the ACE.

C. GRADUATE-LEVEL EDUCATION REQUIREMENTS

Graduate-level education is an essential part of the professional and self-development of Acquisition professionals. It is recommended for all Acquisition officers to complete graduate level education no later than their first year as a lieutenant colonel (LTC) (Department of the Army, 2014, p. 442). According to the U.S. Army Acquisition Support Center–Army Director for Acquisition Career Management (DACM) Office, as of July 2015, 92% of all Acquisition LTCs had advanced degrees, and only three LTCs (about 2%) did not possess an advanced degree (Torres, 2015). The Army has many partially and fully funded programs to obtain an advanced degree. This analysis considers the fully funded NPS, fully funded Advanced Civil Schooling (ACS), and partially funded Tuition Assistance (TA) to obtain a graduate degree. While their costs, time

requirements, and academic focus vary, each option awards an advanced degree to the officer. The degree is critical for retention and in keeping the officer competitive for promotion.

The 18-month fully funded Acquisition Management MBA program at NPS allows officers to focus in either the 815 Acquisition and Contract Management curriculum or the 816 Systems Acquisition Management curriculum. The Army pays tuition of $4,925 per quarter, for a total of $29,550 for Acquisition officers to complete the six-quarter program. Officers incur an Active Duty Service Obligation (ADSO) of three months for every month of education, resulting in the officer owing four and a half years after completing the 18-month course (Department of the Army, 2009). According to Michelle Houston, the ACS coordinator at Human Resources Command (HRC), the Army Acquisition Branch sent 17 officers to complete their degree at NPS in 2015 (M. Houston, personal communication, October 9, 2015).

The Army offers TA to help offset the costs of college for any officer pursuing a graduate degree in an approved degree program at a school registered in the Go Army Ed system during non-duty hours (GoArmyEd, n.d.). The Army will pay up to $250 per semester hour, up to $4500 per year, for up to 39 semester hours of graduate education (GoArmyEd, n.d.). This assistance does not cover the entire cost of the graduate degree. If the officer maximizes the use of his benefits for 39 semester hours, he must bear the difference in tuition cost above the $9,750 maximum benefit. While this does not represent a cost to the Army, it is a cost to society. The officer incurs a two-year ADSO upon completion of the last class for which TA is used (Department of the Army, 2009).

Another fully funded option for obtaining a graduate degree is ACS. This program pays tuition for up to 18 months at approved civilian institutions. The schools are divided into three cost categories; “low cost—less than $26,000 per year, medium cost—less than $43,000 [and] high cost—less than $55,000 per year” (United States Army Human Resources Command, 2015b). Students are encouraged to work with the school to obtain in-state tuition price to save the government money. Additionally, students are not permitted to pay any tuition cost not covered by ACS. The Acquisition branch sent 18 officers to civilian education institutions under the ACS program in 2015

(M. Houston, personal communication, October 9, 2015). Officers incur an ADSO of three months for every one month in school (Department of the Army, 2009).

D. METHODOLOGY

Our analysis uses the traditional CBA process outlined in OMB Circular No. A-94 guidelines. CBA is the preferred technique for government program economic evaluation. Typically, a CBA identifies and compares all benefits and subtracts from that all costs to calculate the overall net benefit. We conducted our analysis using the steps of the CBA process outlined below. There are assumptions and stipulations that go into conducting each COA in order to ensure we are making equitable comparisons. In addition, there are often extenuating circumstances and factors that go into the final determination and recommendation from a CBA (Office of Management and Budget, 2015). Specifically, this CBA does not quantify the value of the type of degree obtained by the various COAs. Although not monetized in this analysis, there are qualitative differences highlighted in the analysis, which could skew the decision of which COA is the most cost effective.

(1) Identify all COAs. Ensure that all alternative programs are identified for proper evaluation. This CBA seeks to determine the best program COA, not necessarily rejecting or accepting any one COA over the other.

(2) Identify all Stakeholders. All obvious, probable, and potential stakeholders are identified and the effect that different COAs may have upon them. It is important to not just limit the analysis to the costs associated to the government, but the possible social effects as well.

(3) Determine all costs and benefits. Real costs and benefits that will have a direct impact are identified and included. Transfer costs are discussed but not included in our CBA calculations. Many of the costs are not as straightforward or easy to determine as one would like so assumptions are made and included.

(4) Quantification of costs and benefits in monetary terms. Tangible costs and benefits are identified and calculated. Financial costs and benefits are actual cash values and are easy to determine. Intangible costs and benefits are identified and computed based on our assumptions. Social cost and benefits and opportunity cost are determined based on our assumptions. Some costs have been determined insignificant or transfer costs and are

discussed but not part of the quantified data. Also, sunk costs that are irrecoverable regardless of the COA determined are not included in the calculations.

(5) Adjust all future, past, and present values to now dollars. This CBA did not require adjustments as all data was in FY15 dollars.

(6) Calculation of each COAs net benefits. Monetized costs and benefits based on our research and assumptions are presented for each COA.

(7) Conduct Sensitivity Analysis. By varying assumptions to determine their overall effect on the outcome of our final determination, we establish the effect of our assumptions and their importance to the conclusion and recommended COA.

(8) Make a recommendation. Based upon our calculations and verification of our assumptions we make a qualified recommendation (Office of Management and Budget, 2015).

E. STAKEHOLDERS

In order to methodically analyze how the defined COAs affect society, it is important to identify the stakeholders who are impacted by each COA, the degree to which they are impacted, and the extent to which these stakeholders have influence over which COA to choose. The Office of Management and Budget (OMB) Circular A-94, which provides guidance for CBAs conducted for federal programs, dictates the analysis of costs and benefits should focus on the impact to society as a whole as opposed to just the government. The stakeholders include entities of the Army and the Navy, as well as DAU, and the officers in the acquisition field. We proceed to describe them in turn.

1. Army

The ACE exists to provide career development and initial, intermediate and pre-command training to Acquisition officers and NCOs (Department of the Army, 2014). The majority of their staff exits in order to provide the training highlighted in Chapter II. Any change to the established technical training route will have a substantial impact on the ACE's operations and funding. As the Army's schoolhouse for the Acquisition Corps, they have a moderate ability to impact decisions related to training Acquisition officers.

DAU updates the equivalency requirements annually for various courses required for the different levels of technical training certification. This impacts the curriculum taught at various institutions, such as NPS or the ACE that strive to instruct courses in an attempt to satisfy these requirements. Any change in technical training requirements would significantly affect the DAU. Because they are the managing agency for certification, they do have a significant amount of influence on these decisions.

The Acquisition Management Branch (AMB) and proponency play a fundamental role in influencing all aspects of an officer's career. They control the board process to decide which officers are selected for ACS and what school they will attend. Additionally, they work with the officer to determine a timeline for attending an ILE venue. AMB and proponency would be substantially impacted by which COA is instituted.

The CGSC operates the resident ILE venue and all satellite campuses of ILE for the Army. Acquisition Corps officers represent a very small portion of the students they train each year, so the impact on CGSC resulting from any changes to how Acquisition officers achieve MEL-4 certification would be minimal. Since the deputy director of Acquisition Career Management has already approved alternative routes for MEL-4 certification through completion of JPME, CGSC's ability to impact a decision relating to MEL-4 certification is minimal.

Ultimately, the individual officer is most impacted by which COA is pursued in civil education, technical training, and professional education. Which route they achieve these milestones affect the amount of free time they have with families, potential for future promotions, marketability once they leave the military and how much they spend in tuition. The boards are performance based that determine which ILE venue the officer will be selected for and if they are selected for ACS or NPS. Therefore, the individual officer does not have a great deal of impact on their education.

2. Navy

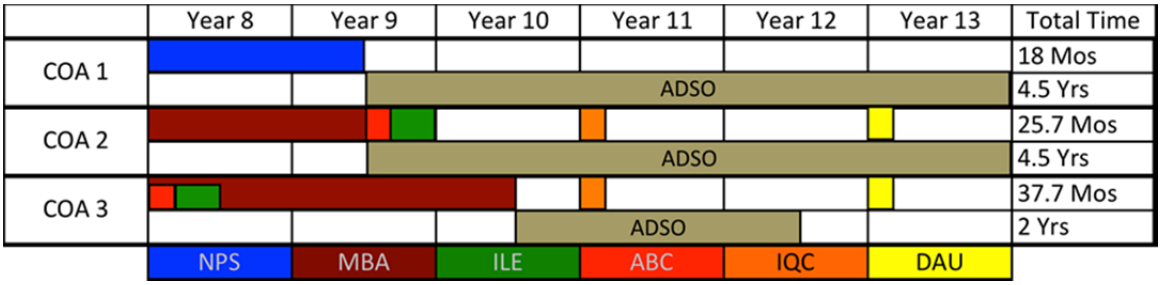
NPS hosts numerous DOD organizations, as well as the Army at its facilities located in Monterey, CA. As long as the Army is willing to pay the tuition fee, NPS will partner with them to support the master's-level education of the individual (Department of the Navy, 2012). From the core curriculum, to the MBA projects that have a focus on improving and strengthening the military and its capabilities, NPS is core stakeholder in this analysis. Through its ability to adjust tuition prices, they have a strong influence on which COA is the most cost effective.

The Naval War College (NWC) has partnered with NPS, offering students the opportunity to complete their JPME while attending graduate school. The main facility in Newport, RI sends instructors to NPS to instruct the JPME courses. Naval officers attending NPS automatically have this included in their curriculum and must complete the courses in order to graduate. Other services may also take advantage of the opportunity for completing joint qualifications at NPS. Since Navy officers must complete JPME if they attend NPS, the NWC would be minimally impacted by the Army's decision on how AC officers achieve MEL-4.

III. COURSES OF ACTION

The COAs analyzed in this research project all lead to the same credentials for the officer; an advanced degree, MEL-4 completion, and DAWIA Level III technical training. The various routes an officer can take to achieve these qualifications define the differences between COAs. For each COA, we present typical or average cost, as well as a low and high estimate of costs that result from varying key assumptions. The various COAs are defined in further detail below. The time it takes to achieve each COA using the typical assumptions are depicted in Figure 3.

Figure 3. Typical Timeline to Achieve Each COA



A. COA 1: ACCOMPLISHING MBA, JPME AND DAWIA LEVEL III EQUIVALENCY WHILE AT NPS

This COA allows the officer to achieve MEL-4, a master's degree, and Level III DAWIA technical training certification all while attending NPS. The officer earns an MBA by completing an 18-month curriculum with a defense focus in areas specifically pertaining to a critical military need. Taking the JPME courses offered by the NWC on the NPS campus earns the student MEL-4. DAWIA level III technical training is achieved through DAU equivalency courses completed as part of the MBA curriculum.

The low cost estimate is computed for an O-3 with eight years of service without dependents attending NPS for 18 months. The typical cost is computed similar to the low cost, only assuming the officer does have dependents. The high cost is computed for an O-4 with 12 years of service with dependents completing NPS in 18 months.

B. COA 2: ACCOMPLISH MBA USING ACS; ILE VIA RESIDENT OR SATELLITE FOLLOWED BY IQC; ACQ BASIC FOLLOWED BY RESIDENT DAU FOR DAWIA LEVEL III

In this COA, officers earn their advanced degree at any civilian university through the fully funded ACS program. Officers are limited to 18 months to earn a graduate degree through ACS (United States Army Human Resources Command, 2015a). Therefore, to standardize the comparison, this analysis assumes the degree is completed in 18 months. MEL-4 is completed through either the resident or satellite ILE venue, with satellite ILE attendees also required to attend the IQC to complete MEL-4. Finally, this COA assumes the officer achieves DAWIA Level I technical training by attending the ABC at the ACE. They then complete DAU resident courses for Level III technical training certification (see Tables 1 and 2).

The low cost estimate is computed for an O-3 with eight years of service without dependents attending ACS for 18 months at Auburn University followed by four months of satellite ILE and two months at the ABC both at Redstone Arsenal, AL. The cost then includes 21 days at the IQC as an O-3 with 10 years of service without dependents, followed by one month at resident DAU training as an O-4 with 12 years of service without dependents both at Redstone Arsenal.

The typical cost is computed for an O-3 with eight years of service with dependents attending ACS for 18 months with BAH paid at the average cost of the top 15 most common ACS schools. The satellite ILE, resident ABC and IQC are computed similarly to the low cost estimate only BAH is calculated based on the average of the top five most common acquisition duty stations for those 6.7 months. Finally, the one month at resident DAU training is computed as an O-4 with dependents paid BAH at average of the top five most common acquisition duty stations.

The high cost is computed for an O-3 with eight years attending resident ILE at Fort Leavenworth, KS for 10 months followed by two months at the ABC while stationed at Picatinny Arsenal, NJ. The officer then attends the University of California at Berkley for 18 months as an O-4 with 12 years of service with dependents followed by one month at resident DAU training at Redstone Arsenal while stationed at Picatinny Arsenal, NJ.

C. COA 3: ACCOMPLISH MBA USING TA AND PERSONAL FUNDS; ILE VIA RESIDENT OR SATELLITE FOLLOWED BY IQC; ACQ BASIC FOLLOWED BY RESIDENT DAU FOR DAWIA LEVEL III

Officers use TA to partially cover some of the costs of an advanced degree, with the officer paying the remaining costs out of pocket to earn an advanced degree on their own time in this COA. According to gradschoolhub.com (n.d.), a part-time MBA student completes their degree in two to three years. This analysis assumes it takes two years on the low estimate, two and a half for the typical and three years for the high estimate to complete the degree as a part time student. Both MEL-4 and DAWIA level III technical training are earned in the same manner as COA 2.

The low cost estimate assumes no compensation costs for the time an officer attends graduate school since he is still assigned to an acquisition billet, and his work is not impacted by his school attendance. The officer incurs an opportunity cost for lost free time while taking classes in the evening for two years. It assumes he attends satellite ILE, the two-month ABC and 21 day IQC as an O-3 with eight years of service without dependents while stationed at Redstone Arsenal. As an O-4 without dependents while still stationed at Redstone Arsenal, he attends the resident DAU courses for one month.

The typical cost estimate assumes the officer sustains a 10% degradation of work quality while attending class in the evening for two and a half years to complete an advanced degree beginning class as an O-3 with eight years of service with dependents. The officer incurs an opportunity cost for lost free time while attending evening classes. It also assumes he attends satellite ILE, ABC and IQC as stated in the low cost estimate, however the BAH calculations are based upon an average of the five most common AC assignment locations.

The high cost estimate assumes the officer sustains a 25% degradation of work quality while attending class in the evening for three years beginning as an O-4 with 12 years of service with dependents while stationed at Picatinny Arsenal, NJ. This COA also shows an opportunity cost for lost free time while attending class. It assumes the officer attends the ABC in a TDY status while stationed at Picatinny Arsenal and resident ILE at Fort Leavenworth, KS.

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IV. COST ANALYSIS

The quantifiable cost elements are exhibited as the rows in Table 3, with COAs as columns. The assumptions that drive these estimates are listed in the notes to Table 3. All costs are calculated in 2015 dollars, and compensation used in calculations is based on 2015 pay rates. Total budgetary costs represent estimates of the actual monetary cost impact for each COA. Total societal costs take into consideration the impact of opportunity costs in addition to budgetary costs. Overall, we find from a societal view that the least expensive COA to obtain a graduate degree, achieve MEL-4 and complete DAWIA level III technical training is to pursue COA 1, which entails accomplishing all of these in an 18-month program at NPS.

Figure 4. Graphical Comparison of Costs Between COAs

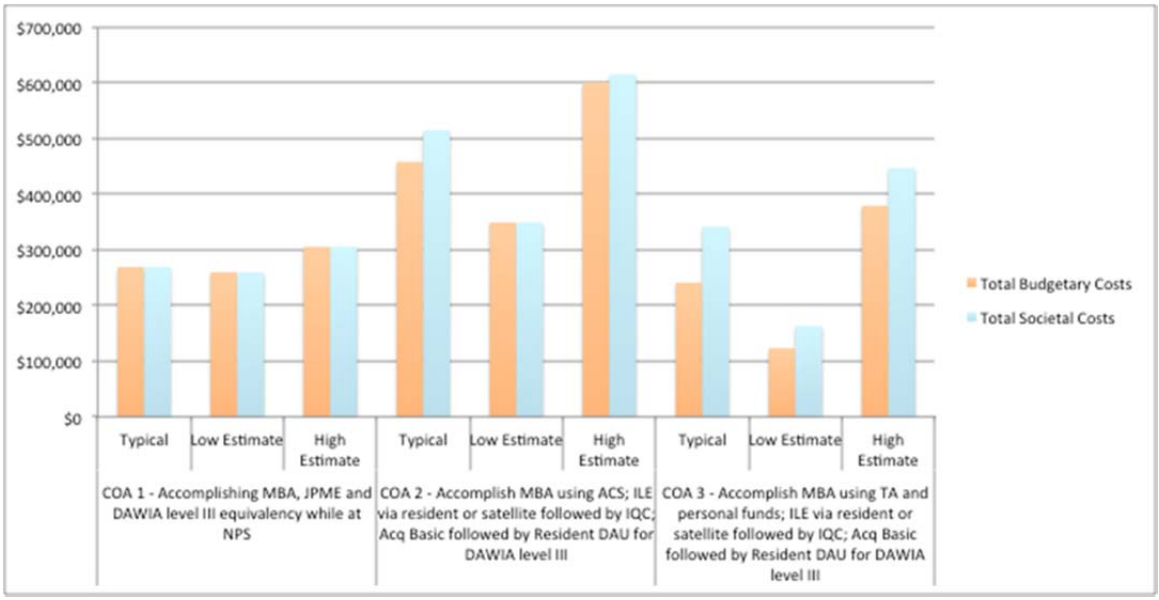


Table 1. The Quantifiable Costs of the Various COAs

	COA 1 - Accomplishing MBA, JPME and DAWIA level III equivalency while at NPS			**COA 2** - Accomplish MBA using ACS; ILE via resident or satellite followed by IQC; Acq Basic followed by Resident DAU for DAWIA level III			**COA 3** - Accomplish MBA using TA and personal funds; ILE via resident or satellite followed by IQC; Acq Basic followed by Resident DAU for DAWIA level III		
	Typical	Low Estimate	High Estimate	Typical	Low Estimate	High Estimate	Typical	Low Estimate	High Estimate
Costs									
Tangible									
Tutition									
Graduate School	$29,550	$29,550	$29,550	$51,750	$39,000	$73,500	$23,016	$13,650	$29,148
TDY Expense									
ILE (Satellite)				$12,142			$12,142		
IQC				$3,804		$3,804	$3,804		$3,804
Acq Basic Course				$8,578		$8,578	$8,578		$8,578
Resident DAU Schools				$4,920		$4,920	$4,920		$4,920
Instructor Cost									
ILE				$5,866	$5,866	$14,335	$5,866	$5,866	$14,335
IQC				$589	$589		$589	$589	
Acq Basic Course				$1,010	$1,010	$1,010	$1,010	$1,010	$1,010
Classroom Expenses									
Acq Basic Course				$143	$143	$143	$143	$143	$143
IQC				$200	$200		$200	$200	
Compensation	$209,992	$200,704	$246,173	$280,139	$255,594	$389,028	$120,417	$80,216	$255,294
Total Budgetary Costs	**$239,542**	**$230,254**	**$275,723**	**$369,140**	**$302,401**	**$495,317**	**$180,684**	**$101,673**	**$317,230**
Opportunity Costs									
ILE (Satellite)				$44,157			$44,157		
Resident DAU Schools				$12,713		$13,670	$12,713		$13,670
Loss of Free Time Using TA							$43,649	$39,989	$54,230
Total Societal Costs	**$239,542**	**$230,254**	**$275,723**	**$426,010**	**$302,401**	**$508,987**	**$281,203**	**$141,663**	**$385,131**

Table 1 Notes:

COA 1: officer completes MBA, MEL 4 and DAWIA level III technical training in 18 months while stationed at NPS. The compensation the officer receives is based upon an O-3 with dependents for the typical estimate, O-3 without dependents for the low estimate and O-4 with dependents for the high estimate.

COA 2: *typical estimate* takes 25.7 months to complete. Officer attends graduate school at a middle-cost category ACS school for 18 months. It assumes the officer attends the Acquisition Basic Course (ABC) for 2 months, Intermediate Qualification Course (IQC) for 21 day, and satellite ILE for 4 months at Redstone Arsenal, AL as an O-3 with 8 years of service with dependents. The officer attends resident DAU training for 1 month as an O-4 with 12 years of service with dependents. Instructor costs are based on a 1:8 instructor to student ratio at satellite ILE and annual throughput for IQC and ABC. Classroom expenses are also calculated based on annual throughput for these courses. Compensation includes base salary, Basic Allowance for Subsistence (BAS), Basic Allowance for Housing (BAH), TRICARE expense estimates, pension accrual and future healthcare accrual for the rank and Time In Service (TIS) throughout the officer's time to complete the COA. Opportunity costs are assumed to exist for the officer's organization while the officer is on TDY to attend satellite ILE and resident DAU training to gain level III technical training. The *low estimate* assumes the officer attends a low-cost category ACS school and does not incur any TDY expenses or opportunity costs because they are stationed at the location these schools are offered or they attend the school in route to their next duty station. Instructor, classroom expenses and compensation calculated similar to the typical cost. The *high cost* estimate assumes the officer attends resident ILE at Fort Leavenworth, KS, which alleviates TDY and opportunity expenses for ILE and IQC. It assumes they then attend a high-cost category ACS school as an O-4 with dependents for 18 months. All other computations are similar to the typical costs, but are higher due to the officer being more senior and in a higher cost location.

COA 3 *typical estimate* takes 37.7 months to complete and is based on the officer completing graduate school in 2.5 years using TA costing an average of the MBA tuition programs at the top three TA-receiving schools. All TDY, instructor costs, classroom expenses and TDY opportunity costs are similar to COA 2 typical estimates. Compensation expense is based on a 10% degradation of work quality at their assigned unit while the officer attends graduate school in addition to the 4 months of satellite ILE, 2 months of ABC and 21 days of IQC. This estimate assumes additional opportunity costs for lost free time while attending graduate school after duty hours computed as their hourly compensation cost for their rank and location multiplied by 630 classroom hours to complete the degree. The low cost assumes the officer completes the MBA program at the least expensive of the top three TA-receiving schools (American Military University) in 2 years with no degradation of work quality. It assumes the officer does not incur any TDY expenses or opportunity costs because they are stationed at the location these schools are offered or they attend the school in route to their next duty station. Instructor and classroom expenses are calculated similar to the typical cost. Compensation costs only include the time the officer attends satellite ILE, IQC and resident DAU courses. The *high cost* estimate assumes the officer attends resident ILE at Fort Leavenworth, KS, which alleviates TDY and opportunity expenses for ILE and IQC. It assumes they complete the MBA program at the most expensive of the top three TA-receiving schools (University of Maryland, University College) in 3 years with 25% degradation of work quality at their assigned unit while the officer attends graduate school in addition to the 10 months resident ILE, 2 months of ABC and 1 month of DAU training. This estimate assumes additional opportunity costs for lost free time while attending graduate school after duty hours computed as their hourly compensation cost for their rank and location multiplied by 630 classroom hours to complete the degree.

A. GRADUATE SCHOOL TUITION

COA 1 graduate school costs are based on NPS tuition costs the Army pays of $4,925 per quarter, resulting in a cost of $29,550 for the 18-month graduate program in either the 815 or 816 curricula. In COA 2, ACS costs are computed with a low cost of $39,000 and a high cost of $73,500 for an 18-month program. The low cost is based on the low cost ACS category of $26,000 per year. Typical costs are based on the average of the middle-cost ACS category calculated at $51,750. High costs are based on the high cost ACS category calculated at $ 73,500. The low cost of COA 3 is based on earning an MBA from the cheapest university of the top three recipients of TA, which is American Military University (AMU) costing only $13,650. Average tuition at the top three TA receiving schools, which are AMU, University of Maryland University College (UMUC) and Bridgeport University, was used to compute the $23,016 typical graduate school cost (Military Times, n.d.). The high cost graduate school cost using TA is based off of UMUC's tuition, which costs $29,148, the most expensive of the top three TA recipient schools. Of that $29,148, Army TA pays only $9,750; the individual officer must pay the remaining $19,398.

B. TDY EXPENSE

Temporary Duty expenses to cover meals and lodging are based on the location of the school. Rental car costs are not factored into the TDY expenses because they are not always authorized. These TDY expenses are only reimbursed to the officer if the school is more than 50 miles from their assigned duty location. The schools officers can attend on TDY status are satellite ILE, IQC, Acquisition Basic Course (ABC) and Resident DAWIA schools. Since all these schools are offered in the Redstone Arsenal/Huntsville, AL area, TDY is calculated using this location. The low cost estimate in both COA 2 and COA 3 assume the officer attends ILE and DAU training immediately after signing into Redstone Arsenal, which negates the need for any TDY expenses. Typical and high cost estimates do not vary between the two COAs.

Officers not stationed at Redstone Arsenal receive TDY for 98 days while attending Satellite ILE. The TDY cost is calculated using the following rates: $63 per day

for lodging, $41 per day per diem to cover the cost of meals and $1,200 for airfare. The lodging per diem, which is lower than the published Huntsville lodging rate, reflects the $63 cost of on-post lodging where military personnel are required to stay while in training. The total TDY cost to attend Satellite ILE at Redstone Arsenal is $12,142.

TDY costs for attending the 21-day IQC are calculated at the following rates: $83 per day for lodging, $41 per day per diem and $1,200 airfare (M. Houston, personal communication, October 9, 2015). The total TDY cost for an officer to attend IQC is $3,804.

Attendance to the Army Acquisition Basic Course (ABC) is computed by averaging the training time for Program Management (PM) and Contract Management (CM) students. PM students spend six weeks in training between the three-week Army Acquisition Foundation Course and the Acquisition Intermediate Program Management Course. TDY rates are the same as described in IQC for lodging, meals and airfare. This results in 42 days on TDY status totaling $6,408 for a PM student. The CM students spend 11 weeks in training also taking the Army Acquisition Foundation Course along with the Army Basic Contracting Course and Army Intermediate Contracting Course. This amounts to 77 days on TDY status, costing the government $10,748. An average of TDY costs for PM students and CM students is $8,578.

Huntsville, AL is the location analyzed for officers to attend resident DAWIA schools when they complete the courses necessary for Level III technical training. PM requires 26 days of class to complete certification versus 16 class days for CM officers. Based on an average of PM and CM officers, total time on TDY for this training is 30 days. Total cost for officers to complete Level III technical training at the Huntsville, AL resident DAIWA site is $4,920. TDY rates are the same as described above for the ABC and IQC.

C. INSTRUCTOR COST

The cost of an ILE instructor is calculated based on the pay of an O-5 with 18 years in service. BAH and BAS are also factored into the calculation. Instructors at the Army's Command and General Staff College at Fort Leavenworth, KS cost the

government $114,676.50 for the 10-month course. The cost per student per instructor is based on a ratio of one instructor per eight students totals $14,334.56. The cost of an instructor at the Redstone Arsenal Satellite location is $46,926.60 for the 4-month course. Using the same 1:8 ratio, the cost per student of the course is $5,865.83.

The instructors at the ACE are Department of the Army Civilians in the NH-3 pay grade (M. Houston, personal communication, October 9, 2015). The NH-3 pay scale ranges from $61,486 to $95,048. Most of the instructors max out the pay scale at $95,048 (M. Houston, personal communication, October 9, 2015). The ACE employees 12 instructors to teach the Acquisition Foundation Course, Acquisition Intermediate Program Management Course, Army Basic Contracting Course and Army Intermediate Contracting Course. The average cost of an instructor per year is $88,335.60, based on the assumption that 80% of instructors max out the NH-3 pay scale and 20% represent the bottom of the NH-3 pay scale. The total annual cost for 12 instructors is $1,060,027.20. The annual throughput of students for these courses is 1,050 (C. Gardunia, personal communication, October 5, 2015). Therefore, the cost per student for instruction is $1,009.54.

The ACE assigns one instructor at the NH-3 pay grade to teach the officers attending the IQC (M. Houston, personal communication, October 9, 2015). The cost of the instructor per year is $88,335.60. The annual throughput for IQC is 150 students (M. Houston, personal communication, October 9, 2015). The result of the instructor distribution is a cost of $588.90 per student for the instructor at IQC.

D. CLASSROOM EXPENSES

The ACE rents classroom space from the University of Alabama-Huntsville. The contracted cost of each classroom is $30,000 per year (M. Houston, personal communication, October 9, 2015). Only one classroom is dedicated for IQC, which results in a cost of $200 per student based on the 150-student throughput.

The ACE rents five additional classrooms from the University of Alabama-Huntsville to teach Acquisition Foundation Course, Acquisition Intermediate Program Management Course, Army Basic Contracting Course and Army Intermediate

Contracting Course. The annual cost to rent these five classrooms total $150,000. Based on a throughput of 1050 students, the classroom cost per student is $142.86.

E. COMPENSATION

Across all COAs, the Army incurs an opportunity cost of sending officers to training. If the officer were not in school, they would fill an operational assignment. Therefore, the Army must maintain a manning level that allows them to send a number of officers for a full time degree or technical training while also filling required operational billets. The opportunity cost for sending an officer to these courses is the total compensation this officer is paid during the time they attend the course with the assumption that an officer is worth the compensation they receive.

According to a November 2012 Congressional Budget Office report on the *Costs of Military Pay and Benefits in the Defense Budget*, there are four major areas to consider in computing military personnel compensation (Congressional Budget Office, 2012). Applying this framework to the variables detailed in each COA, a detailed breakdown of total compensation is presented (see Table 3). The areas of compensation are listed below:

(1) Cash compensation, which includes base salary, BAH, Basic Allowance for Sustenance (BAS) and any special bonuses or special pay the individual Solider may be entitled to.

(2) Funding for TRICARE, the health insurance plan for current members of the military.

(3) Accrual payments in estimating costs of future retirement benefits. Based upon accrual accounting calculations, the military makes accrual payments equal to 34.3% of an active duty service member's base pay for future pension costs (Congressional Budget Office, 2012, p. 24).

(4) Accrual payments in estimating costs for future covered health care costs. Although the Army's policy on ACS (to include NPS) is to give the same level of priority and consideration in filling ACS quotas as regular operational assignments, the Army must maintain an adequate number of officers to fill that operational billet while the student attends school (United States Army Human Resources Command, 2015a). Officers typically attend graduate school as a Captain with eight years of service. The computation of compensation as the opportunity cost to society

depicted below is broken down into several categories to include: salary (includes BAS), BAH, TRICARE funding, pension accrual and healthcare accrual (see Table 2). Salary and BAS are based on 2015 pay rates and reflect the pay rate commensurate with when the officer would attend the training.

Table 2. Details on the Calculation of the Opportunity Costs

	COA 1 - Accomplishing MBA, JPME and DAWIA level III equivalency while at NPS		
	Typical	Low Estimate	High Estimate
Salary	O-3 with 8 years of service for 18 months [($5744.1 + $253.38) x 18]	O-3 with 8 years of service for 18 months [($5744.1 + $253.38) x 18]	O-4 with 12 years of service for 18 months [($6990.6 + $253.38) x 18]
Cost	$107,955	$107,955	$130,392
BAH	O-3 with dependents stationed in Monterey, CA for 18 months [$2916 x 18]	O-3 without dependents stationed in Monterey, CA for 18 months [$2400 x 18]	O-4 with dependents stationed in Monterey, CA for 18 months [$3252 x 18]
Cost	$52,488	$43,200	$58,536
Pension Accrual	34.3% of base pay [$103,393.8 x .343]	34.3% of base pay [$103,393.8 x .343]	34.3% of base pay [$125,830.8 x .343]
Cost	$35,464	$35,464	$43,160
Healthcare Accrual	DOD Annual Accrual rate of $4400 per year for 18 months [$4400 x 1.5]	DOD Annual Accrual rate of $4400 per year for 18 months [$4400 x 1.5]	DOD Annual Accrual rate of $4400 per year for 18 months [$4400 x 1.5]
Cost	$6,600	$6,600	$6,600
TRICARE Funding	Employer costs and employee copayments for comparable HMO for general US public for 18 months [$4010 + $980 x 1.5]	Employer costs and employee copayments for comparable HMO for general US public for 18 months [$4010 + $980 x 1.5]	Employer costs and employee copayments for comparable HMO for general US public for 18 months [$4010 + $980 x 1.5]
Cost	$7,485	$7,485	$7,485
Total Compensation	**$209,992**	**$200,704**	**$246,173**
	COA 2 - Accomplish MBA using ACS; ILE via resident or satellite followed by IQC; Acq Basic followed by Resident DAU for DAWIA level III		
	Typical	Low Estimate	High Estimate
Salary & BAS	O-3 with 8 years TIS for 18 months grad school, 4 months satellite ILE, 2 months Acq Basic Course; 21 days IQC as O-3 with 10 years TIS; 1 month resident DAWIA training as O-4 with 12 years TIS [($5744.1 + $253.38) x 24 + (($5921+$253.38)/30 x 21) + $6990.6 + $253.38]	O-3 with 8 years TIS for 18 months grad school, 4 months satellite ILE, 2 months Acq Basic Course; 21 days IQC as O-3 with 10 years TIS; 1 month resident DAWIA training as O-4 with 12 years TIS [($5744.1 + $253.38) x 24 + (($5921+$253.38)/30 x 21) + $6990.6 + $253.38]	O-3 with 8 years TIS for 10 months resident ILE, 2 months Acq Basic Course; O-4 with 12 years TIS for 18 months grad school, 1 month resident DAWIA [($5744.1 + $253.38) x 12 + ($6990.6 + $253.38) x 19
Cost	$155,506	$155,506	$209,605
BAH	O-3 with dependents at average of common ACS schools for 18 months; O-3 with dependents at average of common AC assignment locations 4 months ILE, 2 months Acq Basic Course and 21 days IQC, O-4 with dependents at average of common AC assignment locations 1 month resident DAWIA course [=$1971 x 18 + $2289 x 6 + (($2289/30) x 21) + $2603.4]	O-3 without dependents stationed at Auburn University for 18 months; 4 months ILE, 2 months Acq Basic Course and 21 days IQC stationed at Redstone Arsenal, O-4 without dependents stationed at Redstone Arsenal for1 month resident DAWIA course [=$993 x 18 + $1407 x 6 + (($1407/30) x 21) + $1572]	O-3 with dependents 10 months resident ILE at Ft. Leavenworth; 2 months Acq Basic Course while stationed at Picatinny Arsenal; O-4 with dependents stationed at UC Berkley for 18 months, 1 month resident DAWIA course while stationed at Picatinny Arsenal [$1572 x 10 + $3045 x 2 + $3384 x18 + $3246]
Cost	$53,418	$28,873	$85,968
Pension Accrual	34.3% of base pay [$148,993.70 x .343]	34.3% of base pay [$148,993.70 x .343]	34.3% of base pay [$201,750.6 x .343]
Cost	$51,105	$51,105	$69,200
Healthcare Accrual	DOD Annual Accrual rate of $4400 per year for 25.7 months [$4400 x 2.1417]	DOD Annual Accrual rate of $4400 per year for 25.7 months [$4400 x 2.1417]	DOD Annual Accrual rate of $4400 per year for 31 months [$4400 x 2.583]
Cost	$9,423	$9,423	$11,365
TRICARE Funding	Employer costs and employee copayments for comparable HMO for general US public for 25.7 months [($4010 + $980) x 2.1417]	Employer costs and employee copayments for comparable HMO for general US public for 25.7 months [($4010 + $980) x 2.1417]	Employer costs and employee copayments for comparable HMO for general US public for 31 months [($4010 + $980) x 2.583]
Cost	$10,687	$10,687	$12,889
Total Compensation	**$280,139**	**$255,594**	**$389,028**

	COA 3 - Accomplish MBA using TA and personal funds; ILE via resident or satellite followed by IQC; Acq Basic followed by Resident DAU for DAWIA		
	Typical	Low Estimate	High Estimate
Salary & BAS	10% work degredation cost while using TA for 30 months (24 as O-3 with 8 years TIS, 6 as O-3 with 10 years TIS); O-3 with 8 years TIS for 4 months satellite ILE, 2 months Acq Basic Course, 21 days IQC as O-3 with 10 years TIS; 1 month resident DAWIA training as O-4 with 12 yrs TIS [(($5744.1 + $253.38) x 24 + ($5921.1 + $253.38) x 6)) x 0.1 + ($5744.1 + $253.38) x 6 + (($5921+$253.38)/30 x 21) + $6990.6 + $253.38]	No salary cost while using TA since serving in an AC billet; O-3 with 8 years TIS for 4 months satellite ILE, 2 months Acq Basic Course, 21 days IQC as O-3 with 10 years TIS; 1 month resident DAWIA training as O-4 with 12 yrs TIS [($5744.1 + $253.38) x 6 + (($5921+$253.38)/30 x 21) + $6990.6 + $253.38]	25% work degredation cost while using TA for 36 months total (24 as an O-4 with 12 years TIS, 12 as O-4 with 14 years TIS); O-3 with 8 years TIS for 10 months resident ILE, 2 months Acq Basic Course; 1 month resident DAWIA training as O-4 with 12 yrs TIS [(($6990.6 + $253.38) x 24 + ($7221 + $253.38) x 12)) x 0.25 + ($5744.1 + $253.38) x 12 + $6990.6 + $253.38]
Cost	$65,650	$47,551	$145,101
BAH	10% of BAH costs for 30 months of TA use for as an O-3 with dependents at average of common AC assignment locations; 4 months ILE, 2 months Acq Basic Course and 21 days IQC at full BAH using the same rate; O-4 with dependents at average of common AC assignment locations for 1 month resident DAWIA course [($2289 x 30) x .1 + ($2289 x 6) + (($2289/30)*21) + $2603.42]	No BAH costs while using TA since serving in an AC billet; O-3 without dependents stationed at Redstone Arsenal for 4 months satellie ILE, 2 months Acq Basic Course, and 21 days IQC; O-4 without dependents for 1 month resident DAWIA course [$1407 x 6 + (($1407/30)*21) + $1572]	25% of BAH costs for 36 months of TA use as an O-4 with dependents at Picatinny Arsenal; 10 months resident ILE at Ft. Leavenworth; 2 months Acq Basic Course while stationed at Picatinny Arsenal as an O-3 with dependents; O-4 with dependents stationed at Picatinny Arsenal for 1 month Resident DAWIA course [($3246 x 36) x .25 + ($1572 x 10) + ($3045 x 2) + $3246]
Cost	$24,807	$10,999	$54,270
Pension Accrual	34.3% of base pay [(($5744.1 x 24 + $5921 x 6) x 0.1 + $5744.1 x 6 + ($5921/30*21) + $6990.6) x .343]	34.3% of base pay [($5744.1 x 6 + ($5921/30*21) + $6990.6) x .343]	34.3% of base pay [(($6990.6 x 24 + $7221 x 12) x 0.25 + $5744.1 x 12 + $6990.6) x .343]
Cost	$21,588	$15,641	$47,858
Healthcare Accrual	DOD Annual Accrual rate of $4400 per year for 7.7 months and 10% for 30 months [($4400 x .6417) + (($4400 x 2.5) x .1)]	DOD Annual Accrual rate of $4400 per year for 7.7 months [$4400 x .6417]	DOD Annual Accrual rate of $4400 per year for 13 months and 25% for 36 months [($4400 x 1.083) + (($4400 x 3) x .25)]
Cost	$3,923	$2,823	$8,065
TRICARE Funding	Employer costs and employee copayments for comparable HMO for general US public for 7.7 months and 10% for 30 months [(($4010 + $980) x .6417) + (($4010 + $980) x 2.5 x .1)]	Employer costs and employee copayments for comparable HMO for general US public for 7.7 months [($4010 + $980) x .6417]	Employer costs and employee copayments for comparable HMO for general US public for 13 months and 25% for 36 months [(($4010 + $980) x 1.083) + (($4010 + $980) x 3 x .25)]
Cost	$4,450	$3,202	$9,147
Total Compensation	**$120,417**	**$80,216**	**$255,294**

Basic Allowance for Housing (BAH) expense calculations vary because of different location rates and because officers attend schools at different points in their career. The BAH rates used in computing typical costs in COA 2 are based on five prominent locations in which Army Acquisition officers are stationed. The five installations are Redstone Arsenal, Detroit Arsenal, Fort Belvoir, Aberdeen Proving Grounds and Picatinny Arsenal. BAH costs for the typical officer in COA 3 are based upon 15 historically attended schools (see Table 4) for officers using ACS (United States Army Human Resources Command, 2015a).

F. OPPORTUNITY COSTS

In most cases, officers attend Satellite ILE and resident DAIWA Schools on temporary duty status. There is an additional opportunity cost associated for officers in COAs 2 and 3 while away at school. These officers are filling a work billet, but are not present to complete their daily duties and responsibilities. Organizations must still

complete their mission without the assigned officers. The opportunity cost for officers being in training is calculated using the same framework as above used to calculate compensation for the time they are in the training required for that COA with the assumption that the cost of their absence is the compensation they receive while absent.

Officers attend resident DAU Schools as an O-4 to complete their level III technical training. Program Managers and Contracting Officers have different requirements to complete certification. PM Officers require an average of 26 duty days of resident training, while Contracting Officers on require 16 duty days to move from level II to level III technical training. An average of 30 total days was used to determine opportunity cost for Officers attending school.

The typical cost estimates for COAs 2 and 3 are computed using the total compensation the officer receives for the four months of ILE and one month at resident DAU training on TDY for a total of $56,870 in opportunity costs. The high estimate assumes the officer attends resident ILE but still incurs opportunity cost for the one month they attend DAU courses as an O-4 resulting in an opportunity cost of $13,670. These calculations are detailed in Table 3.

Table 3. Opportunity Cost Calculation Breakdown

	Opportunity Cost of Absence for COAs 2 & 3		
	Typical	Low Estimate	High Estimate
ILE (Satellite)	4 months O-3 with dependents with 8 years TIS at average of common AC locations with salary, BAH, pension accrual, healthcare accrual and TRICARE funding as computed in table x [($5744.1 + $253.38 + $2289) x 4 + ($5744.1 x 4) x .343 + ($4400 x 4/12) + (($4010 + $980) x 4/12)]	**N/A**	
Cost	**$44,157**		
Resident DAU Schools	1 month O-4 with dependents with 12 years TIS at average of common AC locations with salary, BAH, pension accrual, healthcare accrual and TRICARE funding as computed in table x [($6990.6 + $253.38 + $2603.4) + ($6990.6 x .343) + ($4400 x 1/12) + (($4010 + $980) x 1/12)]	**N/A**	1 month O-4 with dependents with 12 years TIS at Picatinny Arsenal with salary, BAH, pension accrual, healthcare accrual and TRICARE funding as computed in table x [($6990.6 + $253.38 + $3246) + ($6990.6 x .343) + ($4400 x 1/12) + (($4010 + $980) x 1/12)]
Cost	**$12,713**		**$13,670**

Officers attending graduate school in their off-duty time using TA incur additional opportunity costs linked to their loss of free time. The extra time spent in

school after hours has a meaningful cost to the officer. An average online MBA program consists of 42 credit hours. The total class time spent completing one credit hour over the course of a semester is 15 hours. Therefore, using this method, 42 credit hours translate to 630 class hours. The officer's total pay is used to calculate the value of time. The monthly compensation in a typical scenario is based on an O-3 with dependents and eight years TIS for the first two years and reaches 10 years TIS during the remaining six months of the program. The compensation for an O-3 with dependents and eight years TIS includes the following: $5,744 in base salary, $253 for BAS, $2,289 for BAH, $1,970 for pension accrual, $366 for healthcare accrual, and $416 for healthcare totals $11,038 a month. An O-3 with dependents with 10 years TIS earns the following: $5,921 in base salary, $253 for BAS, $2,289 for BAH, $2,030 for pension accrual, $366 for healthcare accrual, and $416 for healthcare totals $11,275 a month. The total monthly compensation is then divided by 160 hours to derive the hourly total of $68.99 for O-3 with eight years TIS and $70.47 for O-3 with 10 years TIS.

The total time spent in class of 630 hours multiplied by the officer's hourly compensation of $68.99 for two years added to $70.47 for six months creates a total opportunity cost of $43,649 while the officer pursues an MBA on off-duty time. The low estimate compensation for off-duty time is based on an O-3 without dependents and eight years TIS while completing the program in two years. The total opportunity cost for the low estimate is $39,910. The high estimate compensation for off-duty time is calculated based on the total salary of an O-4 with dependents and 12 years TIS for two years and O-4 with dependents and 14 years of service for the third and final year of the program. The high estimate opportunity cost is $54,230. Out of class time to include preparation and homework is not factored into this additional opportunity cost even though a student cannot complete a degree by only attending class. This estimate is detailed (see Table 4).

Table 4. Opportunity Cost for Out-of-Class Preparation

	Opportunity Cost of Lost Free TIme for COA 3		
	Typical	Low Estimate	High Estimate
Off Duty Time Spent Pursuing MBA	Compensation for an O-3 with dependents and 8 years TIS with BAH calculated as table x for the first 2 years of the program and the following 6 months based on 10 years TIS computed at an hourly rate assuming a 40 hour work week multiplied by the number of hours required to complete the degree assuming 1 credit hour equates to 15 hours of classroom time [(($5,744+$253+$2,289+$1,970+$366+$416)÷160)x630x.8)+[(($5,921+$253+$2,289+$2,030+$366+$416)÷160)x630x.2]	Compensation for an O-3 without dependents and 8 years TIS with BAH calculated as table x for the 2 years of the program computed at an hourly rate assuming a 40 hour work week multiplied by the number of hours required to complete the degree assuming 1 credit hour equates to 15 hours of classroom time [(($5,744+$253+$1,970+$1,407+$366+$416) ÷160)x630]	Compensation for an O-4 with dependents and 12 years TIS with BAH calculated as table x for the first 2 years of the program and the following 12 months based on 14 years TIS computed at an hourly rate multiplied by the number of hours required to complete the degree assuming 1 credit hour equates to 15 hours of classroom time [(($6,991+$253+$3,246+$2,397+$366+$416)÷160)x630x(2/3)]+[(($7,222+$253+$3,246+$2,477+$366+$416)÷160)x630x(1/3)]
Cost	$43,649	$39,989	$54,230

V. BENEFIT ANALYSIS

While all COAs result in the same level of qualifications for newly accessed Acquisition officers, there are substantial differences across COAs in both the quality of the education that is received and the benefits received by the Army. Unfortunately, many of these benefits are difficult to monetize and we do not attempt to attach monetary values to them. Rather, we proceed with to outline the benefit elements that differ across COAs in the hope that they will be of use to a decision maker in choosing the optimal policy.

A. CREDIT HOURS

The credit hours required to accomplish a master's program at a civilian university vary between each institution, but they are all significantly less than the credit hours required at NPS. Typical MBA programs require an average of 48 to 62 credit hours to complete (Robinson, 2015). However, NPS requires an average of 97.5 credit hours to complete an MBA degree. The difference comes from NPS adhering to a diverse core curriculum, as well as providing specific courses that provide DAU equivalencies. This allows the officer DAWIA level III technical training, as well as an MBA. This is similar to how many civilian universities are offering specialization courses in addition to the core curriculum.

If one considers more credit hours to be beneficial, NPS would be considered superior to all other ACS schools depicted (see Table 4). However, if one believes students could use their time doing more productive or beneficial projects or gaining more in depth knowledge of fewer courses during that class time, NPS would not be considered superior to other ACS schools.

B. EDUCATION QUALITY

Officers in COA 1 who attend NPS are not just receiving an MBA with a defense focus; they are learning valuable skills relevant to military careers. They are exposed to a diverse mix of over 200 military officers from more than 45 countries in addition to

officers from every U.S. military branch ("IGPO Home," n.d.). The networking between not only sister services but international students broadens the knowledge sharing received while attending NPS (Coughlan, Hager, Garrett, King, & Thomas, 2013, p. 10). This cooperative group learning where "an individual's human capital enhances the productivity of other factors of production" is known as human capital externalities (Venniker, 2001).

It is not clear though weather students would gain a greater benefit through human capital externalities at a military-run institution or a civilian university. From the student's perspective, there are many reasons to pursue their education at a civilian university, especially at of the elite top 20 schools. The most obvious being the networks the student can create with civilian counterparts who will likely rise to high-level, high-paying jobs where they could help the military student get hired as soon as they leave the military. University name recognition is another benefit to civilian schools over DOD-run schools where not many people outside of DOD know what a school, such as NPS even exists. In a 5 November, 2015 report on the Force of the Future, Brad Carson, the Acting Under Secretary of Defense for Personnel and Readiness, recommends expanding civilian schooling for military officers. He recognizes the benefits of officers earning advanced degrees and recommends a balance of defense-run and civilian institutions to increase diversity in learning for both military and civilian students (Barno & Bensahel, 2015, p. 10).

While the education experience MBA students receive at civilian institutions may help graduates fit into the organizational culture of profit-seeking firms, the business of national defense has little in common with corporate America. In that context, a DOD-run institution likely provides the type of education experience the military is seeking for its officers. Industry best practices often encounter organizational friction with the military where regulation, tradition and structure govern virtually every aspect of life.

Additionally, from the military's perspective, the Army wants to reap the benefits of their investment in an officer's education as long as they possibly can. Sending officers to top civilian universities may have the opposite effect of the intended retention tool. An MBA from a top college makes that Soldier very marketable and very capable of

finding a high-paying job as soon as the initial ADSO is completed. By sending more officers to civilian schools, DOD is risking losing a higher number of highly trained officers before they become eligible for retirement. This compounds the problem facing the DOD Acquisition career field where 36% of its workforce will be eligible to retire by 2022 (Brooks, 2013, p. 21). While sending more officers to prestigious civilian universities initially sounds like a great idea, more research should be conducted to determine its true effect on retention.

Officers using ACS in COA 2 or TA in COA 3 at a civilian university gain a non-DOD perspective that exposes them to more industry best practices than a DOD-run master's program could offer. The students pursuing a degree at a civilian university are required to participate in either ROTC or local recruiting events each month to share their unique knowledge and experience. They get a unique opportunity to interact with the civilian population and gain from this non-DOD level of exposure. This unique perspective would be lost if these students were not participating in ACS. The government is not necessarily the ideal model to use in best business practices because of the bureaucratic hierarchy we abide by therefore, officers who attended civilian universities can bring a fresh perspective to an often-monochromatic military force.

While most schools are focused on the ranking race in order to attract new applicants, NPS has already established niche MBA market-supplying officers with the same core competency as other universities while maintaining a defense focus (Coughlan et al., 2013, p. 3). The rankings that are published use varying techniques in order to quantify the rank of each school. The value of each ranking system is somewhat arbitrary and many universities are now leaning toward specialization in certain fields in order to distinguish their degree from the rank race. To further distinguish NPS from other universities, its students provide the government with defense focused research projects and theses' often sponsored by the DOD.

Beyond the defense focus, each officer receives specialized education in a field needed by his service. NPS is matching the needs of the military with the training and education of its officers. Unlike traditional MBAs that may not be applicable to the job training necessary for officers to perform their daily tasks, NPS provides the military with

a fully qualified officer with all the necessary relevant training to meet a directly needed specialty (Coughlan et al., 2013, p. 6). A good example and the focus of our study is the acquisition professionals who graduate from NPS fully educated to meet the contracting and program management needs of the Army. By being a full time student, officers attending NPS do not lose their invaluable free time as those in COA 3 using TA. That time could be spent with family, friends, doing hobbies, or other enriching activities. Additionally, research has shown that full-time students rate the value of their MBA much higher than students who attended school part-time (Bruce, 2009, p. 44). A major contributing factor to this difference is the work-life balance.

Table 5. Comparison of Different Qualitative Benefits of Top ACS Institutions

School Name	Rank per US News & World Report	Total Compensation Based on location	Average GMAT Score	Program Tuition in State	Total Credit Hours	Total Cost	In State Total Cost Per Credit Hour	Cost Per Credit Hour Ranking
Naval Postgraduate School (Monterey, CA)	n/a	$ 209,992	n/a	$ 29,550	97.5	$ 239,542	$ 2,456.84	1
University of North Carolina (Chapel Hill, NC)	18	$ 275,117	697	$ 34,015	63	$ 440,161	$ 6,986.68	2
Georgia Institue of Technology (Atlanta, GA)	30	$ 272,795	676	$ 27,486	54	$ 431,310	$ 7,987.22	3
Texas A&M University (College Station, TX)	27	$ 274,685	647	$ 39,652	55	$ 445,366	$ 8,097.57	4
North Carolina State University (Raleigh, NC)	70	$ 272,147	639	$ 44,637	55	$ 447,813	$ 8,142.06	5
University of Maryland (College Park, MD)	41	$ 293,477	662	$ 45,499	54	$ 470,005	$ 8,703.80	6
George Washington University (Washington, DC)	58	$ 293,477	648	$ 89,355	55.5	$ 513,861	$ 9,258.76	7
University of Arizona (Tucson, AZ)	56	$ 267,989	646	$ 23,238	45	$ 422,256	$ 9,383.47	8
University of California (Berkeley, CA)	7	$ 302,873	717	$ 51,520	51	$ 485,422	$ 9,518.08	9
University of Louisville (Louisville, KY)	70	$ 273,767	607	$ 32,000	45	$ 436,796	$ 9,706.58	10
George Mason University (Fairfax, VA)	n/a	$ 293,477	550	$ 42,684	48	$ 467,190	$ 9,733.13	11
Old Dominion University (Norfolk, VA)	n/a	$ 280,625	665	$ 17,480	40	$ 429,134	$ 10,728.35	12
University of Central Florida (Orlando, FL)	n/a	$ 277,709	538	$ 14,416	39	$ 423,154	$ 10,850.11	13
Auburn University (Auburn, AL)	83	$ 265,613	616	$ 12,879	36	$ 409,521	$ 11,375.59	14
Purdue University (West Lafayette, IN)	53	$ 274,199	617	$ 22,418	30	$ 427,646	$ 14,254.87	15
University of Colorado (Denver, CO & Boulder, CO)	86	$ 284,243	600	$ 16,860	30	$ 432,132	$ 14,404.40	16

Unfortunately, there is limited quantitative data on the differential benefits of attending different schools. We have no data for COA 3 schools because we do not know what schools students using TA attend. COA 2 data (see Table 5), which shows the most common schools attended by individuals seeking their MBA at a civilian university and the vast differences in Graduate Management Admission Test (GMAT) scores, total program cost, total credit hours, and cost per credit hour are all detailed. The quality of the education received at each university can vary vastly, as some focus more on certain areas of specialization and others focus more on research. The cost per school also varies

significantly, with the majority of the variance driven by tuition cost and BAH rate, which influences total compensation for that location.

Although all MBA programs will provide overall benefits to the individual, NPS would be ranked number one compared to other commonly attended schools in the ACS program in terms the total cost per credit hour (see Figure 5). NPS has the highest credit hour requirement for completion of an MBA showing their focus on producing well-rounded officers fully trained and educated back into operational billets. The relevance of the degree and level of education for NPS can be applied directly into future positions because the degree specialization requests come directly from the military. Also, the value of some institutions may carry more weight and offer a better opportunity for networking due to the size, defense relatedness, and history of the program and the university.

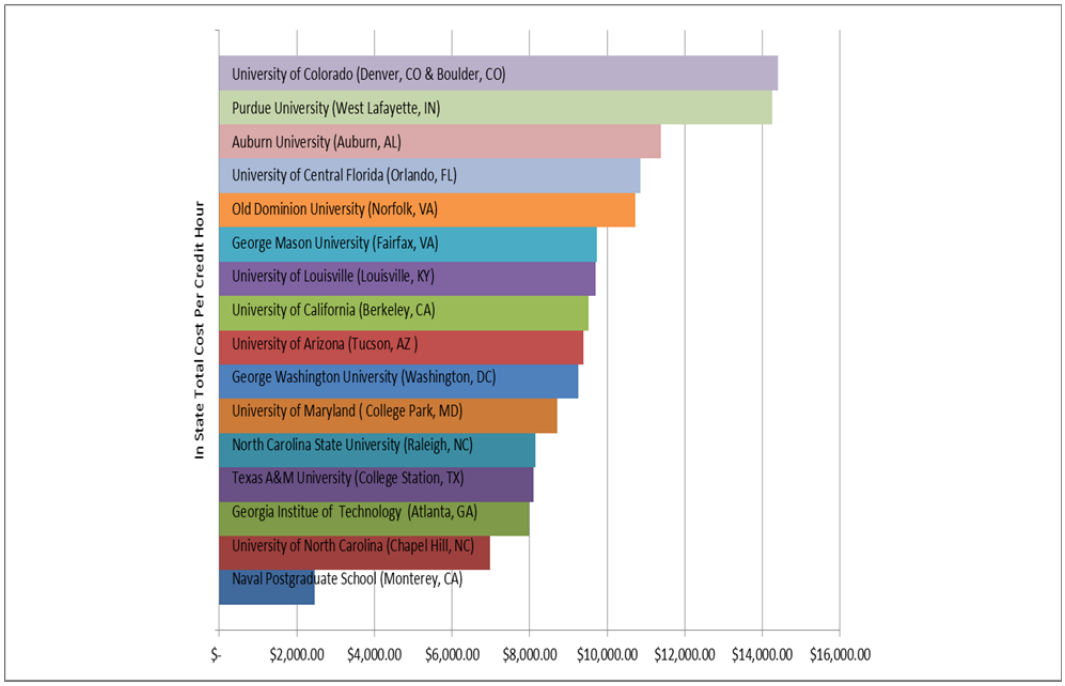


Figure 5. Total Cost Per Credit Hour for ACS institutions

To equally compare the quality of NPS to the other schools listed (see Table 4) would require some form of common qualitative measure of student aptitude. The GMAT

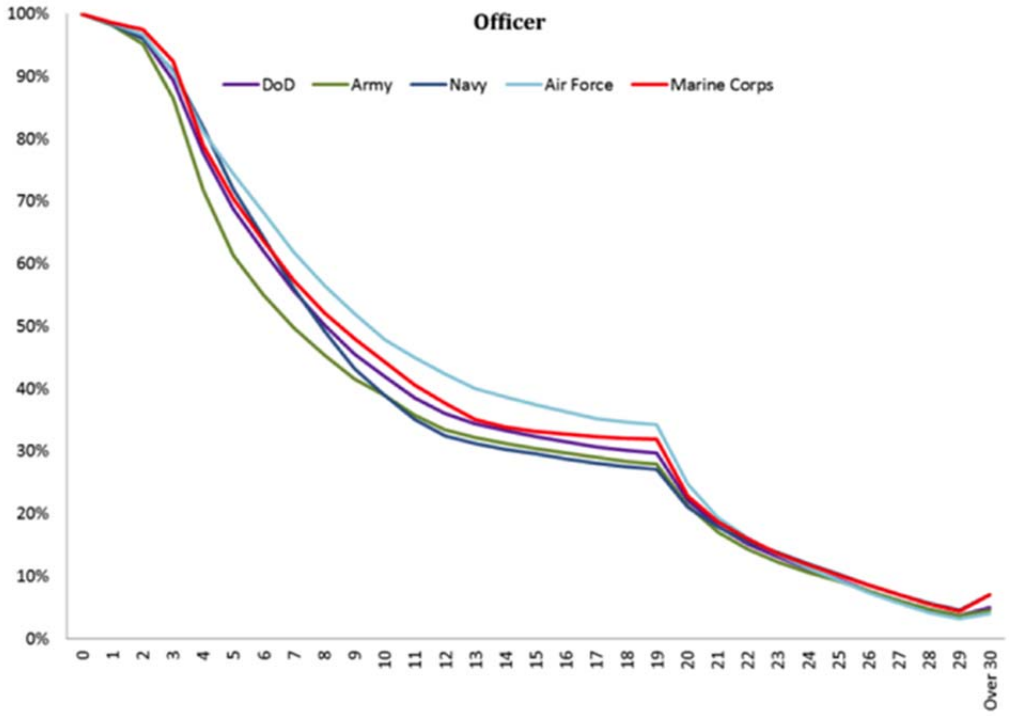
is the most readily available measure most business schools use as a qualitative predictor of a graduate student's potential. Unfortunately, NPS does not require its business students to complete the GMAT for entrance into its program. Additionally, NPS is not ranked by any of the traditional publications.

C. ACTIVE DUTY SERVICE OBLIGATION

An ADSO is considered to be the Army's return on an investment in an officer-funded education. It is often used as a retention tool. By fully funding an officer's education, the Army will to retain that educated officer for at least three times as long as the time spent in school given the 3:1 payback for each day of fully funded education. Even using TA ensures the officer is retained for at least two years. The use of ADSO allows the Army to place the officer in a position where it can benefit from his education and newly developed skills. Officers attend school around the middle of their career, often pushing their ADSO to a point in their career where they are more likely to stay until retirement. This benefits society by keeping the talent the Army has paid for to fill higher-level positions with the most qualified individuals.

In viewing the ADSO as the return on the Army's investment, we calculate the total cost for each typical COA divided by the total number of years of ADSO to determine the cost of each year of payback. COA 1 incurs a cost of $239,542 with a four and a half year ADSO resulting in a cost of $53,232 per year of payback. COA 2 incurs a cost of $426,010 with a four and a half year ADSO resulting in a cost of $94,669 per year of payback. Finally, COA 3 incurs a cost of $281,203 with a two year ADSO resulting in a cost of $140,602. This analysis reveals COA 1 costs substantially less per year of payback returned to the Army by the officer.

Figure 6. Continuation Rates by Years of Service



Source: Military Compensation and Retirement Modernization Commission. (2015, January 29). Final report of the military compensation and retirement modernization commission. Retrieved from http://www.mcrmc.gov/public/docs/report/MCRMC-FinalReport-29JAN15-HI.pdf

The Army receives a guaranteed service benefit from Officers after the completion of their graduate degrees in terms of an ADSO. The ADSO varies between Advanced Civil Schooling and Tuition Assistance. Officers in the ACS program, which includes NPS, incur three years of service for every year in school, but the TA Students only owe the Army two years of service following the completion of their last class. According to DA Pamphlet 600–3, Army Acquisition Officers typically begin their graduate degree programs at eight years of service. After 18 months of education, an officer would PCS to their next assignment with nine and a half years of service then owing a four and a half year payback to the Army. At a minimum, the ACS or NPS Officer must remain in the military until year 14. If a TA officer graduates on the same timeline, they are eligible to separate from the military two years earlier at year 12.

By comparison, the ADSO associated with ACS or NPS is a greater benefit because the Army receives an additional two years of guaranteed service over the TA Officer. However, the guaranteed service benefit may become a moot point because the continuation of service by years of an Army Officer's career can be seen (see Figure 6) by showing the diminishing effects after ten years of service. The difference between an officer separating between 12 and 14 years of service is 2% at most. Trends show that officers that stay in the service until year 12 will most likely go beyond the required ADSO, and most will stay until they are eligible for retirement at 20 years of service.

Since the officer is likely to stay to 20 years of service regardless of which COA is selected, the length of benefit from funding the officer's education is strongly impacted by when the officer actually completes either COA. A fully qualified officer is returned to the operational force in 18 months using COA 1 as opposed to 25.7 and 37.7 months for COAs 2 and 3, respectively (see Figure 3). Our analysis assumes the officer starts the program at eight years of service, but if they start much later in their career, the time it takes to complete the selected COA become much more important. If each COA is started in the 13th year of an officer's career, the Army will have that fully qualified officer for five and a half years using COA 1 as opposed to less than four years using COA 3 if they remain in the service for 20 years. The later in their career an officer begins their training, the more important it is for the Army to have that training completed as fast as possible.

VI. SENSITIVITY ANALYSIS

The low and high estimates presented in Table 3 provide the overall high/low sensitivity analysis for these COAs. The variables used in the analysis that present the most substantial influence on which COA is least expensive are the amount of time it takes to complete a degree, the amount of degradation to work quality while using TA, and when an officer begins and completes the tasks in each COA. An analysis of these three variables is presented below.

For COA 1, it is assumed the officer completes all degree requirements in 18 months they are assigned to NPS. However, if the officer takes additional time, they will incur tuition expenses of $4925 per additional quarter. What's more substantial is the amount of compensation the officer continues to receive while completing the degree requirements. Each month adds a cost varying in range from $11,150 to $13,676 depending on the officer's rank. The same degree of impact can be seen in COAs 2 and 3 if the officer takes substantially longer than the estimated time to complete their degree.

The percentage of degradation to work quality in an officer's assigned unit accounts for the majority of the difference in the high and low estimates for COA 3. This COA allows the officer more flexibility to complete their degree at their own pace, which could result in a lower compensation cost if they complete their degree faster than the two–three years assumed in the analysis. However, his quality of work at their assigned unit would likely further degrade, offsetting this compensation savings. The more degraded an officer's performance is at their assigned unit, the more it will reflect poorly in their annual evaluation. This impact would be substantial if the poor ratings led to the officer being separated from the service or failing to remain competitive for promotion.

Finally, the later an officer begins either of the COAs or the longer they take to complete either COA will result in a much higher cost estimate. This is intuitive since officers are promoted and provided longevity pay increases on a very structured timeline. Across all COAs, compensation is the most expensive variable. The further along an

officer is in their career, the more expensive their time becomes and the shorter their potential payback becomes for the Army.

VII. CONCLUSION

Based upon the results of this analysis we conclude the most cost effective means for a typical officer to earn a graduate degree, complete military education level four and satisfy technical training requirements of the Defense Acquisition Workforce Improvement Act is to accomplish these concurrently while attending the Naval Postgraduate School. As the most cost effective means, only when extreme circumstances are applied in sensitivity analysis displayed in the minimum and maximum estimates does any other COA become more cost effective. We further recommend additional analysis and review be conducted in future projects pertaining to the questions below:

- What are the effects on promotion rates based on which COA is pursued by Acquisition professionals to achieve initial training, MEL 4 and obtaining an advanced degree?
- Are retention rates impacted by which COA is pursued by Acquisition professionals?
- Is there a quantifiable metric to evaluate the return on investment (ROI) that the Army gets from sending officers to each COA beyond the ADSO returned for each option?
- Can the benefits to the individual, Army, and society be quantifiably defined to deliver a more accurate representation of the net benefits for each COA to determine the most cost effective means of educating newly accessed Acquisition professionals?

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