The Effect of Credentialing on Sailor Advancement, Retention, and Unemployment

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Abstract

The Navy's Credentialing Opportunities On-Line (COOL) program began in FY07. COOL enables sailors to earn credentials (e.g., licenses, certifications, memberships) related to their occupations or collateral duties. The Assistant Secretary of the Navy for Manpower and Reserve Affairs asked CNA to determine the extent to which COOL enhances sailor advancement and retention and reduces the probability of requiring unemployment compensation on separation from the Navy. We conclude that participation in COOL alone does not directly benefit sailors in terms of advancement, but we have evidence that COOL participants who pass all of their exams are probably more motivated and/or able to advance than their nonparticipating peers. We cannot determine the retention effects of COOL because of the factors that have existed throughout the period of COOL, especially high unemployment and Navy downsizing. We also found that successful participation in COOL may be effective in lowering unemployment for some sailors.

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Executive Summary

The Navy began its Credentialing Opportunities On-Line (COOL) program in FY07. COOL offers sailors the opportunity to earn credentials—such as licenses, certifications, or memberships—related to their occupations or collateral duties. The program pays for application, exam, and membership fees for credentials that have been mapped to at least 80 percent of the duties specified in the sailor's rating or critical skill Job Duty Task Analysis (JDTA). In addition to having the relevant rating or skill, a sailor must have at least one year remaining on his or her contract at the time of application for the credential and must satisfy any other credential requirements, such as experience and education.

The Assistant Secretary of the Navy for Manpower and Reserve Affairs (ASN (M&RA)) asked CNA to determine the extent to which COOL enhances sailor advancement and retention and reduces the probability that a sailor requires unemployment compensation on separation from the Navy.

Participation in COOL

Our COOL data include 30,478 individuals and 72,885 applications, covering the period between August 30, 2007, and April 21, 2014. Of these, 8,170 sailors participated at least once involuntarily as part of the Information Assurance Workforce. We do not include these sailors in our analyses. Six ratings represent over 80 percent of applicants and 76 percent of all applications:

- Culinary Specialist (CS)
- Cryptologic Technician (Collections) (CTR)
- Electronics Technician (non-Nuclear Field) (ET)
- Hospital Corpsman (HM)
- Information Systems Technician (IT)/IT (Submarine) (ITS)
- Master-at-Arms (MA)

No other rating represents at least 2 percent of the total applicants. Early on, sailors in the CS and MA rating represented the largest percentage of participants, but since

FY11 IT/ITS sailors have dominated COOL applications. The large increase in IT/ITS applications results from COOL exams being administered during IT A-School beginning in December 2010. We have evidence that other sailors are taking COOL exams during training, such as HMs in certain C-Schools.

When we control for relevant factors, we find statistically significant differences in participation based on gender (women are 5 percent less likely to participate, all else equal) and race (Asian/Pacific Islanders are 23 percent and blacks are 9 percent more likely to participate than otherwise similar Caucasians). The greatest difference, however, is based on education; sailors with associate degrees are 37 percent more likely to participate in COOL than sailors with high school diplomas, all else equal. This is the first indication we found that sailors who participate in COOL may be more motivated or more able sailors.

Advancement

We expect that the primary way that participation in COOL would affect the speed of advancement is the extent to which it helps sailors perform better on the occupational component of their advancement exams. We found that sailors who successfully participate in COOL—where success is defined as passing all COOL exams—before their first E4 advancement exam outperform their peers on the occupational component of the advancement exam, even when we control for typical measures of ability, such as Armed Forces Qualification Test and education.

We conclude that participation in COOL on its own does not directly benefit sailors in terms of advancement, however. Sailors who passed all of their COOL exams had no greater improvement in occupational exam scores on consecutive E5, E6, and E7 advancement exams than their peers who did not participate; if the participation itself improved sailors' knowledge related to their ratings, we would expect participants to have a greater improvement than their peers who did not participate, all else equal.

These results are additional evidence that successful participants in COOL are likely more motivated and/or more able than their peers who do not participate, especially relative to those who participate but do not pass all of their COOL exams.

Retention

We find that retention initiatives and other factors that existed throughout the period of COOL make it impossible to correctly estimate the true effect of COOL participation on retention. We do not have a sufficient number of sailors in any rating who participated consistently across all zones and over the entire COOL experience to control for all of the relevant factors that affect retention. This is especially important because of the unusual circumstances under which COOL has operated—a period of historically high unemployment, which resulted in an increase in the proportion of sailors wishing to reenlist at the same time that the Navy was downsizing and restricting reenlistments. We have some indication, however, that sailors in the CS and MA ratings who successfully participated in COOL had higher Zone A retention during the era when Perform To Serve (PTS) imposed the greatest reenlistment limits, all else equal, but these results may be more a reflection of which sailors the Navy allowed to reenlist rather than of sailor preferences, and they may not be robust in a more steady-state retention environment.

Unemployment

For sailors who separated while in Zone A, we find that, all else equal, those who passed all of their COOL exams were 6.5 percentage points less likely to receive Unemployment Compensation for Ex-Servicemembers (UCX) than their peers who failed one or more COOL exams, and sailors who failed one or more of their COOL exams were 8.4 percentage points more likely to receive UCX than sailors who did not participate in COOL. This latter difference persists for sailors who separated in Zone B; those who failed at least one COOL exam were 10.0 percentage points more likely to receive UCX than their similar peers who did not participate in COOL. Clearly, COOL is not responsible for reducing their ability to find employment; we conclude that this is another indication that unsuccessful COOL participants differ in some unobservable traits that make them less able or less motivated than their peers.

We also looked at the UCX experience of sailors in the MA rating, the only rating with a sufficient number of participants in COOL who separated in each zone. For these sailors who separated in Zone B, successful COOL participants were 6.3 percentage points less likely than nonparticipants to collect UCX, all else equal.

We found that participation in COOL helps to lower total UCX payments for some sailors, especially those who separated in Zones C and E. Using the average cost per voluntary participant of about $590, the cost of COOL almost completely offsets the cost of UCX for participants in Zone E, and the net savings to the Navy for sailors in Zone C is over $800.

Zone A sailors who failed COOL exams received more UCX than their peers who did not participate, but we conclude that this is further evidence that these sailors are likely less able or less motivated than their peers and hence may have more difficulty in finding civilian employment.

Recommendations

Overall, we find some evidence that successful COOL participation is associated with less UCX, and it may have beneficial retention effects during periods of more typical unemployment, and when the Navy is not downsizing. However, our findings must be considered to be preliminary for a number of reasons. First, we do not have complete information regarding whether sailors actually earned credentials, only that they applied, and, in most but not all cases, whether they passed a particular exam. The effect of COOL on retention could depend on this outcome; they may reenlist in order to complete all of the exams necessary for one or more credentials but separate on receipt of the desired credentials. Therefore, our first and most important recommendation is that the Navy should revise the COOL data collection protocol so that it indicates whether the sailor was awarded the credential and the date of the award.

We conclude that COOL could serve as a signal for sailor motivation and ability, especially for sailors who pass all of their COOL exams. This could be useful in identifying sailors of the highest quality for purposes of evaluations, Selection Board consideration, and so on. The signal may be twofold; sailors who participate could be more motivated to seek out the credential for a particular purpose (self-improvement, career enhancement, civilian opportunities), and they may be more motivated and able to do well on measures of competency. The less voluntary that participation is, the more muted the first source of the signal becomes.

Based on our finding that some sailors who pass all of their COOL exams are less likely to require UCX, the Navy may want to consider encouraging sailors who are denied reenlistment in-rate to pursue a COOL credential before separating. For these sailors, the Navy would need to waive the requirement of a minimum of one year remaining on their contract in order to participate in COOL.

Finally, we conclude that more accurate measures of the effect of COOL on advancement, retention, and unemployment will not be possible until COOL has been in existence longer and under more normal conditions. It is not clear how sailors learn about COOL, and participants so far have been "early adopters"; as such, they may exhibit different behaviors than those who participate in COOL in the future. It is also not clear what the long-term effects of PTS (now called C-Way) or mid-career retention boards will be on sailor retention behavior and their motivation for participating in COOL. Therefore, we recommend that the Navy revisit the effectiveness of COOL in a few years.

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Glossary

AEF	Advanced Electronics Field
AFQT	Armed Forces Qualification Test
API	Asian/Pacific Islander
ASN (M&RA)	Assistant Secretary of the Navy for Manpower and Reserve Affairs
CO	Commanding Officer
CONUS	Contiguous United States
COOL	Credentialing Opportunities On-Line
CPO	Chief Petty Officer
CS	Culinary Specialist
CTM	Cryptologic Technician (Maintenance)
CTN	Cryptologic Technician (Networks)
CTR	Cryptologic Technician (Collections)
DMDC	Defense Manpower Data Center
EAOS	End of Active Obligated Service
EDIPI	Electronic Data Interchange Personal Identifier
EMF	Enlisted Master File
ET	Electronics Technician
FC	Fire Control Technician
FMS	Final Multiple Score
FTS	Full-Time Support
GM	Gunner's Mate
HM	Hospital Corpsman
HSDG	High School Diploma Graduate
HYT	High Year Tenure
IA	Information Assurance or Individual Augmentee
IT	Information Systems Technician
ITS	Information Systems Technician (Submarine)
JDTA	Job Duty Task Analysis
LaDR	Learning and Development Roadmap
LOS	Length of Service
MA	Master-at-Arms
NDAA	National Defense Authorization Act
NEC	Navy Enlisted Classification
NF	Nuclear Field
NHSDG	Non-HSDG

OCONUS	Outside Contiguous United States
PMA	Performance Mark Average
PMK	Professional Military Knowledge
PNA	Points Not Advanced
PTS	Perform To Serve
SIPG	Service in Paygrade
SRB	Selective Reenlistment Bonus
SSN	Social Security Number or Attack Submarine
TA	Tuition Assistance
TIR	Time in Rate
UCX	Unemployment Compensation for Ex-Servicemembers
VOLED	Voluntary Education

Background[1]

The Navy began the Credentialing Opportunities On-Line (COOL) program in FY07. COOL offers sailors the opportunity to earn credentials—such as licenses, certifications, or memberships—related to their occupation or collateral duties.[2] The program pays for application, exam, and membership fees for credentials that have been mapped to at least 80 percent of the duties specified in the sailor's rating or critical skill Job Duty Task Analysis (JDTA). Sailors bear the costs of supplemental materials, such as study guides or courses that they feel are necessary for them to pass an exam. These costs should be minimal, however, since the Navy pays only for credentials for which the sailor has already received a majority of the necessary training and/or experience.

In addition to having the rating or skill (such as recruiter or instructor), a sailor must have at least one year remaining on his or her contract at the time of application for the credential and must satisfy any other credential requirements, such as experience and education.

According to the Navy's COOL website [1], the Navy believes that credentialing opportunities will help active duty sailors, sailors considering separating or retiring, and those who have already separated. Regarding current sailors, the Navy believes that:

> it improves the professionalism of Sailors…and it has incorporated civilian credentials into the Navy Learning and Development Roadmaps (LaDRs) to encourage Sailors to earn specific certifications

[1] The authors would like to thank Mr. Keith Boring, the Navy's COOL Program Manager, for providing us with the COOL data and for all of his assistance. We also thank Dr. Neil Carey for his guidance and Dr. Jane Pinelis for her assistance with some of the analyses.

[2] Licenses are typically issued by federal, state, or local governments and are often required for employment in a particular field. Examples include Emergency Medical Technician (EMT) and Electrician licenses. Certifications are generally issued from nongovernmental agencies, associations, and companies and are more likely to be voluntary for employment, although some employers may require a particular certification or may pay an employee more for having one. Examples include Microsoft Certified IT Professional and Certified Executive Chef.

> at certain points in their Navy careers. LaDR-designated credentials are considered during promotion evaluations, for example. So you can increase your effectiveness as a Sailor and improve your chances for promotion while on active duty, and at the same time better prepare yourself for civilian employment when you do get out.

The Assistant Secretary of the Navy for Manpower and Reserve Affairs (ASN (M&RA)) asked CNA to determine the extent to which COOL enhances sailor advancement and retention, and improves the transition of sailors from the Navy to the civilian workforce.

First, we discuss the mechanisms by which COOL may affect these various outcomes and review literature regarding empirical research on the impact of education and training on these outcomes. Then, we discuss our findings regarding the effect of COOL on advancement, retention, and unemployment. We conclude with a summary of our findings.

Literature Review

To determine whether COOL benefits sailors in any of the outcomes under consideration, we need to understand why the credentialing opportunities have the potential to do so. If there is no mechanism by which they may affect advancement, retention, or unemployment, any correlation between these credentials and the outcome is purely coincidental.

In general, research in the civilian sector is concerned with whether employees who participate in voluntary education and/or training advance faster than their peers and if their participation results in higher turnover. The literature is lacking regarding the impact of credentials on employee advancement or retention, however. In fact, the credentials offered via COOL differ in two important ways from voluntary education and training that has been the subject of much research. First, participation in COOL should only require minimal coursework; sailors should have completed the training and/or experience necessary to earn the credentials, which means that relatively little additional time (and effort) is required to obtain the COOL credential, relative to the time and effort of earning a college degree, for instance. Second, receipt of the credential does not in itself provide an opportunity for a sailor to advance; civilians are typically not required to wait months or even years to become eligible to advance after earning a degree, whereas sailors may advance only when eligible to do so. The military differs from the civilian sector in one other important regard: servicemembers may not voluntarily choose to leave their employer at any time of their choosing.

In spite of the differences, we submit that the literature may provide some indication of the direction and magnitude of the potential effects of COOL.

Gary Becker's economic theories regarding the willingness of *employers* to make investments in employees' education is the foundation for much of the research in this field for the past 50 years [2]. The theory is predicated on the notion that education enhances productivity and has implications for turnover; employees will leave their present employer if they are able to find an employer willing to pay them more than their current employer will pay as they acquire additional education or credentials. This may happen if they fail to get a raise with their current employer after completing the training, or if the raise they receive is not sufficient.

Research reveals that companies invest in the training and education of their employees for a number of reasons. For instance, in his research regarding why employers pay for college, Cappelli [3] found that, controlling for other relevant factors, employers who offer Tuition Assistance (TA) are more likely to attract people with higher levels of education. This effect is likely because these employees want to take advantage of the TA offered by the employer to attain even higher levels of education. Hence, TA serves as an incentive in recruiting higher-quality employees. COOL may have a similar effect.

In their review of the literature, Benson et al. [4] found that college degrees are more accurate predictors of the wage effect of education than just additional courses or additional years of education. According to that research, this is likely because degrees are more widely understood than individual courses, thereby providing better signals to employers of workers' potential productivity.

This research would imply, then, that credentials attained via COOL would provide a signal to civilian employers that sailors had attained the minimum level of competency required for that particular credential, thereby increasing their employability and/or their civilian wage. In contrast, Navy personnel are assured that sailors have attained the minimum level of competency required for their rating, paygrade, and perhaps Navy Enlisted Classification (NEC), even if they do not have a COOL credential because sailors are not awarded ratings, NECs, or advancements without demonstrating proficiency.

The effect of education on voluntary turnover

The reasons why employees leave their employers are numerous and complex. Certainly, job satisfaction is one of the reasons, but this has been shown to be a fairly modest component of turnover [5].

The decision to leave an employer after using education benefits may be complicated by company policies to retain those employees. For instance, some companies require employees to reimburse the company for education expenses if the employee does not remain for a specified period of time after completing their education. And some companies offer short- or long-term financial incentives to employees who complete a degree or credentialing program to ensure that the employee remains long enough for the company to reap a return on its investment, with or without a promotion or raise.

According to one theory of employee turnover, employee development, including training and credentials, influences employee satisfaction with the current job. According to Benson et al. [4], it does so by helping employees to maintain skills and to create a better fit between their knowledge and skills and those required of their jobs. This is especially obvious with “knowledge” workers who need regular skill updating; the lack of skill enhancement likely leads to an increasing mismatch between skills and job requirements, and ultimately to lower job satisfaction. The authors conclude that the prevailing view is that the primary effect of TA is to maintain fit, which reduces employee turnover over time.

By extension, then, employees who participate in COOL and gain knowledge above that required for their current jobs would need to be promoted to jobs that more closely match their current skills and ability in order to maintain job satisfaction. In other words, under this theory, turnover will be greater for sailors who earn a credential via COOL and are not promoted. Research by Benson et al. [4] supports this. Their research on turnover rates showed that a large manufacturer’s employees who were pursuing graduate education through the company’s TA had lower turnover while pursuing their graduate degrees, but their turnover increased once their degrees were earned. The effect was mitigated if the employees were promoted after graduation.

There is little consensus in the civilian literature regarding the impact of employer-provided education on retention, however. One reason for this is that comprehensive civilian data are lacking that would allow researchers to track the same people over time within or across corporations and to control for important demographic and career characteristics that are related to the decision to use employer-provided education benefits and job performance. Even if such data were readily available, the analysis must control for the fact that the decision to participate in employer-provided general education and the decision to remain with an employer are jointly determined (this means that the decision to participate in education programs is endogenous). In other words, employees who choose to participate in employer-provided education may do so because they are the most motivated or able employees, which would also make them more likely to be promoted within the company and more attractive to other employers. Motivation and ability are unobserved traits, so it is difficult to control for them in statistical modeling.

As we noted, the relevance of the literature on the effects of civilian investments in education to our research is somewhat limited. For instance, other than attriting, sailors may leave the Navy only after they have reached their End of Active Obligated Service (EAOS). This can be as short as one year after receiving education benefits, or as long as three or more years. This makes it more difficult to attribute retention effects to participation in COOL because many factors affect sailors’ retention decisions. The more time between receiving a credential and the decision, the more these other factors may weigh in the decision. For instance, sailors may pursue a COOL credential with the intention of separating at EAOS in three years. During that time, events may occur that have a positive influence on retention, such as an improvement in evaluations, advancing to the next paygrade, a rewarding tour, or a change in marital or family status.

Further, sailors who earn a COOL credential may not be eligible to advance for several years, due to the Navy's minimum time-in-rate (TIR) requirements to advance to each paygrade. Referring to the research previously cited, this inability to be advanced (and hence receive a raise) soon after completion of a credential could result in lower retention of sailors who participate in COOL.

For these reasons, we review military-specific studies of the effect of voluntary education (VOLED) on advancement and retention, which is likely more relevant for our purposes.

Impact of VOLED on military retention and advancement

Military studies

In contrast to the civilian sector, individual-level data are readily available regarding the advancement and retention of servicemembers, as well as important demographic and career characteristics. As a consequence, there are a few more studies on the effect of VOLED on military advancement and retention than there are for the civilian sector, but still the research is relatively sparse and conflicting.

Sticha et al. [6] provide a comprehensive review of several studies of the effect of VOLED on the attrition, retention, and promotion of servicemembers. As we noted previously, the endogeneity of the choice to participate in VOLED complicates the analysis, and these authors stress that it is important to account for differences in the motivation of members to pursue VOLED.

Sticha et al. reviewed six somewhat dated studies (conducted between 1987 and 2002) of the impact of TA on advancement. They found that participation in VOLED generally improved the probability of promotion of both officers and enlisted, but the effect was generally larger for enlisted.

Their review of nine studies of the retention effects of VOLED, including many of the six studies, led to inconclusive findings; some find a positive effect, some find a negative, and some find little or no effect of VOLED on retention. The two studies that they conclude were the most valid because they controlled for many of the relevant factors showed a negative relationship between VOLED and retention.

The authors then conducted their own study of the retention effect of participation in VOLED on the retention of 1995-1998 enlisted Army accessions. They used a bivariate probit estimation strategy to control for self-selection bias. They concluded that soldiers who participated in VOLED were 7.6 percentage points more likely to reenlist than those who did not participate, all else equal. They note that these estimates are a bit high, especially when compared with the retention effects of increases in SRBs. For instance, according to [7], estimates of the effects of a one-level increase in SRBs is 2.5 percentage points, or one-third the effect of TA on retention.

Navy-specific studies

There are two oft-cited studies of the retention effect of TA on first-term sailors, both conducted on the same cohort (those who accessed in 1992), and both using a bivariate probit strategy to control for endogeneity in the decisions to retain and to participate in voluntary education. Even so, these two studies had opposite findings; one concluded that VOLED participants are more likely to leave the Navy [8], while the other concluded that they were less likely to leave [9]. The contradictory findings are evidence of the difficulty in identifying the correct population and in controlling properly for motivation and ability.

In another Navy study, Mehay and Pema [10] estimated the impact of TA on the retention of first-term sailors who entered the Navy between 1994 and 2001 with a 4-year obligation, as well as the impact on the probability that these sailors would be advanced to E4 and E5 by their fifth year. Their results indicated that sailors who successfully passed a TA course were 6.2 percentage points (9 percent) more likely to reenlist than those who did not pass, all else equal, while those who were successful were 3 percentage points (5 percent) more likely to advance to E4 and 4.9 percentage points (20 percent) more likely to advance to E5 by the end of their first term than those who participated in TA but did not pass a course.

Research regarding the impact of education on unemployment

To our knowledge, there are no studies that look specifically at the effect of a credentialing program such as COOL on unemployment. If TA makes employees more employable, it should reduce the probability of collecting unemployment. However, there is a full literature on the effect of education on unemployment that should apply. We also review studies that correct for the endogeneity of education in its effect on unemployment (i.e., the self-selection into participation based on unobservable factors); lastly, we review literature on the effect of job training on unemployment.

First, we examine the literature that looks at the effect of education—specifically, years of schooling—on unemployment. Ashenfelter and Ham (1979) note in [11] that "it is widely known that unemployment rates are inversely related to the educational attainment levels of workers." Mincer (1991) notes in [12] "that this relation is negative is well known from nearly ubiquitous observation."

In [11], the authors analyze the effect of an additional year of schooling on unemployed hours for adult male workers. They find that schooling reduces unemployed hours by reducing unemployment incidence but not unemployment duration. In [12], Mincer studies the effect of education levels (fewer than 12, 12 to 15, or at least 16 years of schooling) on unemployment incidence and unemployment duration. Similar to [11], he finds that the reduced risk of unemployment is found to be more important than the reduced duration of unemployment in creating education differentials in unemployment rates. Furthermore, he states that the lower unemployment risk of more educated workers is due to their greater attachment to their employers and their lower risk of becoming unemployed if they separate from their employer. Mincer attributes the lower job turnover frequency of more educated workers—and fewer unemployment episodes—to more on-the-job training.

Next, we look at the literature that corrects for the endogeneity of education in its effect on unemployment. In [13], Zweimuller and Winter-Ebmer (1996) analyze the impact of an Austrian manpower public training program on employment stability. The training program gives disadvantaged and less motivated job-seekers priority in enrollment into training programs. They find that misleading results emerge without properly considering the selection processes for the participation decision. Using a bivariate probit to take this into account, they find that participation in such courses improves employment stability significantly.

In [14], Fitzenberger and Prey (2000) evaluate the employment and wage effects of training supported by public income maintenance outside a firm in East Germany. To account for the evaluation problem from the training participation decision, the authors estimate a simultaneous model for participation in training, employment, and wages. Taking the selection effects into account, their findings indicate positive though only partially significant long-run effects of training on employment and wages.

In [15], Riddell and Song (2011) investigate the causal effect of years of schooling on unemployment incidence and reemployment. They use exogenous variation in compulsory schooling laws, child labor laws, and conscription risk during the Vietnam War to create instrumental variables. They find that education increases reemployment rates of the unemployed, especially at 12 and 16 years of schooling.

They find inconclusive results on the effect of years of schooling on unemployment incidence.

Lastly, we review the literature that analyzes the effect of on-the-job or off-the-job training on unemployment. In [16], Card and Sullivan (1988) analyze the effect of training on the probability of unemployment for the 1976 cohort of adult male participants in the Comprehensive Employment and Training Act program. They estimate a fully specified first-order Markov model of employment probabilities with individual heterogeneity. They find that training participation increases the probability of employment in the 3 years after training by 2 to 5 percentage points. They also find that classroom training programs have bigger effects than on-the-job training and that training increases the probability of moving into employment and the probability of continuing employment.

In [17], Card et al. (2011) investigate the impact on employment of a job training program operated in the Dominican Republic. Because of problems with treatment and control group participants being lost for follow-up, the authors model selectivity in the program effect parametrically. They find little indication of a positive effect on employment outcomes. This paper also reviews the literature on the effect of job training on unemployment and reports that the impacts of job training are generally modest. Impacts vary by the type of training and the type of client, however. For U.S. job training programs, typically women benefit more than men, on-the-job training is thought to be more beneficial than classroom training (unlike the foregoing result), voluntary programs are found to be more effective than mandatory programs, and private-sector work experience programs are thought to be more effective than public-sector programs. European evidence suggests that programs serving youth are more likely to show positive effects than adult programs.

Summary of research

Because COOL is a unique incentive for which previous research is lacking, it is difficult to predict the direction and magnitude of the effect of credentials on sailors' advancement, retention, and, perhaps less so, unemployment. As we have noted, sailors must wait until they are TIR eligible to go up for advancement, which can take years, depending on paygrade. The effect of COOL on advancement should diminish with time and be increasingly outweighed by other factors that are important in determining which sailors advance.

Regarding retention, again the literature is mixed as to the direction of the impact. If we rely on findings from the civilian sector, we would predict that retention would be reduced for sailors who received a credential and were not advanced. As time increases between when the credential is awarded and the retention decision, however, other factors that affect retention will become more important.

Finally, from the literature on the effects of voluntary education on unemployment, we conclude that additional years of schooling have a significant negative effect on unemployment incidence and a smaller negative effect on unemployment duration, but the impacts of job training are generally modest. Job training is more effective for women or when it is on the job, voluntary, or offered by the private sector. Therefore, we would expect that a credential such as COOL would have a negative effect on unemployment that might vary by the type of participant. We also take account of the estimation strategies used in the literature to correct for the endogeneity of education in the unemployment equation.

Summary of COOL Participation

In this section, we provide a summary of COOL applications and trends over time. We begin with a description of the data.

COOL data

COOL participation data were provided to us by the Navy's COOL Program Manager, Mr. Keith Boring. Each observation in the data represents a unique application made by a sailor for a particular exam or membership, and a certificate title is associated with that exam or membership. Several exams may be required for a particular certification, so each application does not represent a unique certificate.

The data include all applications approved between August 30, 2007, and April 21, 2014. Because of privacy issues, the data did not include social security numbers (SSNs), which we required in order to merge COOL data with demographic information (e.g., gender, race, ethnicity, and education) and with training, career, and retention data.

While lacking SSNs, the data did include sailors' names, paygrade, and, for 86 percent of the observations, an electronic data interchange personal identifier (EDIPI). We obtained an EDIPI-to-SSN crosswalk from the Defense Manpower Data Center (DMDC). For those observations without an EDIPI, we used name, rating, paygrade, and other COOL information to identify sailors' SSNs on the Enlisted Master File (EMF). We dropped observations for COOL participants for whom we could not assign an SSN, or who were not on the EMF, so the population defined consists of 30,478 individuals and 72,885 unique applications.

The data are missing some important variables that limit our analysis. First, not all exams paid for by COOL are passed. The Navy's policy is to pay for a credential exam one time only. If sailors fail that exam, they must pay to retake it. The only exception is sailors in the Information Assurance (IA) workforce who are required to pass the exams for their jobs. However, not all sailors report the outcome of an exam to the Navy COOL office, even though the policy states that they must. In some cases, the certifying authority may report the results of the exam, but, again, that is not always the case.

Even if the outcomes of all exams were recorded, we would still be unable to determine whether a sailor received the credential because many of the certificates have more than one exam or additional requirement. For instance, we identified 27 different exam names associated with the Microsoft Certified Technology Professional credential, and 13 different exam names associated with the Certified Dental Technician credential. We do not know whether some or all of the exams are necessary for each of the credentials. In addition, there may be other requirements for a particular certification or license (for instance, some credentials require at least an associate degree and some require sponsorship), but the data do not provide that level of detail, nor are we able to ascertain the requirements for each of the hundreds of credentials on COOL. We can only tally the number of applications made, not the number of actual credentials received.

We will revisit this recommendation later, but it is important enough to note here as well: in order to control for the effect of credentials on advancement, retention, and unemployment—and not just applications to take credentialing exams—we recommend the addition of a field to the COOL data that indicates whether sailors were ultimately awarded the credential.

In addition, the data do not provide us with information regarding the date that credential exams were taken, only the date that the sailor applied to take the exam. Applications should be made within 7 to 60 days before the scheduled exam. In addition, in cases where we do not know whether sailors passed or failed the exam, or whether the voucher was recalled, we do not know if, in fact, the sailor actually took the exam.

These are important distinctions that result in less precise analyses than we would desire. In particular, we are restricted to reporting on the effect of applying to COOL, or perhaps of passing COOL exams, but not on the effect of actually earning a credential.

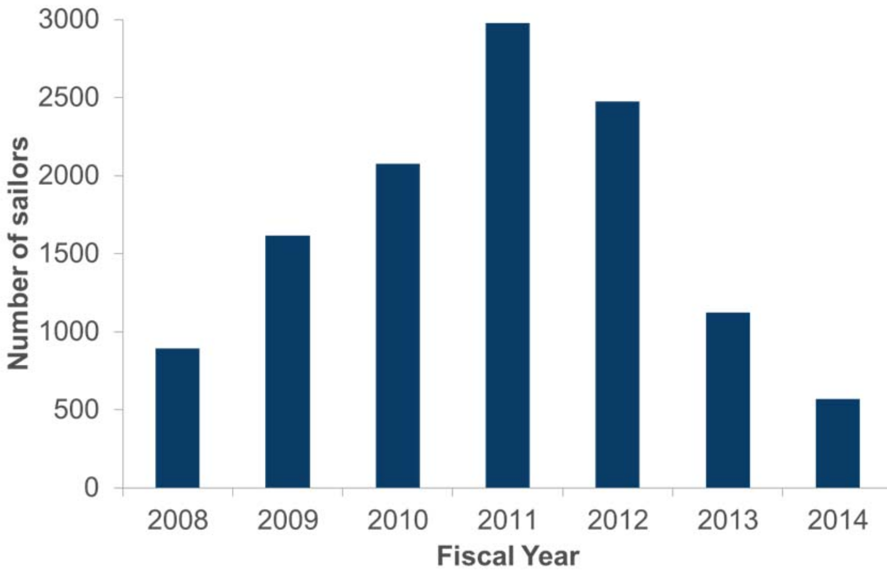
Trends over time

We begin by summarizing basic statistics and trends regarding the number of sailors participating in COOL.

Because our focus is on the effect of voluntary participation in COOL on advancement, retention, and unemployment, we drop sailors who applied for an IA voucher from our subsequent analyses. Before dropping IA sailors, we display in

Figure 1 the number of sailors who applied to COOL as part of the IA workforce each fiscal year. The gradual reduction in the number of IA sailors who applied since FY11 may be due to the implementation of an IA credentialing requirement, which resulted in an increased demand for credentials by sailors already in the IA workforce. Most of these sailors satisfied that requirement by FY11; from FY12 on, therefore, IA applications are mostly from sailors entering that workforce or enhancing or renewing their required credentials.

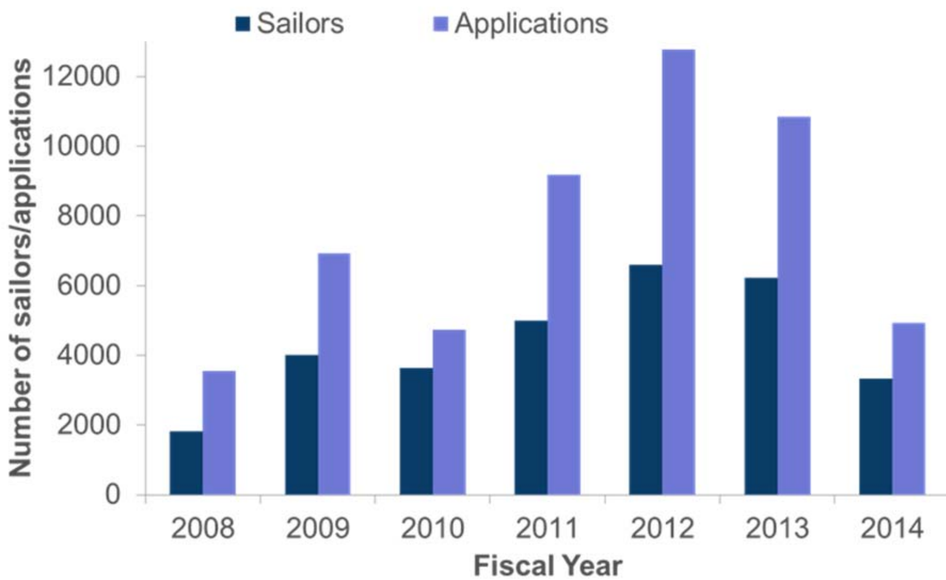
Figure 1. Number of sailors who applied for IA vouchers, by FY



In Figure 2, we chart the number of sailors who voluntarily participated in COOL by fiscal year[3] and the total number of applications made that year. We include only those sailors who never applied as part of the IA workforce that fiscal year. The average number of applications made by each sailor range from 1.16 in FY14 (recall that FY14 is only a partial year, however), to a high of 1.91 in FY08, the first full fiscal year that COOL was available. Subsequently, we discuss the significant increase in both individuals and applications beginning in FY11.

[3] Several dates are associated with application activity in the COOL dataset. We use the application entry date for the date of the application.

Figure 2. Number of sailors and COOL applications each FY



In Figure 3, we illustrate the distribution of participating sailors' paygrades, by fiscal year. Individual sailors are only counted once per fiscal year, regardless of how many applications they have that year.

The increase in the number of sailors applying to COOL beginning in FY11 came largely from sailors in paygrades E1 through E3; before that time, E5 and E6 sailors represented the largest number of voluntary participants.

In Figure 4, we identify the ratings of these sailors when they applied. We include the ratings with the largest number of sailors each year, which includes the Culinary Specialist (CS), Cryptologic Technician (Collections) (CTR), Electronics Technician (non-Nuclear Field (NF)) (ET), Hospital Corpsman (HM), Information Systems Technician (IT), IT Submarine (ITS) (we combine IT and ITS into one category), and Master-at-Arms (MA). These ratings represent 80 percent of all applicants, and 76 percent of all voluntary applications. No other rating includes at least 2 percent of total applicants.

Figure 4 helps to explain the large increase in the number of sailors applying in FY11; there was a fourfold increase in the number of IT/ITS applicants from the previous year, and, since that time, the IT/ITS sailors have far outnumbered applicants in all other ratings.

Figure 3. Number of sailors applying for COOL each FY by paygrade

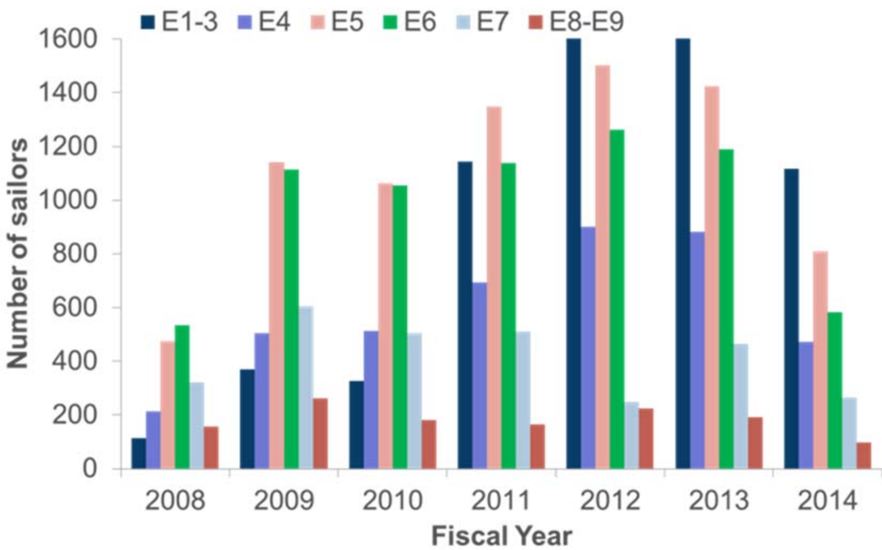
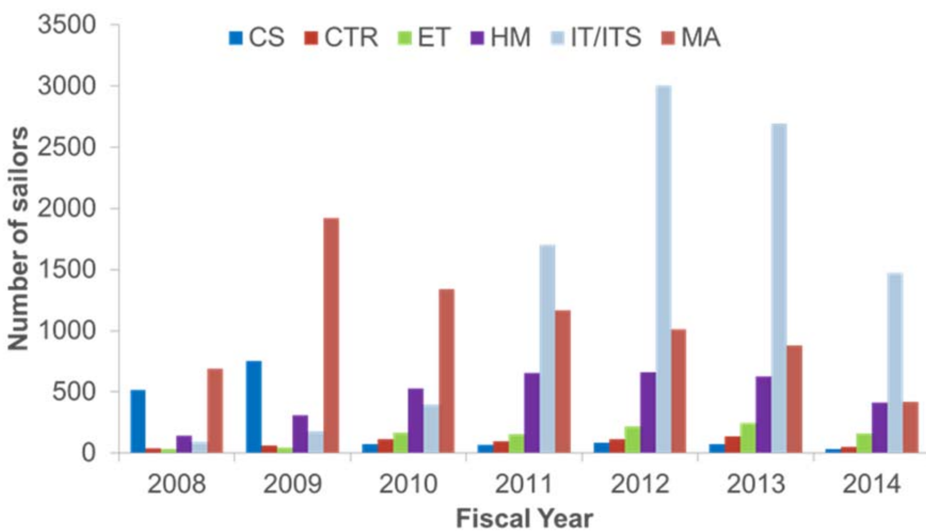


Figure 4. Number of sailors applying for COOL by FY and rating



In contrast, the number of applicants in the CS rating was highest in FY08 and FY09, but fell in FY10 and has remained fairly low. There has been a fairly consistent number of applicants each year for all other ratings. For reference, sailors in the IT/ITS rating represent 40 percent of all applicants, followed by MAs, who represent 20 percent. This figure also helps to illustrate the fact that just a few ratings currently dominate COOL applications.

On further investigation, we discovered that the large increase in applications beginning in FY11 was largely due to changes in accessions entering IT A-School; all of the sailors who began IT A-School beginning around December 2010, and who successfully completed that training, applied to COOL during their A-School. This includes about 4,200 sailors from that time onward.

In Appendix A, we provide tables of the 10 most popular certificates applied to each fiscal year through April 2014. These numbers represent one application per sailor each fiscal year, regardless of the number of exams required of that certificate. In Table 1, we provide the top 10 certificates for this entire time period.

Recall that MAs represent 20 percent of all applicants in this time period, and one of the certificates that they most often apply for is called Certified in Homeland Security. However, the data indicate that ratings other than MAs have applied to take exams in Homeland Security.

Given the administration of COOL exams during IT A-School, it is not surprising that many of the most popular certificates are related to computer security.

Table 1. Top ten certificate titles

Title	Number of sailors
Certified in Homeland Security Level I, II, & III	8,869
CompTIA A+ Certification	4,737
CompTIA Security+ Certification	3,801
Certified in Homeland Security Level IV	2,932
Microsoft Certified Professional	2,180
Certified in Disaster Preparedness	1,855
Certified in Homeland Security Level V	1,735
Sensitive Security Information, Certified	1,630
Certified Anti -Terrorism Specialist	1,519
Fiber Optics Installer	1,410

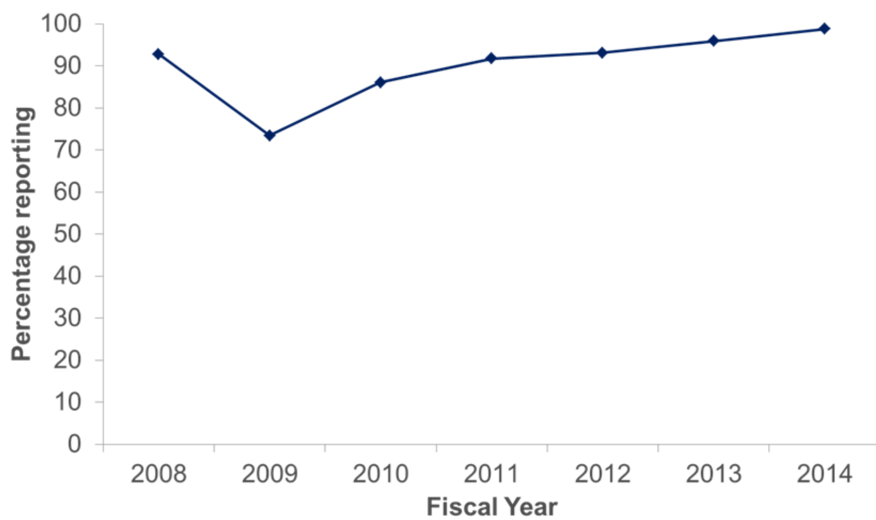
Referring to Appendix A, note that culinary-related certificates were in the top 10 for FY08-FY09 but not after that time.

Pass rates

Recall that we do not have complete information regarding the outcome of each exam, including whether it was taken.

To examine the trends in reporting exam outcomes, we took all applications (1) that were closed or expired as of April 2014, (2) that were not a membership or renewal request (for which a pass or fail is meaningless), and (3) for which the payment voucher had not been recalled (which means that the Navy was able to use the money spent on that exam for another sailor because the sailor did not take the exam). Of these, we then noted whether there was an indication that the exam was either passed or failed, which we refer to as the reporting rate. These reporting rates are displayed in Figure 5, by fiscal year.

Figure 5. COOL exam status reporting rate, by FY

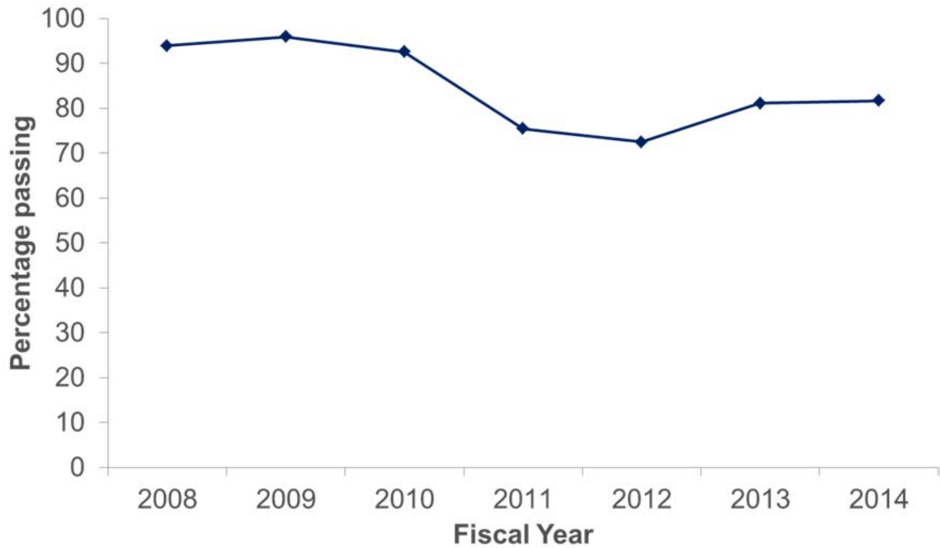


The reporting rate was around 93 percent in FY08, fell to about 74 percent the following year, and has increased steadily since then. Almost all of the closed applications in FY14 were reported as either a pass or a fail.

Next we report the pass rate of exams that were reported as either passed or failed.

As shown in Figure 6, the pass rate fell from over 90 percent in the first three years of COOL, to 75 percent in FY11, which was the same year that IT sailors began to take the exams during A-School.

Figure 6. Pass rate of COOL exams reported by FY



We also calculated the pass rate for each certificate title each fiscal year (which includes all exams taken by sailors for that credential) for all certificates that had at least 50 applications that year (see Appendix B). Of the sailors taking any of the nine exams for the CompTIA A+ credential, the pass rate was 62 percent in FY11, which is well below the overall average pass rate for all exams in FY09 through FY10. This may be an indication that these sailors differ in important ways from sailors who applied to COOL outside their training. In particular, unlike other participants, these sailors did not actively seek to take a COOL exam, and many may not have otherwise pursued a credential or understood the value of having one. This may have resulted in them taking the exam less seriously, taking less time to study for them, or being more careless in answering the exam questions. Since that certificate dominated the exams taken beginning in FY11, their low pass rate has a large impact on the overall pass rate each fiscal year. Referring to Appendix B, the pass rate for CompTIA A+ exams has steadily increased each year. We will return to differences in these sailors when we examine advancement outcomes.

Demographic characteristics

We first examined differences in demographic characteristics of sailors who did and did not participate in COOL. To do this, we created a dataset of all sailors who were on the EMF at any time between September 2007 and September 2013 and never participated in COOL for our control group, as well as all sailors who participated in COOL through March 2014. For sailors in the control group, we kept their last record during this time period, which is September 2013 for all sailors who were still in the Navy as of that date. For sailors who participated in COOL, we kept the EMF record closest to the quarter in which they applied to COOL for the first time.

We then calculated differences in several demographic characteristics of sailors based on whether they participated in COOL. We calculate these statistics for all sailors in the sample as defined, as well as for sailors in eight ratings with the largest number of sailors participating voluntarily (we added Fire Controlman (FC) and Gunner's Mate (GM), the largest ratings after the six we have already noted). We grouped all non-NF ETs into one ET category, and both IT and ITS sailors into one IT category. We also dropped any sailors on the EMF who were not in the active component (such as Full-Time Support (FTS) and activated reservists), prior-service sailors, and sailors in the Nuclear Field. This leaves us with 21,545 COOL participants and 408,031 sailors in the control group. For the analysis in this section, we report the raw differences only and do not report whether the differences are statistically significant. We conduct multivariate analyses in subsequent sections, and we report on significant differences then.

In Figure 7, we illustrate the differences in average Armed Forces Qualification Test (AFQT) scores, by COOL participation status. Overall, sailors who participate in COOL have slightly higher average AFQT scores than their peers who do not participate. This is not consistent across ratings, however. In particular, COOL participants in the CS, MA, CTR, and GM ratings generally have slightly lower AFQT scores than their peers who do not participate, FC and ET sailors differ little, HM COOL participants have slightly higher AFQTs, and the average AFQT scores for IT sailors who participated are much higher than their peers in the control group.

Then, in Figure 8, we illustrate the differences in the COOL participation rate of sailors who have any college degree (including associate, bachelor's, or higher), versus those who do not. In this case, the results are unambiguous: sailors with a college degree are more likely—in most cases, far more likely—to participate in COOL than their peers without a degree. We believe that this is an indication that sailors who participate in COOL are likely to be more motivated than their peers to obtain professional credentials, including degrees and COOL credentials. In other words, participation in COOL may be a signal that a sailor is more highly motivated than his or her peers. Note also that the difference in COOL participation for those with a college degree is largest for sailors in ratings for which COOL participants had lower AFQT scores than their peers.

Figure 7. Average AFQT score, by COOL participation status

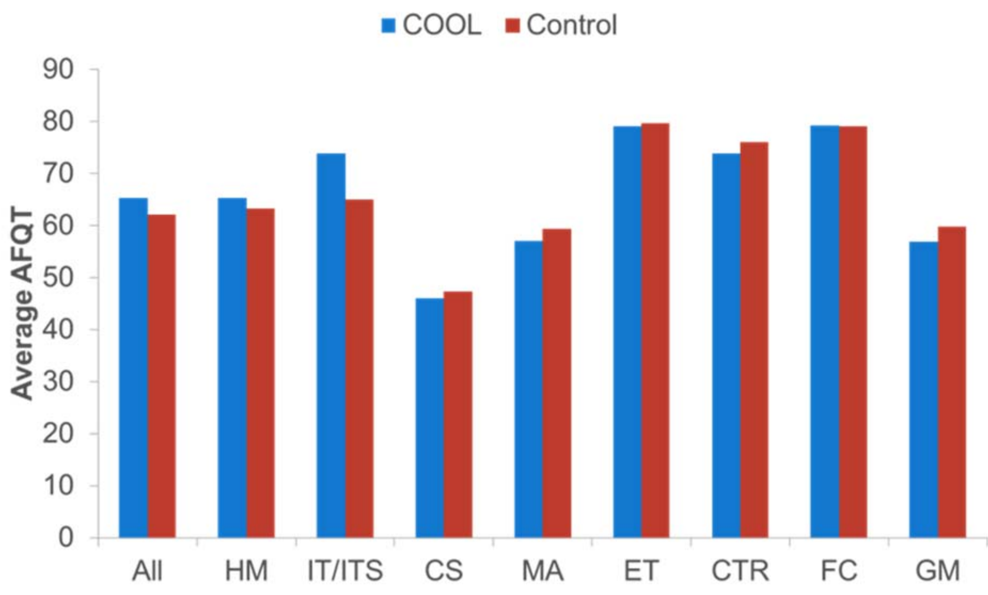


Figure 8. COOL participation rate by college status

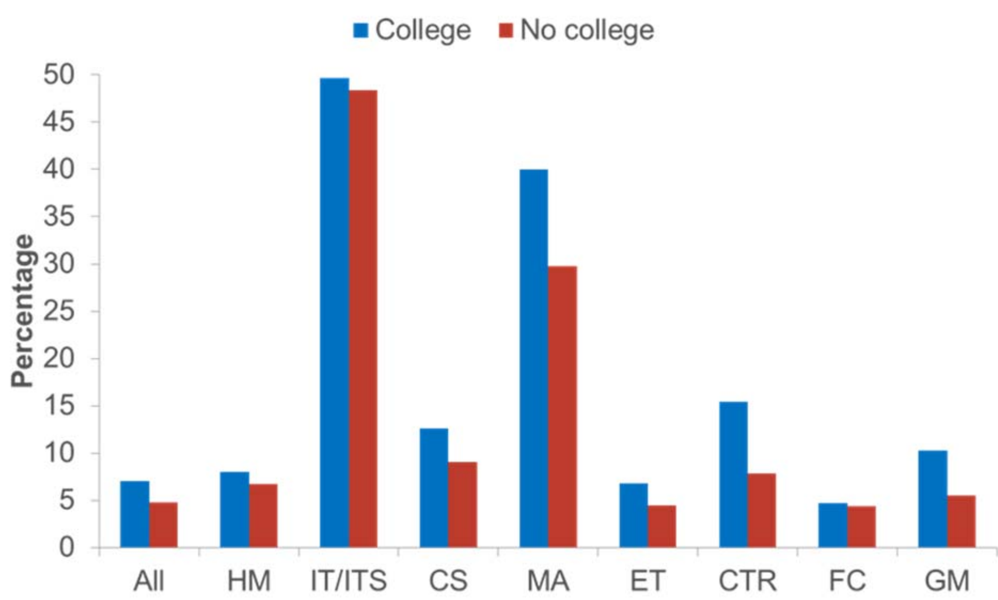
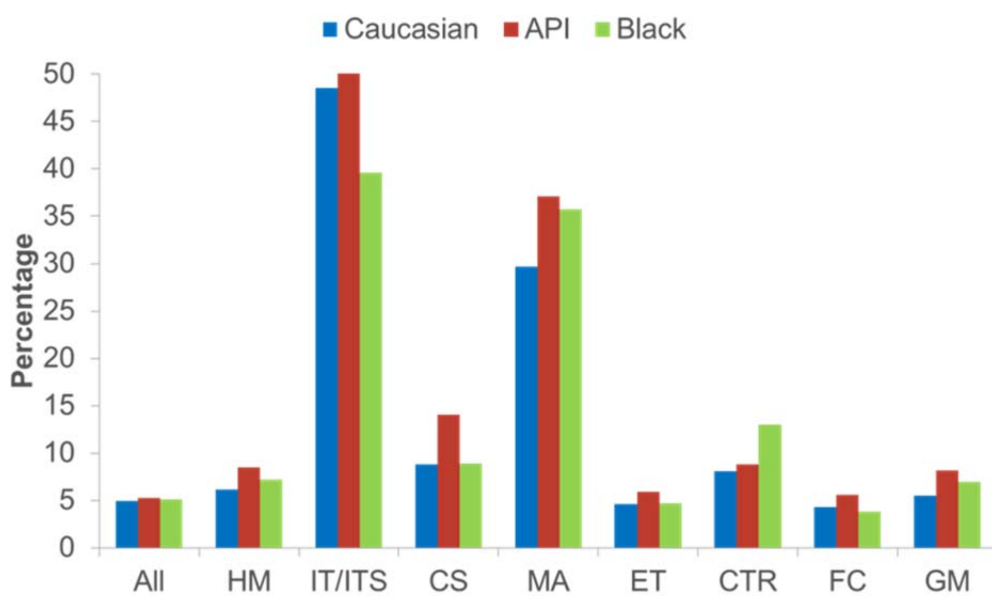


Figure 8 also reveals the COOL participation rate of sailors in each of these ratings, which varies considerably. Almost 50 percent of IT/ITS sailors have participated in COOL, and over 30 percent of sailors in the MA rating have done so. The administration of COOL during IT A-School is likely responsible for the large participation of IT/ITS sailors. At the other extreme, fewer than 5 percent of sailors in the FC and GM rating have participated. We attribute this differential to the types of credentials available; there are clearly far more that pertain to sailors in the IT/ITS and MA ratings than for all other ratings.

Next we illustrate the difference in COOL participation by race. We include the three largest races: Caucasian, Asian Pacific Islander (API), and black (see Figure 9).

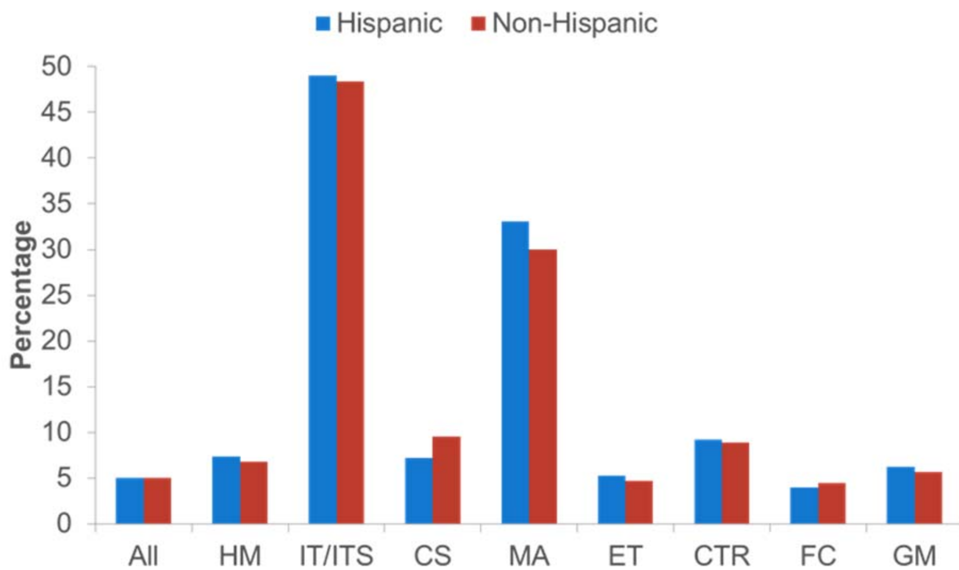
Figure 9. COOL participation by race



There is very little difference in the overall rate of COOL participation among the three races, but the differences are much larger within individual ratings. Across all ratings, APIs are more likely to participate in COOL than Caucasians, and, for all ratings except CTR, they are the most likely to participate. In contrast, blacks are far less likely to participate than Caucasians in the IT/ITS ratings, slightly less likely in the FC rating, and far more likely in the MA and CTR ratings.

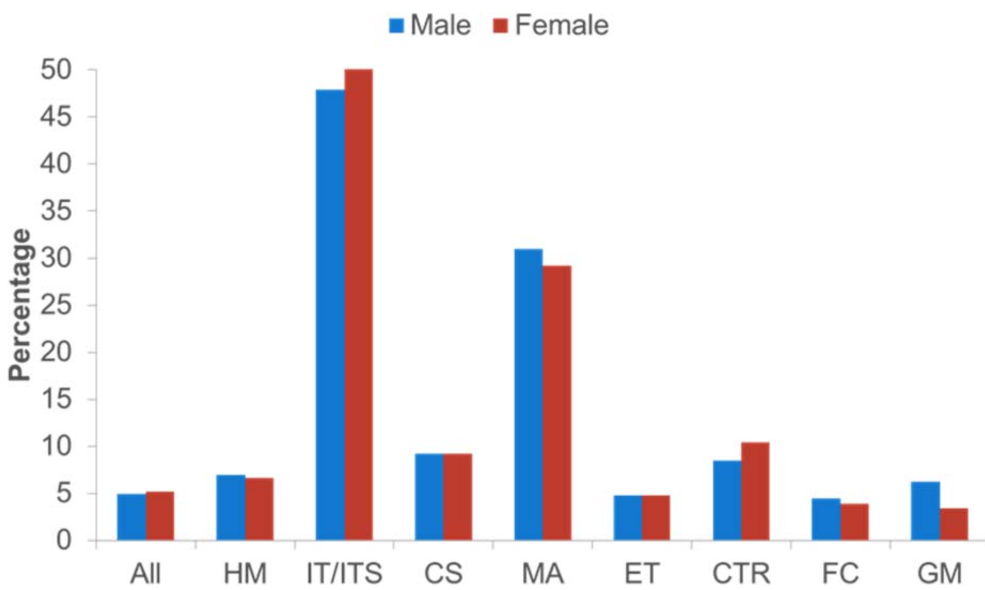
In Figure 10, we illustrate the difference in COOL participation rates by ethnicity. Overall, and within many of the ratings, there is no difference in participation by ethnicity. The largest differences are for sailors in the CS rating, in which Hispanics are less likely to participate in COOL, and in the MA rating, in which Hispanics are more likely to participate.

Figure 10. COOL participation by ethnicity



Lastly, we display in Figure 11 differences in the COOL participation rate by gender. As with ethnicity, there is little difference, on average, but there are several ratings with apparently moderate differences in participation by gender. Women are more likely to participate in the IT/ITS and CTR ratings, while they are less likely to participate in the GM rating.

Figure 11. COOL participation by gender

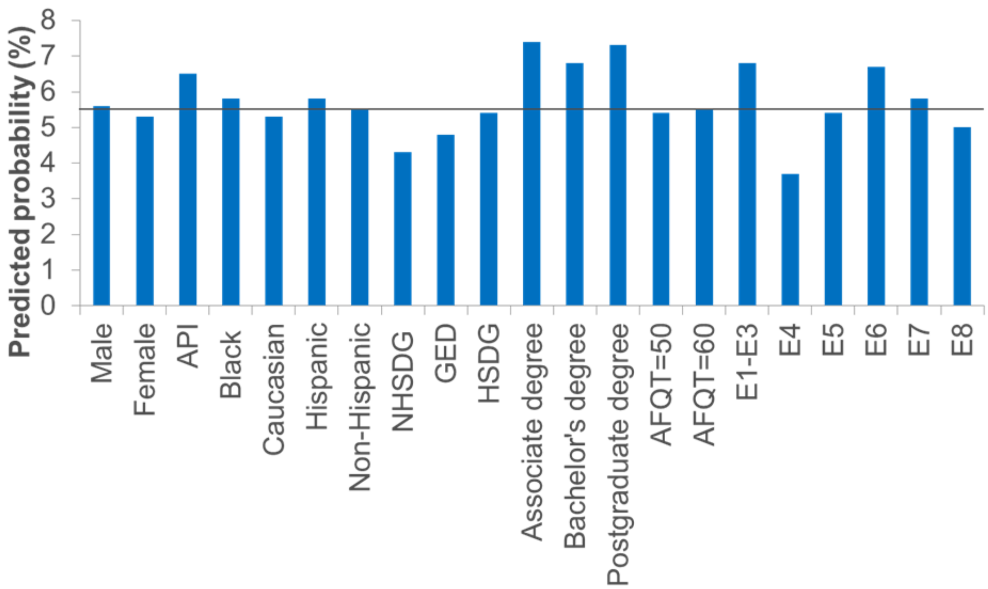


Our results concerning differentials in the COOL participation rate of sailors based on demographic variables leave us with little to conclude, except that it is apparent that more educated sailors are more likely to participate in COOL. Differentials in participation by various demographic characteristics may be due to confounding effects of two or more of these characteristics. For instance, APIs may be more likely to participate because they are also more likely to have college degrees. To understand the differentials in participation for each characteristic in isolation, we estimated a multiple regression of the probability that a sailor would participate in COOL for the entire sample, as a function of AFQT, education, race, ethnicity, gender, rating, and paygrade.[4] We then predicted the probability that sailors would participate in COOL when we vary just one of these factors, holding all else constant. For example, for two otherwise identical sailors (in terms of the variables noted), how does the participation rate differ based on gender alone?

Figure 12 shows the estimated probabilities. We have drawn a line at 5.5 percent—the average participation rate for sailors in this sample.

[4]All of the regression results discussed throughout the paper are available on request.

Figure 12. Predicted probability of participating in COOL (percentages)



Statistically significant characteristics that are associated with a greater likelihood of participating, all else equal, include being male, being an API or black (relative to Caucasian), being a college graduate or above (relative to being a high school diploma graduate (HSDG)), having a higher AFQT, and being in paygrades E1-E3 or E6. We know why new accessions are the most likely to participate, but it is not clear why E6s are as likely to participate—although far more voluntarily—as new accessions; they may be seeking a credential to help them to advance to E7, especially if they feel that Selection Boards favor these credentials, or they may be seeking them to help them find civilian employment.

The difference in participation between Hispanics and non-Hispanics is fairly small; Hispanics are only 3 percent more likely to participate than non-Hispanics. In contrast, the differences by race are quite large; APIs are 23 percent more likely, and blacks are 9 percent more likely to participate than their Caucasian peers, all else equal. And women are 5 percent less likely to participate than men in the same rating, with the same AFQT, of the same race and ethnicity, and with the same level of education.

The difference in participation by education is especially noteworthy; relative to sailors who are HSDGs, non-HSDGs (NHSDGs) are 20 percent less likely to participate, while those with an associate degree are 37 percent more likely to participate, all else equal. Education is used by the military as a screen for new recruits because NHSDGs have much higher attrition than HSDGs. The explanation usually given for this phenomenon is that the high school credential is an indication of individuals' ability to remain committed to an activity and to see it through to its successful end. Sailors who could not complete high school may be less likely to qualify for some of the credentials, but it may also be that they are less motivated to pursue credentials of any form. In contrast, sailors with an associate degree have demonstrated a desire to earn additional credentials beyond high school; the finding that they are more likely to pursue COOL than their otherwise similar peers provides us with some evidence that these sailors are more motivated than their peers.

Deployment

We wanted to know whether deployed sailors were generally able to apply to COOL. To do this, we used quarterly EMF data to identify the ships to which sailors were assigned in the quarter in which they applied to COOL and noted whether the ship was deployed on the date of application. We kept multiple observations for the same sailor, as long as each application was in a different quarter. Of this sample, 619 sailors, with 680 quarterly observations, made an application while they were deployed. The dates of their applications cover the entire range of our COOL data.

From this sample, we kept sailors who were on any of the six largest platforms during the quarter: Cruiser (CG), Destroyer (DDG), Carrier (CVN), Frigate (FFG), Amphibious Assault Ship (LHD), or Attack Submarine (SSN). We then noted the number of different units in each of the categories to which sailors were assigned at the time they applied and, of these, the number of units that had at least one sailor apply while on deployment. Table 2 presents the results.

Table 2. COOL applications of deployed sailors by platform

Platform	Number of sailors who applied to COOL	Percentage of sailors on deployment when they applied to COOL	Number of different units	Number of different units with deployed sailors who applied to COOL
CG	338	12.0	26	14
CVN	844	46.1	12	11
DDG	793	19.0	65	34
FFG	195	4.9	28	9
LHD	293	14.3	9	7
SSN	359	2.9	55	13

For instance, 884 sailors were on 12 different CVNs when they applied to COOL, and 46.1 percent of these were on deployment when they applied. These 407 sailors were on 11 of the 12 CVNs, which is an indication that sailors are able to apply to COOL, and perhaps take exams, while deployed on CVNs. We are not able to determine why only a very few of the sailors on some of the other platforms have applied to COOL while on deployment.

We turn next to our analysis of the effect of COOL on advancement, retention, and unemployment. Before we do, however, it is important to note that COOL is a relatively new incentive, and the participants to date could be considered to be "early adopters." It is not clear whether sailors who did not participate failed to do so because they were not interested in a credential or because they were not aware of the incentive. This is clearly not the case with research regarding the impact of other incentives or policies, such as TA and SRBs, for instance. Both of these incentives have been around for a long time, and we can assume that the majority of sailors are familiar with them. We can't make the same assumptions about COOL, however. This has important implications for our work. For instance, if only the most motivated sailors knew about COOL (recall that those with an associate degree were the most likely to participate), and they were also the sailors most likely to advance, reenlist, or secure civilian employment, all else equal, we will overestimate the impact of COOL on these outcomes. Therefore, we note that our analysis could be biased because of a lack of general awareness of COOL, and that more precise measures of the true impact of COOL may not be possible until more sailors become aware of the incentive over time.

Advancement

Before we describe our analysis of the effects of COOL on advancement, we provide a brief summary of Navy enlisted advancement policies. We refer readers to [18] for a more detailed description of the advancement process.

Summary of advancement policies

Sailors advance automatically to E2 and E3[5] after serving 9 months TIR. Advancement to E4-E6 is a competitive process in which sailors take a rate-specific exam, offered every March and September.[6] Sailors must have 9 months TIR to advance to E4, 12 months TIR to advance to E5, and 3 years TIR to advance to E6-E8. Advancement is based on a Final Multiple Score (FMS), which consists of seven elements:

- Performance Mark Average (PMA)
- Standardized score on the advancement exam, which consists of occupation-specific and professional military knowledge (PMK) components
- Service in Paygrade (SIPG) (which we refer to as TIR)
- Passed Not Advanced (PNA) points
- Awards
- Education
- Individual Augmentee (IA) points

[5] Some sailors access at a higher paygrade for a variety of reasons, mostly because they access with college credit or access into the Nuclear Field (NF).

[6] There are exceptions to the advancement process. For instance, sailors in the Advanced Electronics Field (AEF) and NF sailors are advanced automatically to E4 after completion of all advancement in rate and TIR requirements, and completion of A-School. In addition, some sailors are advanced outside the normal process, via such programs as the Command Advancement Program, but these programs involve relatively few sailors.

The Navy advances to vacancies, so sailors with the highest FMS are selected for advancing, until vacancies are filled. E4-E6 advancement exams are administered every March and September.

To advance to E7, sailors are required to take a rating-specific exam, but their FMS consists of only the exam score and PMA. Advancement exams to E7 are administered only in January. Sailors who score the highest on this FMS are not advanced, but instead go before a Selection Board that decides which sailors to advance. The board's criteria for advancement are unknown to those outside the board, and they can vary over time and across ratings. Advancement to E8 and E9 is based only on the outcome of a Selection Board.

Evaluations and PMA

Enlisted sailors are evaluated annually, and sometimes more frequently if events warrant (e.g., detachment and frocking evaluations (evals)). The PMA used in advancement is the average of all regular eval promotion recommendations, to include the most recent evals whose time period coincides with the minimum TIR for advancement to that paygrade (i.e., the previous 9 months for advancement to E4, 12 months for advancement to E5, and 36 months for advancement to E6). Eval recommendations confer the following points toward PMA: Early Promote (4 points), Must Promote (3.8), Promotable (3.6), Progression (3.4), and Significant Problems (2.0). Thus PMA ranges between 2.0 and 4.0.

Historically, PMA and the exam have been given the most weight in the FMS. The weights for each component were recently revised according to [19]. PMA and the exam contribute 36 and 45 percent of FMS, respectively, for advancement to E4/E5, and 50 and 35 percent, respectively, for advancement to E6. The next largest component of the FMS for E4/E5 and E6 advancement is PNA, which contributes 9 and 6 percent, respectively, followed by awards, which contribute 6 and 5 percent, respectively. The remaining elements contribute no more than 2 percent to the FMS.

Analysis

We seek to determine whether sailors who participate in COOL advance faster than their peers. Referring to the seven elements considered in advancement to E4-E6, participation in COOL would have no influence over points awarded for TIR, PNA, education, or IA. It is possible that COOL participation could influence award points, but award points contribute very little to the overall FMS and, hence, have little influence over which sailors advance. It also seems unlikely that COOL participation could help sailors improve their scores on the PMK portion of the exam since COOL exams were developed for civilians.

The only two components that remain of the FMS that could potentially be improved by participation in COOL, and thus improve the advancement of COOL participants, are the occupation component of the exam and PMA. Our previous research has led us to conclude that PMA is very subjective (and perhaps biased), and sailors benefit greatly in terms of PMA by being in small summary groups, especially when they detach from a unit [18]. For instance, we found that it was not uncommon for sailors who scored a 3 in all seven traits to receive an Early Promote recommendation in a detaching eval, which is almost always in a summary group of just one sailor.

We therefore expect that the primary (and perhaps only) advancement component that could be measurably affected by participation in COOL is the occupation-specific component of the exam. We postulate that studying for the COOL exam could help sailors learn more material or could refresh material previously covered in their Navy training that is included in advancement exams.

To determine whether this is the case, we first examined advancement exams to E4 using two approaches. Sailors are eligible to advance to E4 by 24 months of service, and even earlier if they accessed at an advanced paygrade. Hence, these sailors have not yet made a retention decision, so our analysis is not affected by sailors' retention decisions.

Second, we conducted analyses for advancement to E5 through E7, in which we examined differences in scores on the rating exam component for two consecutive exams taken. If sailors somehow benefit in their professional knowledge by participating in COOL, we would expect those sailors to have a greater improvement in scores than their peers. We describe these analyses next.

Performance on E4 exam

As we noted previously, almost all of the sailors who began IT A-School starting around December 2010, and who successfully completed that training, applied for COOL during the A-School training. Of the more than 4,200 sailors we identified as successfully completing training in this timeframe, 74 percent successfully passed their first COOL exam.

We noted a similar phenomenon for sailors in certain HM C-Schools. In particular, during certain periods of time, sailors in Surgical Technologist, Psychiatry Technician, Medical Lab Technician Advanced, or Pharmacy Technician C-Schools were very likely to apply to COOL during their training, though not quite as large a percentage as those in IT A-School. The pass rate for the more than 1,300 sailors varied significantly by C-School, with as few as 44 percent of sailors in Surgical Technician C-School passing their first exam to a high of 84 percent of those in Pharmacy Technician training.

Examining the occupational exam performance of these sailors allows us to control, at least to some extent, for motivation differences between sailors who participate in COOL and those who do not. As we described earlier, we must control for the endogeneity between the choice to participate and advancement performance and retention decisions. Since almost all of the sailors who participated in COOL while in school were likely required to participate, differences in their exam performance would be due to differences in ability and motivation overall, not just in their motivation to pursue a COOL credential. These are factors we cannot otherwise observe or measure.

The measure of exam performance that we use in our analyses is the number of standard deviations that sailors' exam scores were from the mean score for that exam in that rating and that advancement cycle. This is expressed as a Z-score, which is a normally distributed random variable with a mean of 0 and a standard deviation of 1. For reference, 50 percent of Z-scores lie below 0, 68 percent lie between ±1.0 standard deviation from the mean, and 95 percent lie between ±2.0 standard deviations.

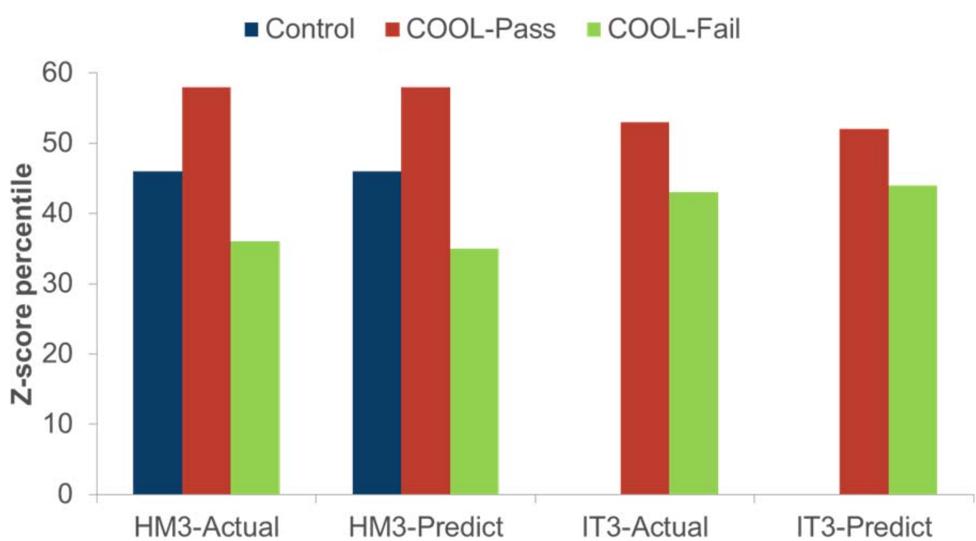
We have already noted that performance on exams depends on a number of factors, so we must control for these other factors. To do this, we merged demographic data from the EMF to the sample of IT and HM sailors who started any of these schools during the time periods in which we observe a majority of sailors participating in COOL.[7] We restricted the sample to sailors who took the first advancement exam at least 60 days after applying to COOL; recall that sailors can apply from 7 to 60 days before the COOL exam, and we want to ensure that sailors have completed the training and studying necessary for the COOL exam before participating in the

[7] Surgical Technology C-Schools include two Course Identification Numbers (CINs): B3010033 and B3010233. We observed that 89 percent of sailors who began the first CIN between December 2009 and February 2012 and passed the course participated in COOL, while 98 percent of those who began the second CIN between January 2011 and August 2013 and passed the course participated in COOL. Psychiatry Technician CIN is B3020046, and we observed that 73 percent of sailors who began that training between July 2009 and February 2011 and passed the course participated in COOL. Medical Lab Technician CIN is B3110018, and we observed that 95 percent of students beginning their training between January 2009 and May 2012 and passed the training participated. Pharmacy Technician CIN is B3120025, and we observed that 96 percent of sailors who began that training between June 2008 and October 2013 and passed the course participated in COOL.

advancement exam. We also included only those sailors who passed their A- or C-School course. Our restrictions leave us with 1,197 sailors in the IT rating and 561 in the HM rating who participated in COOL during training and applied before their first E4 advancement exam.

We then estimated separate multivariate regressions for each rating, with sailors' exam Z-scores as a function of their gender, race, ethnicity, education, TIR, marital status, whether they had children, AFQT, the date of the advancement exam, and the following categories of sailors: (1) applied to COOL during training and passed the first COOL exam, (2) applied to COOL during training and failed the first exam, (3) applied to COOL during training but did not indicate the outcome of the exam, and (4) did not apply to COOL before the advancement exam (i.e., the control group). The control group was dropped from the IT regression because there were so few of them. Lastly, we included the sailor's C-School as an explanatory variable for the HM regression. Figure 13 displays the results: we include raw occupational exam Z-score percentiles, which do not control for any relevant variables, and the predicted-score percentiles. Because they are so few, none of the coefficients for the category of sailors who did not report their COOL exam results were statistically significant, so we do not include them. All other coefficients were significant at the 5-percent level.

Figure 13. Effect of COOL on first HM3 and IT3 occupational exam performance



Without controlling for any relevant factors, sailors who passed their first COOL exams had much higher occupational exam scores than their peers who did not participate in COOL, and much higher scores relative to those who participated but failed their first exams. For instance, sailors participating for the first time in advancement to HM3 who passed their first COOL exam scored better than 58 percent of their peers on their first E4 occupational exam, while those who failed their first COOL exam scored better than 36 percent of their peers. When we control for relevant factors, the differences continue, with little difference in their magnitude. We predict that, all else equal, sailors who passed their first COOL exams scored better than 58 percent of their peers on their first HM3 exam, those who failed scored better than 35 percent of their peers, and those who did not participate scored better than 46 percent of their peers, all else equal.

The results for the IT regressions do not include a control group, but the differences between those who pass their first COOL exams and those who fail are also large, but not as large as for sailors seeking to advance to HM3. We predict that, holding all other factors constant, sailors who pass their first COOL exams score better than 52 percent of their peers on their first exams. Those who fail their first exams score better than just 44 percent of their peers.

The fact that there is little difference between the raw and predicted percentiles for both HMs and ITs is an indication that any differences between sailors, in terms of the factors we include, explain very little of the raw difference in E4 exam performance. Rather, these results provide us with additional evidence that *participation* in COOL itself does not necessarily help sailors to perform better on their advancement exam. Instead, we have evidence that sailors who *participate* in COOL *and do well* on the COOL exams have more ability or perhaps more motivation (at least more than is captured by AFQT, education, and other included factors) than their peers to prepare for and do well on their advancement exams.

To include truly voluntary participants, we then extended our analysis to include all sailors in their first term. Our sample consists of all sailors who first participated in the E4 advancement exam from March 2008—the last cycle before the first sailors who participated in COOL took their first E4 advancement exam—through September 2014. Of these, we dropped sailors who participated in COOL as part of the IA workforce before their first E4 exam. Of the remaining COOL participants, we dropped sailors who first applied to COOL fewer than 60 days before their first advancement exam or more than 15 months before the advancement exam. We have already explained the reasoning for the 60-day restriction. The second restriction was to control for other career events that could affect the exam performance of COOL participants; we are trying to capture the impact of "recent" COOL exam preparation on advancement exam performance. We chose 15 months because sailors who access as E1s are TIR eligible to advance to E4 at 24 months, so their first participation in

COOL was after they had at least 9 months of service, which is typically beyond initial training for most sailors. In addition, we are attempting to control for factors that can affect exam performance, such as time in full duty.

Our COOL/control categories are also slightly different; instead of noting the outcome of just their first COOL exam, we note the outcome of all of their COOL exams before their first E4 advancement exam. The categories and sample sizes are as follows: (1) COOL participants who indicated that they passed all of their COOL exams (1,131 sailors), (2) COOL participants who indicated that they did not pass all of their COOL exams or did not report all of their results (1,177 sailors),[8] and (3) sailors who did not participate in COOL before their first E4 exam (128,859 sailors).

We then estimated multivariate regressions to predict exam Z-scores as a function of the same variables we noted for the HM and IT samples, as well as these new COOL/control variables. Because many of the participants in this sample were in the IT and HM ratings, and may have participated as part of their training past their first nine months in the service, we reran these regressions after dropping HMs and ITs. For reference, these ratings represented 28 percent and 50 percent of the sample, respectively. The largest ratings remaining include MAs (54 percent), CSs (10 percent), OSs (3 percent), GMs (3 percent), and AOs (2 percent). The categories and sample sizes for the restricted samples follow: (1) COOL participants who indicated that they passed all of their COOL exam (238 sailors), (2) COOL participants who indicated that they did not pass all of their COOL exams or did not report all of their results (271 sailors),[9] and (3) sailors who did not participate in COOL before their first E4 exam (107,805 sailors).

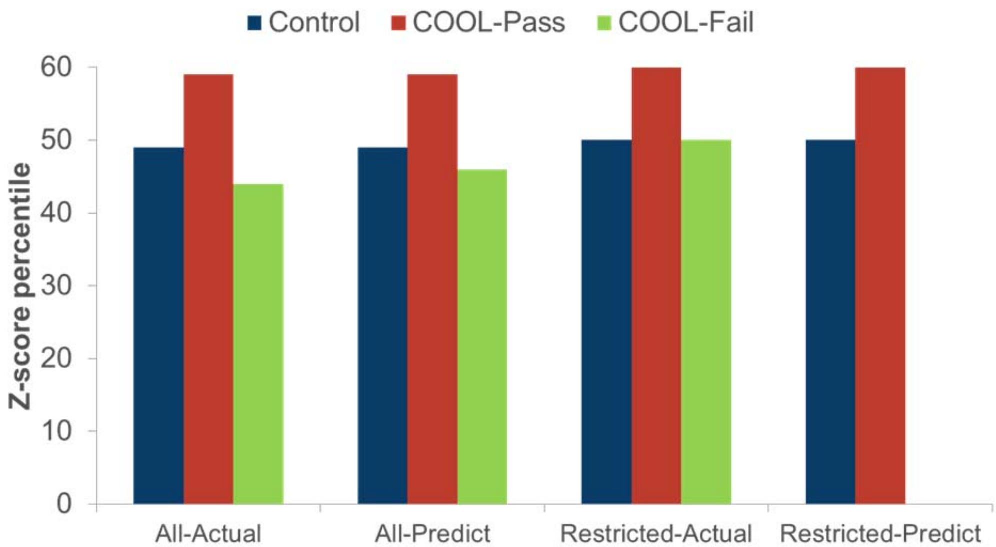
In Figure 14, we display raw percentiles and statistically significant differences (at the 5-percent level).

As was the case with ITs and HMs, before we control for relevant factors, sailors who passed all of their COOL exams before their first attempt to advance to E4 perform better on the occupational component exam than those who do not participate (they score in the 59th and 49th percentile, respectively), and even better than those who do not pass or do not report the outcome of all of their COOL exams (they score in the 46th percentile). The differences between the groups remain even after we control for relevant factors.

[8] Because of the lack of statistical significance for those who failed to report their results in the HM and IT equations, we combined them with those who failed their first COOL exam for this analysis.

[9] See previous footnote.

Figure 14. Effect of COOL on first E4 occupational exam performance: All sailors and all sailors except HMs and ITs



The pattern persists when we omit HMs and ITs from the larger sample, except that there is little difference in the exam performance of those who do not pass all of their COOL exams versus those who never participate, and the predicted difference is not statistically significant.

These results confirm our previous findings that participation in COOL itself is not enough to do better on an advancement exam; sailors must also do well on the COOL exam. Our results do not allow us to conclude, however, that participation in COOL is solely responsible for the superior advancement exam performance. As we have noted, sailors who participate in COOL, and especially those who pass their COOL exams, may be more motivated and more able sailors than their peers, even when we control for AFQT, education, and so on. Furthermore, the result that those who pass their first COOL exam perform far better than their peers on the occupational component of the advancement exam, while those who fail their first COOL exam do far worse, may be an indication that sailors who pass COOL exams are more motivated or able than other sailors. Our next analysis attempts to control for motivation and ability.

Changes in exam performance

Our last analysis of the advancement of sailors who participate in COOL examines whether sailors have a greater improvement in their occupational exam component Z-score after they first participated in COOL than their peers who did not participate in COOL. We restrict our analysis to sailors participating in advancement to E5, E6, or E7. This approach allows us to examine the effect of participation in COOL on sailors who are well beyond initial skills training; as a consequence, it is likely that their participation is entirely voluntary.

In addition, far more sailors advance to E4 the first time they participate than sailors who first participate in advancement to higher paygrades. For instance, of sailors participating in advancement for the first time to each paygrade since September 2007, 41 percent advanced to E4, 23 percent advanced to E5, 16 percent advanced to E6, and 9 percent advanced to E7.

We first selected COOL sailors who had never applied as part of the IA workforce, noting the first date that they applied to COOL and whether they passed their first COOL exam. We then matched these sailors to the advancement exam data we noted previously. We selected sailors who first applied to COOL in the middle of two consecutive advancement exam cycles, and we noted how many times the sailors had previously taken an advancement exam in that paygrade. We restricted the sample further to include only those sailors who first applied to COOL at least 60 days after the first of these two exams, but no fewer than 60 days before the second exam. Recall that E7 advancement exams are administered only once a year, in January. Again, our restrictions are intended to (1) exclude sailors who may be studying for the COOL exam at the same time they took the first advancement exam, and (2) ensure that sailors have studied for, or at least taken, the COOL exam before the second advancement exam.

We then selected all other sailors who participated in two or more consecutive E5, E6, or E7 advancement exams in the same paygrade between March 2007 and September 2014 as our control group.

We combined the COOL and control samples and merged demographic data from the EMF. We dropped those who were prior-service sailors at the time of both exams, as well as those who were not in the active component. We also dropped sailors in ratings for which no sailor had ever participated in COOL voluntarily.

The statistical method we used is useful in determining whether sailors who applied to COOL between two exams have a greater improvement in their occupational Z-score than sailors who did not participate, while controlling for any differences in motivation and/or ability of COOL participants versus other sailors. The technique is known as a difference-in-difference estimate in which we enter information for each sailor twice, once for each of the exams. In addition to the variables we used in the E4 advancement analysis, we included three additional variables. One variable indicates whether the sailor was in the control or COOL group. In our case, the omitted group is the control group, so the variable measures and controls for whether COOL participants, holding all else equal, perform better on exams than their peers. This helps to control for differences in motivation and/or ability that are not captured by the other variables included in the regression. If this variable is positive and significant, it indicates that COOL participants tend to score higher than their peers on both exams, all else equal.

A second variable is added that controls for changes that occur between the first and second exam for all sailors (we refer to the second exam as "after"). It is typical for individuals to score better on most tests the second time than the first because they have better knowledge of what is covered on the test, understand better how to manage time taking the test, have more time to study, and so on. In our case, our variable controls for improvements that are likely to occur in the second test for all sailors, and we would expect it to be positive.

The variable of greatest interest is the one that indicates whether, holding all of these other factors constant, COOL participants have a greater improvement in the Z-score than sailors in the control group (we refer to this variable as "COOL and after"). If this is positive, it means that, even after we control for any overall difference in exam performance between COOL and control sailors, and for overall improvements in the second exam experienced by most sailors, COOL participants increase their occupational exam score more than the control group. If it is positive and significant, this is a good indication that the act of applying and (presumably) studying for a COOL exam improves sailors' occupational exam performance.

We ran separate regressions on advancement to each paygrade, and within each paygrade, by exam order. Specifically, we estimated separate regressions for whether the exams were the first and second ever taken in that paygrade, the second and third, or the third and fourth. We estimated each separately since there are differences in the types of sailors who take an exam the third or fourth time versus those who take it the first and second time. For instance, most sailors who never take the exam more than twice either advance or separate after the second time. Neither is the case for sailors who participate three or four times; they all failed to advance after the second attempt and remained in the Navy long enough to participate in advancement one more time.

This results in three different regressions for each paygrade. We ran these regressions twice; the first time is for all COOL participants, and the second time includes only those sailors who indicated that they passed their first COOL exam. We have already concluded that the sailors in the latter group are likely more motivated and/or able than their peers.

In Table 3, we indicate statistically significant results, and, because the COOL samples are so small, we lower our threshold to a 10-percent level of significance (none of the COOL variables were significant at the 5-percent level). We also include sample sizes, which are twice the number of sailors in that category because each sailor is entered into the regression twice (before and after).

Table 3. Results from the difference-in-difference estimation: Changes in occupational exam Z-score from one exam to the next

Paygrade/exam	COOL	After	COOL and after	Number of COOL observations	Number of control observations
All COOL					
E5					
First and second		.24		266	105,366
Second and third	.17	.21		180	75,518
Third and fourth		.20		136	52,986
E6					
First and second		.16		198	71,276
Second and third		.17		194	63,836
Third and fourth		.17		144	52,728
E7					
First and second		.18		1,684	71,474
Second and third		.16		1,466	59,606
Third and fourth	.12	.13		1,346	47,490
Pass only					
E5					
First and second		.24		178	105,366
Second and third	.18	.21		130	75,518
Third and fourth		.20		90	52,986
E6					
First and second		.16		156	71,276
Second and third		.17		142	63,836
Third and fourth		.17		112	52,728
E7					
First and second		.18		1,330	71,474
Second and third	.07	.16		1,178	59,606
Third and fourth	.16	.13		946	47,490

Note: All reported results in table 3 are significant at the 10-percent level.

The coefficients in each cell indicate the change in occupational exam Z-score from one exam to the next, holding all other variables constant. For instance, regardless of whether they participate in COOL, on average sailors increase their occupational exam Z-score 0.24 point (where Z-score points represent standard deviations away from the mean Z-score) on their second E5 occupational exam relative to their first E5 exam (the after column). All of these coefficients for the second of the two exams are significant at the 1-percent level, and they are positive across all equations, as we predicted they would be.

The variable of interest, whether sailors who participate in COOL have a greater improvement in their advancement scores after they apply to COOL, regardless of whether they passed the COOL exam (which is the "COOL and after" column), is not significant in any equation. In other words, while all sailors experience an average 0.24-point increase in their occupational exam Z-score between their first and second E5 exam, COOL participants have no additional increase than this average, holding all else constant. Note that we have fairly small COOL sample sizes, and more observations could help to refine the estimates, which will only be possible as more sailors participate in COOL. Our results, then, do not allow us to conclude definitively whether sailors are helped in advancement to E5 through E7, at least in terms of their occupational exam component score, which is the most relevant to their COOL participation.

We also are not able to determine whether sailors who participate in COOL are more motivated or more able than their peers, but our results do provide some indication that they may be. The coefficient on COOL is positive for E4 sailors who apply to COOL between their second and third attempts to advance to E5, regardless of whether they pass the COOL exam, and for E6 sailors between their third and fourth exams to E7, regardless of whether they passed their first COOL exam, and between their second and third exams for those who did pass their first exam.

Summary of advancement results

Our analyses of the effects of participation in COOL on advancement to E4 through E7 lead us to conclude that successful participation in COOL is a signal that those sailors have more motivation and/or ability than their peers who do not participate, and also more than their peers who are not successful in their COOL exams. We traditionally measure sailor ability using AFQT and education, but, even when we control for these factors, successful COOL participants perform better on their advancement exams than their otherwise similar peers. Since the occupational exam component is given considerable weight in the FMS used to select sailors for advancement, these sailors should advance faster than their peers.

That said, we have no evidence that participation in COOL itself is beneficial in improving sailors' occupational advancement exam scores; COOL participants, regardless of whether they successfully pass all of their COOL exams, have no greater improvement on their exam scores in subsequent attempts at advancement in the same paygrade than their otherwise similar peers. This is not a surprising result since, to be approved to take a COOL exam, sailors must have already received training or experience that covers at least 80 percent of the COOL exam, so COOL participants have likely had no greater training or experiences than their peers who do not participate.

Our analysis restricted the time between participating in COOL and participation in advancement exams to a fairly narrow window, so that there was little time for the possible effect of participation in COOL to erode. Since we find no effect of participation in COOL on advancement for these sailors, we conclude that there is also none for those with a longer period of time between participation in COOL and their participation in advancement.

Finally, we do not attempt to estimate the effect of participation in COOL on advancement to E8 and E9 for a number of reasons. First, in order to advance to these most senior paygrades, many E7 sailors must decide to remain in the Navy past the point at which they could retire. If sailors participate in COOL as a Chief Petty Officer (CPO) to secure civilian employment and retire, and they are more likely to separate than otherwise similar CPOs, we might conclude that they were less likely to advance to E8 or E9 based on retention differentials and not Selection Board criteria.

More important, however, is the fact that Selection Board criteria are unknown to everyone outside that particular board, and the boards have far more information on which to make their selections than is available to us. For instance, some Selection Boards may give more weight to COOL credentials than others, while some may be more concerned with service to the community. As a consequence, it is beyond the scope of this study to examine the impact of participation in COOL on Senior and Master Chief Petty Officer.

Retention

Unlike the civilian sector, sailors may not separate from the Navy at any time of their choosing. Rather, sailors are permitted to voluntarily separate if they are within three months of the end of their contract, known as the End of Active Obligated Service (EAOS). In general, sailors who leave the Navy outside this window either are attrites or are required to separate due to a Navy policy. Examples of the latter type of separations include sailors who reach High Year Tenure (HYT), are selected for separation by enlisted retention board action, or are medically discharged. In this analysis, we concentrate on retention decisions only, excluding attrites and losses to officers (the latter consists of relatively few sailors).

The decision to reenlist in the Navy is a complicated function of many factors, such as job opportunities in the civilian sector, differences in civilian compensation, opportunities for advancement in the Navy, and reenlistment incentives, which primarily include Selective Reenlistment Bonuses (SRBs) but may also include the promise of additional training, choice of next duty assignment, and so on. Historically, sailors have been less likely to reenlist when unemployment is low and more likely when civilian opportunities are less available. To help moderate fluctuations in retention, the Navy increases SRBs to improve retention in periods of low unemployment, and decreases them during recessions. In addition, SRBs vary across ratings and tenure at the same point in time; those with better civilian opportunities are more likely to separate, and hence require larger SRBs, and sailors beyond Zone C[10] are not offered SRBs.

Other factors help to mitigate the effect of the economy on retention. When retention is high, advancements are slowed down, which causes some sailors who fail to advance to seek civilian employment. The opposite is true when retention is low.

Until a few years ago, sailors were typically permitted to reenlist, with certain caveats. For instance, sailors who reach HYT and those whose commanding officers

[10] Zones A, B, C, D, and E include sailors with 0 to 73 months of service, 74 to 122 months of service, 123 to 170 months of service, 171 to 239 months of service, and 240 or more months of service, respectively.

(COs) do not recommend them for reenlistment are prohibited from reenlisting. The ability to reenlist was altered significantly, however, when the Navy implemented a force-shaping tool called Perform To Serve (PTS).[11] PTS was first implemented in March 2003 for sailors in Zone A only, and only for those in overmanned ratings. According to [20], the Navy began the program to control the number of reenlistments, to ensure that the Navy retained the highest quality sailors, to encourage sailors to laterally move into undermanned skills, and to avoid negatively affecting the tone of the Navy's reenlistment environment. It was expanded to sailors in Zone A in ratings that were manned at appropriate levels in December 2003, and to all sailors in Zone A in February 2006. It was expanded to sailors in Zones B and C in February 2009 [21] and June 2009 [22], respectively. In April 2011, the Navy announced that it would convene mid-career retention boards beginning in October of that year to separate sailors outside their EAOS window who were in the most overmanned ratings and who had 7 to 15 years of service.

Under PTS, sailors applied for reenlistment 12 months before their EAOS. Each month, sailors were racked and stacked to determine which ones could reenlist in rate, which could reenlist if they converted to another rate, and which were denied reenlistment. Sailors with either of the last two outcomes could reapply until they were six months to their EAOS. If they were denied reenlistment at that point, they could not apply again. Throughout this period, PTS reenlistment quotas varied by rating, paygrade, and over time; sailors in overmanned ratings had far fewer reenlistment quotas, while those in undermanned ratings were generally unconstrained by reenlistment quotas. To understand the impact of PTS and the retention boards on retention, we display in Figure 15 the four-quarter moving average reenlistment rates for men, by zone, for those who made an EAOS decision beginning in FY00 through the end of FY13.

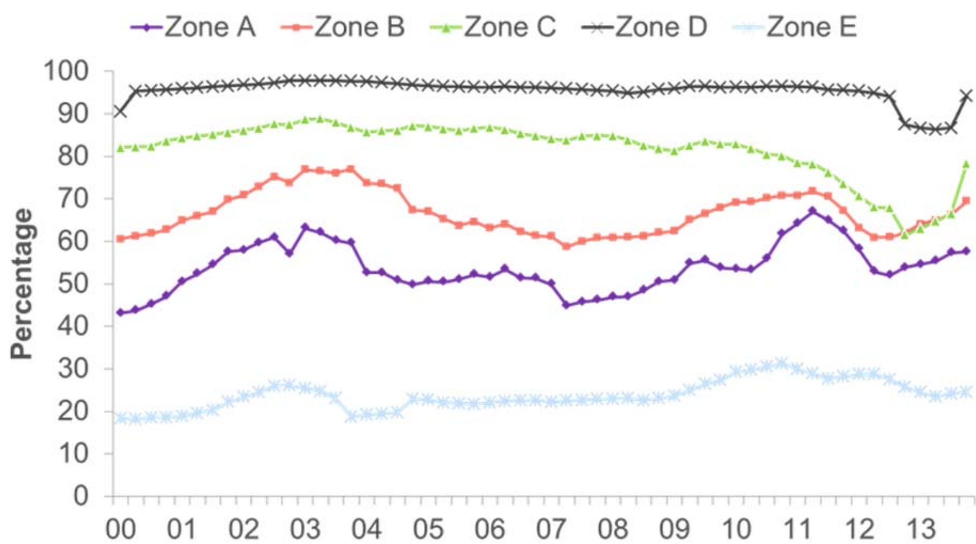
Even though PTS was officially in force for all sailors in Zone A in FY09, retention in that zone actually increased fairly steadily between FY07 and the second quarter of FY11, when the highest reenlistment rate for men in Zone A occurred, and then fell sharply for the next year. In contrast, sailors in Zone C began to experience a decline in retention beginning in FY10, which continued for the next two years.

For reference, according to the Bureau of Labor Statistics [23], the seasonally adjusted unemployment rate for high school graduates without college who were age 25 and older at the end of the second quarter of FY11 was 9.7 percent, which was high by historical standards. The rate increased slightly the next quarter, and decreased gradually for the next nine months, reaching 8.1 percent in March 2012.

[11] In 2013, PTS was replaced by a similar force-shaping tool called Career Waypoints (C-Way).

This was still a high historical unemployment rate, so the precipitous decline in Zone A reenlistments was clearly not solely a function of the economy.

Figure 15. Reenlistment rate of men, FY00-FY13, by zone



The effects of PTS on retention in Zones B, C, and D are also evident in the figure. Sailors in Zone D have at least 14 years of service, and need to complete no more than an additional 6 years to be eligible for full retirement benefits. For that reason, their retention has historically been at least 96 percent (some sailors separate in Zone D, however, due to HYT or misconduct, for instance). That changed beginning in the last quarter of FY13 and continued for the next 12 months, during which time their retention dropped to approximately 86 percent.

The imposition of PTS and mid-career retention boards prohibits us from accurately estimating the effect of COOL participation on retention, especially for sailors who separated from FY10 through FY13. In particular, because the Navy did not maintain accurate PTS records during this time period, we do not know what the PTS quotas were for individual ratings and paygrades, nor do we know which sailors separated involuntarily. The analysis is further complicated by the fact that the reasons for participating in COOL may be different for those who participated before PTS began to limit reenlistment quotas than for those who participated after that time. For instance, sailors who participated before FY10 may have done so in anticipation that a COOL credential would help them to advance faster, or would enhance their Navy careers more generally. In contrast, those who participated later may have done so in anticipation of not being allowed to reenlist, and hence they may have sought the credential in order to secure civilian employment. Even if they were eventually permitted to reenlist, they may have already found civilian employment and separated. Before the imposition of limited reenlistment quotas, many of these sailors would not have sought civilian employment opportunities.

The ability to reenlist voluntarily with a COOL credential may have also changed after PTS imposed limits on voluntary reenlistments. Before PTS, most sailors were allowed to reenlist, regardless of whether they had a COOL credential, but those who participated in COOL after PTS may differ in some meaningful (and unmeasurable) ways that made them more likely to be given a PTS reenlistment quota.

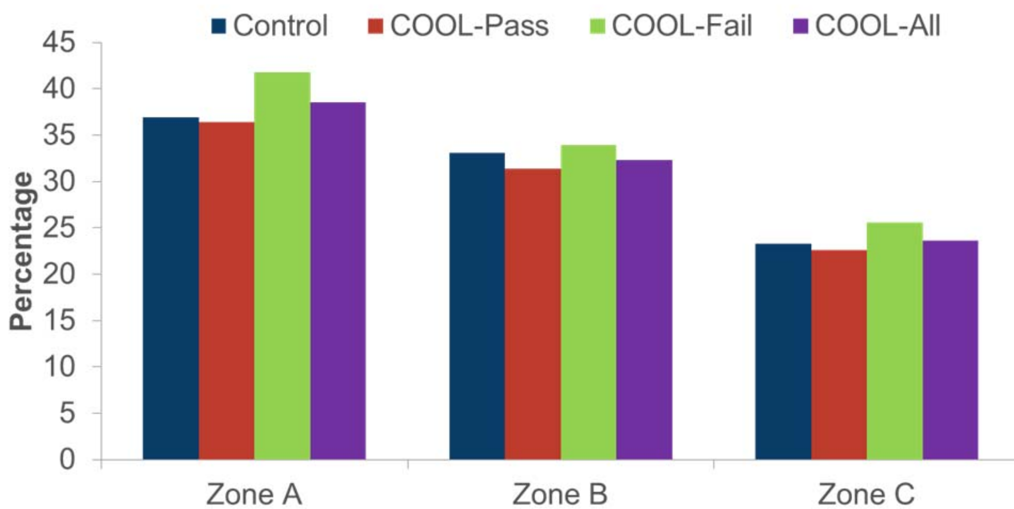
A recent CNA study confirms the disruption of PTS on models of retention. The Vice Chief of Naval Operations and N1 asked CNA to analyze the relationship between the economy and enlisted retention, especially in terms of forecasting retention as a function of economic forecasts [24]. The authors concluded that the PTS policy prohibited them from estimating consistent effects across time; their estimates behaved well when they excluded sailors who reenlisted during the time that PTS was most universally applied, but not when that time period was included.

Our analysis is further complicated because the rating and paygrade composition of sailors participating in COOL changed over time, in part because of changes in the credentials available, and in part because of changes in IT A-School. For instance, referring back to Figure 4, a fairly large number of early participants were in the CS rating, but their numbers dropped off after the first few years, while ITs did not begin to participate in large numbers until around FY10. This means that our analysis of the impact of COOL on retention may be heavily affected by CS retention behavior before PTS, but by IT retention behavior after PTS. Our analysis would be confounded by this if the relevancy of credentials for CSs in terms of finding civilian employment were different from those of ITs, which is likely the case. And, as we have shown, much of the IT participation beginning in FY10 was not truly voluntary.

We attempt to control for PTS in a number of ways, which we describe shortly. First, we display in Figure 16 the percentage of sailors who separated from the Navy from FY08 through FY14, by zone and COOL participation (e.g., the control group, sailors who passed all of their COOL exams, sailors who did not pass all of their COOL exams, and all COOL participants combined). We selected ratings in which at least 30 sailors who made a retention decision in that zone had participated in COOL.[12]

[12] We also looked at the aggregated retention behavior of sailors who participated in COOL who were in ratings in which there were fewer than six COOL participants in each zone. We compared their retention with the aggregated retention of COOL participants in ratings with

Figure 16. Percentage of sailors separating by zone and COOL category



For all zones, the separation rate of sailors who did not pass all of their COOL exams was the highest of all categories of sailors, with the biggest difference for sailors in Zone A. In contrast, there is little difference in the rate at which sailors who passed all of their COOL exams separated compared with their peers who did not participate. The greater losses of sailors who fail their COOL exams may be a function of PTS; given our findings regarding their lower performance on advancement exams, it may be that they had poorer evaluations or failed to advance as fast as their peers.

These unadjusted frequencies fail to control for the issues we noted. To isolate these various confounding factors, we restricted our analysis in the following ways. First, we ran separate analyses by zone (Zones A, B, and C),[13] and by pre-PTS (FY08-FY10), PTS (FY11-FY13), and post-PTS (FY14) periods.

more than five participants, using a logistic regression that controls for the same variables we used in our retention analysis. We found no statistically significant differences in any zone.

[13] We do not include Zone D because there is little variation in retention for that zone over time, and there are very few sailors who do not reenlist. We exclude Zone E because, eventually, all sailors in Zone E must separate, and the timing of retirement is a complicated function of many factors that we are not able to control.

To control for the changing composition of sailors participating in COOL, and to ensure that we have enough observations to conduct our analysis, we limit our analysis to ratings that had a sufficient number of participants in each of these different time periods in each zone. Of these, we exclude the HM and IT ratings because of the involuntary nature of their participation, as described previously, leaving us with only two ratings: CS and MA. Of these, the CS rating does not satisfy these requirements in all zones and time periods, as we note below.

We first examined the differences in retention for each of these ratings by zone and by COOL participation to determine whether any patterns exist. In the two figures that follow, we indicate COOL participation as (1) control, (2) fail (i.e., COOL and did not pass all exams, or (3) pass only (i.e., passed all of their COOL exams). Figures 17 and 18 display these results for the CS and MA ratings, respectively.

Figure 17. Separation of CS sailors by zone, time period, and COOL participation

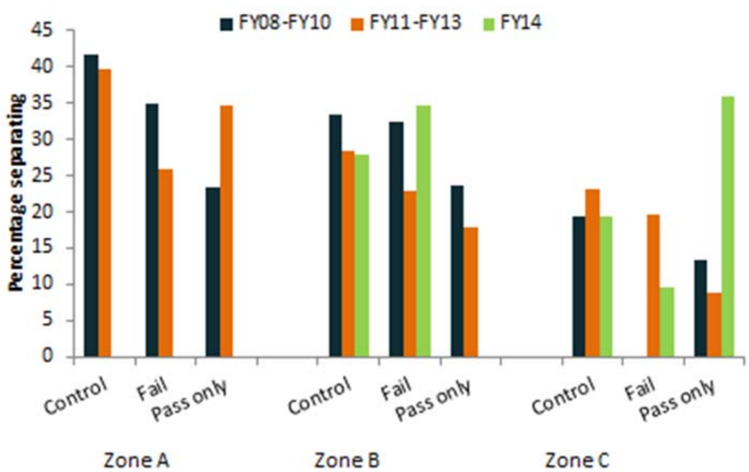
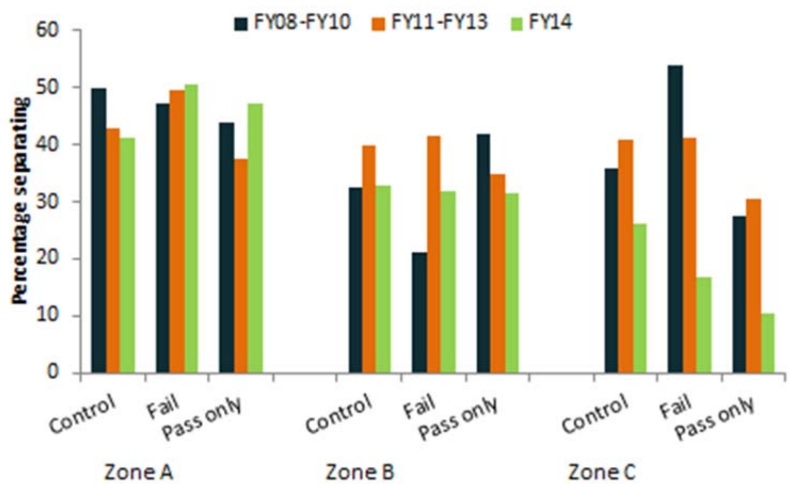


Figure 18. Separation of MA sailors by zone, time period, and COOL participation



Referring to CSs, there were fewer than 10 sailors who participated in COOL who made a decision in Zone A in FY14, and fewer than 10 who passed all of their COOL exams who made a decision in Zone B in FY14.

To understand the differences in retention by zone and by era, we calculated the percentage change in loss rates from one era to the next, by zone and by rating (see Table 4).

Table 4. Percentage change in loss rates by zone, era, and rating

Rating	Zone A		Zone B		Zone C	
	Pre-PTS to PTS	PTS to FY14	Pre-PTS to PTS	PTS to FY14	Pre-PTS to PTS	PTS to FY14
CS						
Control	-5%	N/A	-15%	-.02%	+20%	-16%
Fail	-26%	N/A	-29%	+52%	N/A	-51%
Pass	+48%	N/A	-25%	N/A	-33%	+302%
MA						
Control	-14%	-4%	+23%	-18%	+14%	-37%
Fail	+5%	+1.5%	+97%	-23%	-24%	-59%
Pass	-14%	+25%	-16%	-10%	+11%	-66%

First, we look at changes in losses from the control group from the pre-PTS to the PTS era in each zone as an indication of whether PTS imposed strict retention quotas. For instance, losses decreased for sailors in the CS control group in Zones A and B, and for sailors in the MA control group in Zone A; we believe that this is an indication that there were few restrictions on sailors reenlisting in these zones under PTS. In contrast, losses increased significantly for CS sailors in the control group in Zone C and for MA sailors in Zones B and C; these sailors likely had limited reenlistment opportunities.

Differences in the changes in retention for sailors who participated in COOL, especially those who passed their exams, may be an indication of the direction of the effect of COOL on these sailors' retention. For instance, while CS sailors in the control group in Zone A had little change in their retention under PTS, there was a very large increase in the rate of separation of sailors who passed their COOL exams. It could be that these sailors sought the credential in order to find civilian employment or that they were simply more able to find employment relative to their peers.

In contrast, CS sailors in Zone B who passed their COOL exams experienced a reduction in losses in the PTS era, as did CS sailors in the control group, but the reduction was greater for COOL participants. And if the increase in separations of CS sailors in the control group in Zone C under PTS is an indication of limited quotas, the large decrease in the separation rate of successful COOL participants may be an indication that they ranked higher than their peers in receiving a quota.

This may also be the case with MAs in Zone B; sailors in the control group experienced far greater losses during PTS than in the pre-PTS period, while those who successfully participated in COOL experienced fewer losses.

The changes in retention from the PTS era to FY14 are mixed. In all zones and for both ratings, there was a decrease in losses for sailors in the control group. However, CSs in Zone C who passed their exams were far more likely to separate in FY14 than during PTS, MAs in Zone A who passed their exams were moderately more likely to separate, and MAs in Zones B and C who passed their exams were less likely to separate.

There is little we can conclude based on these trends because we have not controlled for relevant factors. We describe our results when we do control for them in the next subsection.

Multivariate estimates

To isolate the effect of COOL on retention, we need to control for far more than just zone, era, and rating. Typically, researchers use multivariate regression to control for relevant factors, but we must also control for differences in ability and motivation of COOL participants—differences that can have a large impact on the desire, and ability, to reenlist. To do this, we use an econometric technique known as propensity score matching.

With propensity score matching, we find a match for each COOL participant based on his or her propensity score. The propensity score is the probability of participating in COOL and is predicted for each COOL participant and nonparticipant based on individual factors. Once we estimate propensity scores, we estimate what each COOL participant's outcome would have been had it been in the other sample. That is, we estimate the probability that a COOL participant would have been retained had he or she been a nonparticipant. These estimated probabilities of retention come from the sailors they were matched with based on their propensity scores. The marginal effect of COOL on retention is the difference between the estimated probabilities that the COOL participant was retained and would have been retained had he or she been a nonparticipant (known as the average treatment effect on the treated).

We estimated two propensity-score-matching regressions for each zone. Because we have concluded that participation in COOL in itself does not necessarily differentiate sailors, but rather that those who successfully participate are likely to be more able and/or motivated than their peers, all else equal, we ran the regressions twice. The first time, we included all COOL participants, and the second run was without COOL participants who did not successfully pass all of their COOL exams.

The regressions include only CS and MA sailors who made a retention decision, and we control for their rating in the regression. We also control for SRBs one year before sailors' decision (sailors must start to apply to reenlist under PTS by then), as well as the quarter in which they made the decision and the FY of the decision. Even within ratings, however, PTS quotas, civilian opportunities, and civilian wage differentials can vary greatly by NECs. Hence, we also control for sailors' primary NEC at the time of their decision. There are many NECs, and some are rating-specific, while others are not. To have sufficient sample cell sizes when we control for all of our variables, we entered each NEC separately if at least 10 COOL participants had that primary NEC; otherwise, we combined those observations into an "other" NEC category.

Combined, these factors help to control, to some extent, variations in PTS quotas by rating, zone, and over time.

We do not know what the formula was to rack and stack sailors, but it is our understanding that one of the most important factors was sailors' paygrade relative to their peers in the same LOS cell; those in a higher paygrade had a higher ranking, all else equal. Hence, we control for paygrade in our regressions. And, according to [25], other factors for PTS consideration included CO recommendations for retention and advancement, reduction in rate, loss of security clearance, three-time physical fitness assessment failure within the previous four years, submarine disqualification, non-judicial punishment, and HYT. We do not have access to all of these factors, but we do control for LOS, whether sailors were ever demoted, and whether they lost their security clearance in the previous 12 months.

In addition to these variables, we controlled for other factors that could affect sailors' ability or desire to reenlist, such as AFQT, education, race, ethnicity, gender, rating, citizenship, marital status, whether they had children, months to EAOS at time of decision, number of months of sea duty in the previous 36 months (Type 2 and Type 4 combined, and a separate variable for Type 3 only),[14] whether the sailor had participated in COOL before the decision, and whether in the previous 12 months the sailor was promoted, married, divorced, had fewer or more children, was in a disciplinary code, was a student, was in a medical code, or was a recruiter or instructor.[15]

We dropped sailors who had applied to COOL as a part of the IA workforce before their decision, and sailors who had applied fewer than 270 days before their decision. The latter restriction is imposed because sailors are supposed to have a year left on their contract when they apply to COOL, but they may separate within 90

[14] Type 2 duty is Contiguous United States (CONUS) sea duty, Type 4 duty is outside-CONUS (OCONUS) sea duty, and, because it is more arduous, Type 3 duty is OCONUS shore duty that counts as sea duty for rotation purposes.

[15] Very few Zone A sailors are recruiters or instructors, so we do not include these in the Zone A equations.

days of their EAOS. We also drop all non-regular active component sailors and those who were prior service at the time of their decision.

Finally, within each zone, we dropped sailors who reenlisted before the first reenlistment date for any COOL participant in that zone. This restriction allows us to ensure that both the control and COOL samples cover the same general economic conditions and Navy policies.

After controlling for all of these factors, we obtained statistically significant results (at the 5-percent level) only for CS and MA sailors in Zone A. Table 5 displays the results.

Table 5. Estimated differences in the probability of separating – MA and CS sailors

COOL category	Pre-PTS – Pass only	PTS – All COOL	PTS – Pass only
Control	53.2%	46.7%	47.7%
COOL	39.8%	40.5%	37.4%
Percentage-point difference	13.4	6.2	10.3

Sailors in these ratings who made a decision in the pre-PTS era and who passed all of their COOL exams were 13.4 percentage points less likely to separate than their peers, all else equal. The results were not statistically significant for all COOL participants combined. The difference in retention was lower in the PTS era; all sailors who participated in COOL were 6.2 percentage points less likely to separate than those who did not participate, while those who passed all of their COOL exams were 10.3 percentage points less likely, all else equal.

Propensity score matching does not necessarily provide us with confirmation that the decisions to participate and to reenlist are jointly determined. In particular, it adjusts only for observed differences between sailors in the control and COOL groups. To see if the decisions are dependent, we also estimated bivariate probits of the two decisions, using the same variables that we used for the propensity-score-matching analysis. Bivariate probit is used when two decisions are assumed to be dependent, and both decisions have a binary outcome. In our case, the first decision is whether to participate in COOL (yes or no), and the second decision is whether to separate from the Navy (yes or no). The technique tests whether the decisions are dependent; if so, it corrects for the dependence in calculating the coefficients of all of the included variables.

We estimated bivariate probits only for the groups that had statistically significant results using propensity score matching: Zone A MAs and CSs who passed all COOL exams versus the control group pre-PTS, and all Zone A COOL participants and just

COOL participants who passed all exams versus the control group who made a retention decision during PTS.

We are not able to reject the hypothesis that the decisions were made independently. This means that retention decisions for these sailors were likely made independently of their decision to participate in COOL. Since they are independent, results from a standard multivariate regression (in this case, using probit), are not biased, so we estimated the probability that sailors in Zone A would separate in each of these eras.

Unlike our propensity-score-matching results, our regression results were not statistically significant for sailors who passed all of their COOL exams who made decisions in the pre-PTS era. However, our results for sailors in the PTS era were statistically significant (at the .01 level) and very similar to our propensity-score-matching results. Specifically, relative to the control group, MAs and CSs who participated in COOL were 5.3 percentage points less likely to leave (compared with 6.2 percentage points less likely with our propensity-score-matching analysis), and sailors who passed all of their COOL exams were 8 percentage points less likely to separate (compared with an estimate of 10.3 percentage points with propensity-score-matching regressions) than the sailors in the control group, all else equal.

Summary of retention findings

Our results indicate that sailors in Zone A in the CS and MA ratings who successfully participated in COOL were generally less likely to separate than their peers, especially during PTS, all else constant. These results lead us to conclude that sailors who participated in COOL, especially those who passed all of their exams, differ in meaningful ways from their peers who do not participate, which either made them more likely to be selected for retention under PTS or more likely to want to remain in the Navy than their peers. In either case, as we saw with advancement, participation in COOL (especially successful participation) provides the Navy with a signal of individuals who are more motivated and/or more able than their peers, and perhaps more inclined to remain in the Navy, at least beyond their initial obligation. It is not possible at this point, however, to determine whether these effects persist in periods of more average unemployment rates and when the Navy is no longer limiting the number of sailors who may reenlist in rate.

We do not have enough data to determine whether differences exist in other zones, after PTS, or in other ratings. Because of the difficulty in controlling adequately for PTS, we urge the Navy to revisit the retention effects of COOL as more sailors make retention decisions after PTS and as more sailors become aware of COOL.

The Effect of COOL Participation on UCX Collection

Unemployment Compensation for Ex-Servicemembers (UCX) is unemployment compensation that the services pay to veterans who are eligible after they separate. Up to 99 weeks of unemployment benefits were available for 33 states in CY11 in three different components—regular UCX (up to 26 weeks), Emergency Unemployment Compensation (up to 53 weeks), and Extended Benefits (up to 20 weeks). The latter two are paid out when unemployment rates are high. Our CY11-CY13 UCX data contain only the first and third components, which are paid by the services. Our variable of interest—whether a recently separated sailor collected unemployment benefits between CY11 and CY13—does not address unemployment duration or differentiate between regular UCX and Extended Benefits. Not all states report duration or Extended Benefits, and we do not observe Emergency Unemployment Compensation, which is paid by states. See [26] for more details and data limitations.

In general, servicemembers are eligible for UCX at separation if they were honorably discharged and served their first full terms of service, but there are length-of-service exceptions. We restrict our sample to UCX-eligible separators who stayed long enough to use COOL (i.e., we drop attrites). Because unemployment law is set at the state level, it applies equally to eligible veterans and nonveterans in terms of benefit amounts, durations, and requirements related to work search and being able, available, and suitable for work.

Theory tells us that additional education has a significant negative impact on unemployment, while job training has a modest effect. We would expect that earning a credential such as COOL would have a negative effect on unemployment that might vary by the type of participant and type of credential (e.g., more useful credentials will make a person less likely to be unemployed). Given the nature of the COOL and UCX data, however, we are only able to analyze whether those who participated in Navy COOL were less likely to collect UCX. COOL data do not tell us whether sailors earned credentials, only whether they applied for vouchers to take COOL exams/pay fees or passed exams; similarly, UCX data do not tell us whether sailors were unemployed, only whether they collected unemployment benefits.[16]

This section examines the following:

- Whether sailors who participated in Navy COOL were less likely to collect unemployment benefits than those who did not participate
- Whether the outcome of COOL exams matters—that is, whether sailors who passed all of their COOL exams were less likely to collect unemployment benefits than those who did not pass all of their exams or those who did not participate in COOL.

Methodology

We are interested in estimating the effect of participating in COOL on the collection of unemployment benefits. Whether a sailor collects UCX is influenced by a complicated interaction of demographic and service-related characteristics (e.g., gender, race, ethnicity, marital status, any children, education, AFQT, paygrade, loss quarter), personality traits (e.g., ability, motivation), and outside factors (e.g., state unemployment rates). We must control for these factors in order to isolate the effect of COOL on UCX.

In addition, dissatisfaction that may have caused some sailors to separate could increase their sense of entitlement to unemployment compensation. Therefore, we also control for "shocks" that affect one's stay/leave decision (as in the unfolding model of turnover), including changes in marital status, number of children, paygrade, or medical, disciplinary, or student status in the past year. In that same vein, we control for (a) whether a sailor had a security clearance at separation (valuable to DOD-related civilian employers), (b) whether a sailor ever had a security clearance denied, revoked, or withdrawn, and (c) months of sea duty in the last 36 months (including Type 3 duty, as defined previously).

We conduct separate regressions for each zone. Only the MA rating has enough sailors in each zone to allow for a rating-specific analysis.[17] We group a select set of

[16] Not all sailors who are unemployed collect unemployment benefits. Some may already have exhausted their benefits, have yet to use their benefits, or will never use them.

[17] For the MA analysis, we control for NECs with at least five COOL participants in each NEC and in each zone, omit NECs with no COOL participants, and group the rest.

other ratings to allow for an adequate sample size; in the analysis of this group of ratings, we appropriately control for rating-specific effects.[18]

The issue we deal with when estimating the effect of COOL participation on UCX collection is that unobservable individual factors, such as motivation, are likely correlated with COOL participation *and* the effort put toward seeking employment (and thus UCX collection). Therefore, comparing the actual UCX rates of COOL participants and nonparticipants likely overestimates the effect of COOL participation on UCX.

We employ two estimation strategies. With the first estimation strategy, which accounts for differences in motivation, we estimate the set of regressions that compares (1) COOL participants and nonparticipants, (2) COOL participants who passed all of their exams and nonparticipants, and (3) COOL participants who did not pass all of their exams and nonparticipants. To account for the overestimation of the effect of COOL participation on UCX, we use propensity score matching (described earlier). This estimation strategy accounts for observable differences (and unobservable differences, to the extent that they are correlated with observable differences) between participants and nonparticipants. With this strategy, we isolate the effect of COOL on UCX by controlling for the selection into COOL based on unobservable factors.

With the second estimation strategy, we use a logistic regression to compare the UCX rates of COOL participants who passed and did not pass all of their exams. With this model, we find the effect of sailors passing all of their COOL exams on the probability of collecting unemployment benefits. We are not concerned about selection into COOL because both groups are COOL participants.

Analytical sample

We restrict the UCX analytical sample to regular non-prior-service active component enlisted sailors who were eligible to collect UCX between CY11 and CY13. To make the results generalizable to the typical sailor who would participate in COOL, we exclude sailors in the Nuclear Field (who have a very different training pipeline), attrites (who would not have stayed long enough to participate in COOL), and losses

[18] We include ratings with at least 30 COOL participants in each zone (there are between two and five ratings in each regression). We also control for primary NEC. We entered each NEC separately if at least 10 COOL participants had that primary NEC; otherwise, we combined those observations into an "other" NEC category.

to officers. Sailors were eligible to collect UCX between CY11 and CY13 if they separated within two quarters of CY11 to CY13 (we refer to CY10 Q3 to CY13 Q4 losses hereafter as *recently separated sailors).* We also exclude sailors who received an IA voucher.

The UCX analytical sample (which is different from the advancement and retention samples) for Zone A is 6,910 recently separated sailors. This includes only Zone A sailors in ratings with 30 or more COOL participants. Roughly 50 percent of MAs and HMs collected UCX, compared with about 40 percent of ITs and CTRs and 60 percent of CSs.

The Zone B UCX sample is 3,234 recently separated sailors. UCX rates were higher for MAs in Zone B than Zone A (60 percent), but about the same for ITs (40 percent), HMs (50 percent), and CSs (60 percent).

There were only two ratings with at least 30 COOL participants in Zone C. UCX rates for Zone C MAs and HMs are similar to those in Zones A and B (roughly 50 percent).

We do not report results for Zone D because there were no ratings with at least 30 COOL participants.

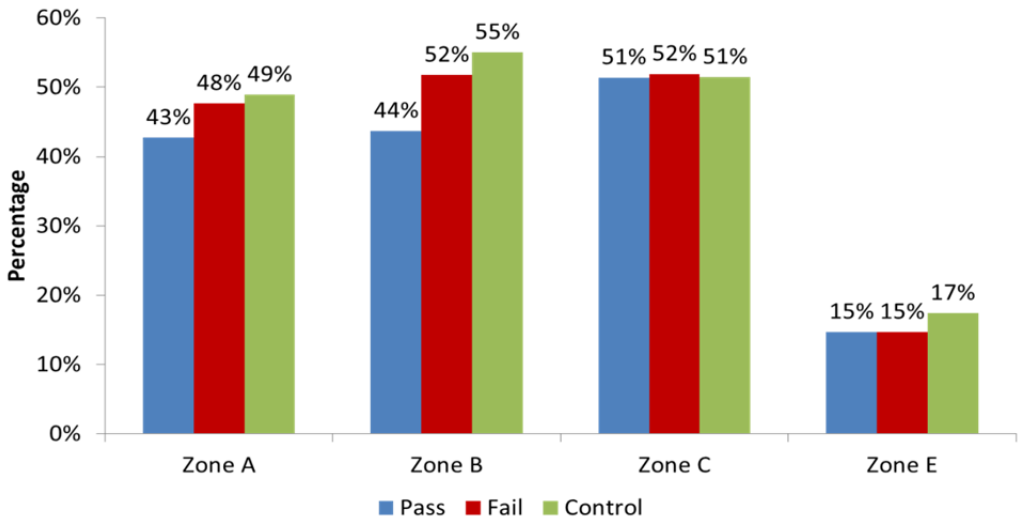
There were 3,857 sailors in five ratings with at least 30 COOL participants in Zone E. Their UCX collection rates are about 30 percentage points lower than Zone A through C sailors in each rating.

In the next subsection, we look at results for ratings with at least 30 COOL participants and, separately, for MAs.

Results on effect of COOL participation on UCX collection

From simple cross-tabulations of sailors who recently separated from ratings with at least 30 COOL participants, we observe that, in Zones A and B, UCX rates were lower among sailors who passed all of their COOL exams than among sailors who participated in COOL but did not pass all of their exams (or took COOL exams but did not report their results) and among sailors who did not participate in COOL (see Figure 19). For ease of convention in the figures, we refer to these as “Pass,” “Fail,” and “Control.” We do not report results for Zone D because there were no Zone D ratings with at least 30 COOL participants.

Figure 19. Ratings with 30+ COOL participants: Actual UCX rates, by whether passed all COOL exams, did not pass all COOL exams, or did not participate



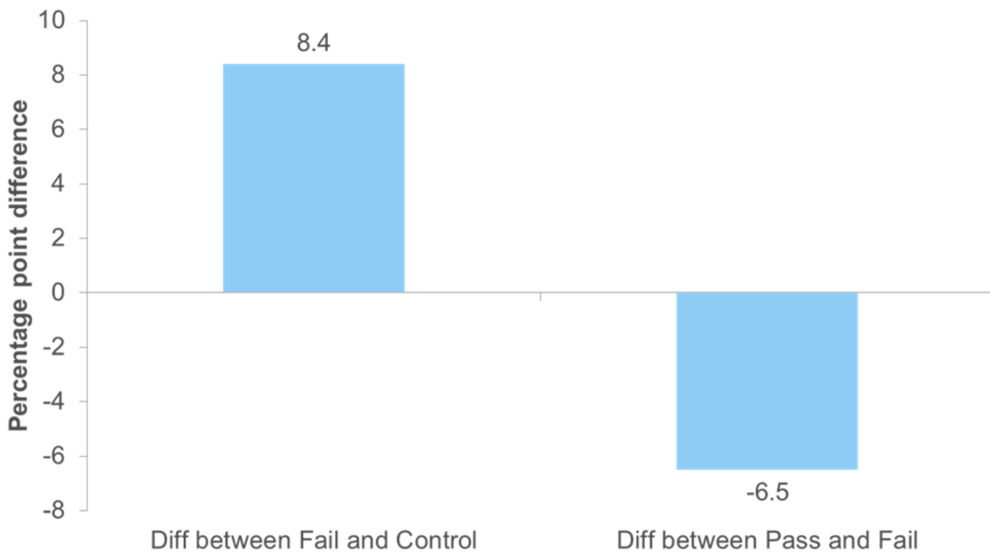
UCX rates differ only slightly between Zone C sailors in the three COOL groups and Zone E sailors in the three COOL groups. About 50 percent of sailors who separated in Zones A, B, and C—but only about 15 percent of Zone E retirees—collected unemployment benefits. Retirees have their UCX payments offset by their retirement payments, so collecting unemployment benefits is not as attractive as it is for nonretirees.

To reveal the true effect of the COOL program on unemployment, we must control for the self-selection of sailors into COOL participation based on their observable and unobservable characteristics, such as motivation or ability.

We use propensity score matching to control for observable differences (and unobservable differences, to the extent that they are correlated with observables) between COOL participants and nonparticipants. We find that the differences in actual UCX rates shown in Figure 19 disappear once we control for other factors, except in the following cases.

We find that for sailors who separated in Zone A, COOL participants who passed all of their exams were 6.5 percentage points less likely to collect unemployment compensation than those who failed exams/did not report results (see Figure 20). We also find that COOL participants who failed exams/did not report results were 8.4 percentage points more likely than nonparticipants to collect unemployment compensation.

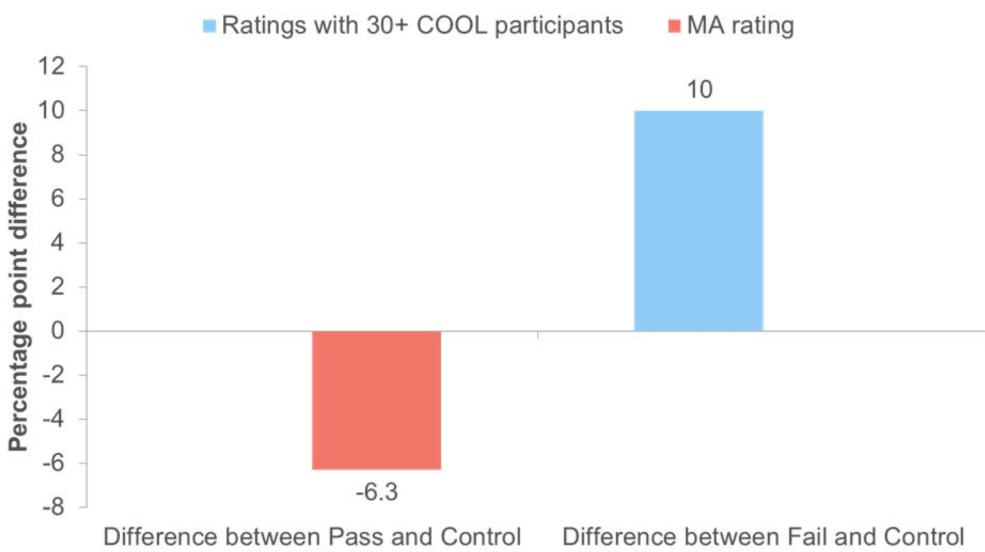
Figure 20. Zone A ratings with 30+ COOL participants: Marginal effect of passing or not passing all COOL exams on UCX rates



The finding that sailors who passed all of their exams were less likely to collect UCX than those who did not pass all of their exams means that the COOL program is effective at reducing the risk of UCX collection for Zone A separators. In addition, the Zone A results mean that those who failed exams/did not report results stand out from the rest in a negative way; they were the most likely of the three COOL groups to become unemployed/collect unemployment benefits.

We also find that Zone B separators who failed exams/did not report exam results were 10.0 percentage points more likely than nonparticipants to collect UCX (see Figure 21). This is consistent with Zone A results. One difference between Zone A and Zone B results is that Zone A participants who passed all of their exams were 6.5 percentage points less likely to collect UCX than those who failed, whereas there is no difference in UCX collection between Zone B participants who passed all of their COOL exams and those who failed one or more exams. The only other situation in which differences in actual UCX rates persist once we control for other factors is when we restrict to the MA rating. MAs who passed all of their COOL exams and separated in Zone B were 6.3 percentage points less likely than nonparticipants to collect UCX.

Figure 21. Zone B ratings with 30+ COOL participants and MAs: Marginal effect of passing or not passing all COOL exams on UCX rates



Because the differences in UCX rates persist once we account for observable and unobservable factors, we conclude that successful participation in COOL is effective in reducing the probability that sailors who separate in Zone A and MA sailors who separate in Zone B collect unemployment benefits. The finding that it is effective for those who pass all of their exams may be an indication that they earned the credential before separating (which we cannot observe) and the credential then helped them to secure a job upon separating. It is enlightening that those who applied for COOL exams but failed an exam/did not report results in Zones A and B are more likely to become unemployed/collect unemployment benefits than even those who do not participate in COOL. It can serve as a signal to the Navy that sailors who fail COOL exams have lower ability/motivation and skill sets than what is observable through their education and AFQT scores compared with those who pass and do not participate.

In Table 6, we show the marginal effects of COOL participation on UCX, by zone. The only statistically significant results are for Zones A and B, as Figures 19 and 20 show.

In Table 7, we show the same results as in Table 6, but for MAs only. The only statistically significant results are for Zone B (shown in Figure 20).

Table 6. Marginal effect of COOL participation and whether passed all COOL exams on UCX collection (percentage points)[a]

	Zone A	Zone B	Zone C	Zone E
COOL-Control	1.7	-2.5	-7.5	-1.9
Pass-Control	-2.0	-7.1	3.7	-4.3
Fail-Control	8.4**	10.0**	N/A	0.4
Pass-Fail	-6.5*	-5.7	N/A	3.5

[a.] We do not show results for the Zone C Fail-Control and Pass-Fail regressions because the number of Zone C separators who failed their COOL exams was too small to analyze.

** Denotes a statistically significant difference between the treatment and control group at the 5-percent level.

* Denotes a statistically significant difference between the treatment and control group at the 10-percent level.

Table 7. Marginal effect of COOL participation for MAs and whether passed all COOL exams on UCX collection (percentage points)[a]

	Zone A	Zone B	Zone C	Zone E
COOL-Control	1.7	7.7	5.8	0.7
Pass-Control	0.7	-6.3***	5.6	0.9
Fail-Control	4.8	6.3	N/A	-1.1
Pass-Fail	-6.9	-10.4	N/A	N/A

[a.] We do not show Zone C Fail-Control and Pass-Fail regressions and Zone E Pass-Fail regressions because their sample sizes were too small to analyze.

*** Denotes a statistically significant difference between the treatment and control group at the 1-percent level.

Summary of UCX results

We find that COOL participants who separated in Zone A and MA sailors who separated in Zone B are less likely to collect unemployment compensation. While we observed differences in actual UCX rates between the three COOL groups in Zone A and the three COOL groups in Zone B, only the Zone A overall and Zone B MA "Pass–Fail" differences persisted after we controlled for observable and unobservable factors. This may mean that the pursuit or receipt of Zone A credentials (MA, IT, CTR, CS, and HM) and Zone B MA credentials is particularly valuable to the civilian sector and that COOL provides validation of sailors' experience and expertise. We also found that Zone A and Zone B separators who failed exams/did not report their results were more likely than COOL nonparticipants to collect UCX. This may be a signal that they are less motivated/able than even nonparticipants.

Cost-Effectiveness of COOL

In this section, we examine the potential cost savings of COOL. Our COOL point of contact provided us with the costs of COOL each fiscal year, including the costs of the credentials (separate for IA versus non-IA credentials), and administrative costs (see Table 8).

Table 8. Costs of COOL

	Credentialing costs		Indirect costs		
FY	Voluntary	IA workforce	Contracts	Full-time employee	Supplies/ travel
2008	$1,610,417	$364,401			
2009	$3,829,215	$638,009			
2010	$2,774,781	$1,147,851			
2011	$3,041,958	$1,504,977			
2012	$3,333,338	$1,075,432	$1,435,695	$688,107	$95,583
2013	$3,289,481	$499,456	$1,501,123	$800,000	$14,000
2014	$2,847,306	$635,740	$1,597,494	$825,000	$45,000
Total	$20,726,496	$5,865,866	$4,534,312	$2,313,107	$154,583

The costs of the IA credentials are unavoidable because these exams are required of IA personnel. Since the indirect costs also help to support the IA requirements, we ignore them for our present purpose.

The average annual cost of exams per sailor (not per exam) has decreased over time, falling from about $900 per sailor in FY08 and FY09 to about $500 per sailor in FY13 (the last full year for which we have COOL data). The total direct cost to date for each sailor who voluntarily participated is about $590.

Advancement

We found that COOL may be useful in identifying some of the most able and motivated sailors, but participation in COOL does not help participants advance faster. We would expect these exceptional sailors to perform better on their advancement exams even if they had not participated in COOL.

To the extent that the Navy benefits from being able to identify these sailors, COOL may yield some benefits, but it is beyond the scope of this study to estimate those potential savings.

Retention

Throughout much of the time period under analysis, the Navy sought to restrict reenlistments of sailors in certain ratings, but which sailors were included in these restrictions is unknown. However, CSs in all zones were not eligible for SRBs in FY11-FY12, and most of FY13, while MAs in all zones were not eligible for SRBs in FY12-FY14, which helps to support our conclusion that these ratings were likely subjected to PTS reenlistment quotas. However, CSs in Zone A became eligible for an SRB of 1 in the beginning of FY14, which increased to 1.5 in March 2014. This may be an indication that the Navy had previously had overly strict PTS quotas for CSs or that the economy has improved sufficiently for sailors with these skills.

The period under analysis is unusual because of high unemployment and the general lack of SRBs, because the Navy was downsizing, and because it imposed restrictions on which sailors could reenlist. These factors make it impossible to determine the extent to which COOL has contributed to some participants having higher retention, and hence to potential cost savings, all else equal. Most importantly, we do not know how much the availability of COOL was responsible for the sailors' decisions to reenlist versus the Navy's decisions to permit them to reenlist. Better estimates may be possible as the Navy reaches a more steady-state endstrength.

UCX

We have already shown that the probability that sailors will use UCX is lower for some sailors who participate in COOL. In this subsection, we examine the extent to which participation in COOL may help to offset UCX costs.

To test this, we cannot simply calculate an across-the-board estimate of differences in the amount of UCX received by COOL participants versus nonparticipants because UCX costs vary by such factors as wages earned in the base period (which are a function of paygrade and rating) and state. We account for these differences by estimating UCX payment amounts, controlling for the same independent variables included in the UCX participation estimation. Because we control for all determinants of UCX payments, variation in UCX payments by COOL participation will incorporate differences in both the probability of receiving UCX and the duration of UCX payments (which includes the case in which no UCX was received, and hence the duration was zero).

We use a Tobit estimation strategy to handle positive, continuous UCX payment amounts for UCX recipients and zero dollar amounts (left-censored) for UCX nonrecipients. Table 9 shows the marginal effects of COOL participation on total UCX payments.

Table 9. Marginal effect of COOL participation and whether passed all COOL exams on UCX payment amount (dollars)

	Zone A	Zone B	Zone C	Zone E
COOL-Control	229.5	-82.5	34.5	-516.4**
Pass-Control	196.5	-524.4	-1,401.4***	-62.0
Fail-Control	737.3**	658.7	N/A	-218.3
Pass-Fail	-626.7	-414.6	N/A	637.1

*** Denotes a statistically significant difference between the treatment and control group at the 1% level, ** 5% level and * 10% level.

Our results indicate that participation in COOL reduces UCX payments to more experienced sailors, and does not increase the costs for any successful COOL participants.

The Zone A results are consistent with Table 6 findings. From Table 6, Zone A sailors who failed exams were 8.4 percent more likely to collect UCX than the control group. To add to this picture, in Table 9 we find that Zone A sailors who failed exams collected $737 more in total unemployment compensation than the control group. We do not know why Zone A sailors who fail exams do so, but as we suggested previously, their failure may be a signal that they are generally less able or motivated than their peers in both the control and successful COOL groups and, therefore, have more difficulty securing employment.

We also find significant results for sailors in Zones C and E in Table 9 that we did not find in Table 6. While Zone C sailors who passed exams were no less likely to collect UCX than COOL nonparticipants, their average payments were $1,401 less. Likewise, while Zone E sailors who participated in COOL were no less likely to collect UCX than COOL nonparticipants, they collected $516 less in UCX payments.

We do not know the average cost of COOL for individual sailors, or by zone. It could be the case that more experienced sailors have taken more COOL exams, which could increase their average cost, or it could also be the case that the credentials they seek are less expensive; we have no additional information to help us determine the average cost per zone. However, using the average cost per voluntary participant of about $590, the cost of COOL almost completely offsets the cost of UCX for participants in Zone E, and the net savings to the Navy for sailors in Zone C is over $800.

Summary and Recommendations

We find that sailors who pass all of their COOL exams perform better on their first occupational exam for advancement to E4 than their peers who do not participate, especially relative to their peers who participate but who fail one or more of their COOL exams. This is true even for sailors who may have been required to participate in COOL during IT A-School or during some HM C-Schools. We conclude that this is not an indication that their participation improved their exam performance because sailors who passed all of their COOL exams had no greater improvement in occupational component exam scores on consecutive E5, E6, and E7 advancement exams than their peers who do not participate; if the participation itself improved sailors' knowledge related to their rating, we would expect participants to have a greater improvement than their peers who did not participate, all else equal. Instead, we conclude that these findings are an indication that sailors who successfully participate in COOL are likely more motivated or more able than their peers, even when we control for observable measures of motivation and ability, such as AFQT, education, and experience.

Our results concerning the effect of COOL on retention are inconclusive. The period during which COOL has been in existence has been unusual in terms of retention climate. Unemployment was at historically high levels, which resulted in an increase in the proportion of sailors wishing to reenlist at the same time that the Navy was downsizing and restricting reenlistments. These factors make it impossible to correctly estimate the true effect of COOL participation on retention. We have some indication, however, that sailors in the CS and MA ratings who successfully participated in COOL had higher Zone A retention during PTS, all else equal, but these results may be more a reflection of which sailors the Navy allowed to reenlist rather than of sailor preferences, and they may not be robust in a more steady-state retention environment.

For the effect of COOL participation on the collection of unemployment benefits, we find that, for sailors who separate in Zone A, and for MA sailors who separate in Zone B, successful participation in COOL lowers the probability that they collect UCX. In contrast, sailors who fail one or more of their COOL exams are more likely to collect UCX in Zones A and B than their peers who did not participate. Clearly, participation in COOL did not make these sailors less likely than their peers to find civilian employment; we conclude instead that their failure provides a signal that these sailors are somehow less motivated or less able, and perhaps less proficient in skills that are attractive to civilian employers, than their peers.

We found that participation in COOL helps to lower total UCX payments for some sailors, especially those who separated in Zones C and E. Using the average cost per voluntary participant of about $590, the cost of COOL almost completely offsets the cost of UCX for participants in Zone E, and the net savings to the Navy for sailors in Zone C is over $800.

Zone A sailors who failed COOL exams received more UCX than their peers who did not participate, but we conclude that this is further evidence that these sailors are likely less able or less motivated than their peers and hence may have more difficulty in finding civilian employment.

These findings must be considered to be preliminary for a number of reasons. First, we do not have complete information regarding whether sailors actually earned credentials—only that they applied and, in most but not all cases, whether they passed a particular exam. The effect of COOL on retention could depend on this outcome, as our literature review indicated. Employees have higher retention while they are pursuing a degree, but their retention is lower after completion of a degree, especially if they are not promoted. The same could be true for COOL participants; they may reenlist in order to complete all of the exams necessary for one or more credentials but then separate on receipt of the desired credentials. We are not able to determine whether sailors have obtained credentials with the current data. Therefore, our first and most important recommendation is that the Navy should revise the COOL data collection protocol so that it indicates whether the sailor was awarded the credential and the date of the award.

It would also be beneficial if the date of the exam could be noted, not just the date of the application. As stated in our discussion of the advancement effects, we had to restrict our sample to include sailors who applied at least 60 days after one advancement exam and 60 days before another to ensure that studying for the advancement and COOL exams did not coincide. We could include more sailors in the analysis if we had more precise information regarding the date the COOL exam was taken.

We recommend that the Navy consider establishing some policies regarding whether sailors should be required to take COOL exams under any circumstances (other than as part of the IA workforce), especially during training. Given the fact that the pass rate is lower when the sailors appear to be less motivated to do well (especially when they have not sought a COOL credential independently), the cost-effectiveness of COOL is reduced significantly.

We have fairly strong evidence that sailors who have voluntarily participated in COOL through April 2014 and who passed all of their COOL exams are more motivated and/or able sailors than their peers. This finding suggests that COOL could serve as a signal for sailor motivation and ability (especially for sailors who pass all of their COOL exams), which could be useful in identifying sailors of the highest quality for purposes of evaluations, awards, critical assignments, Selection Board consideration, and so on. It is beyond the scope of this project to estimate the returns to such a signal, but we suggest that they could be significant. The signal may be twofold; sailors who participate could be (1) more motivated to seek out the credential for a particular purpose (self-improvement, career enhancement, civilian opportunities) and (2) more motivated and able to do well on COOL exams, advancement exams, and other measures of competency. The less that participation is voluntary, the more muted the first source of the signal becomes.

Based on our finding that some sailors who pass all of their COOL exams are less likely to require UCX, the Navy may want to consider encouraging sailors who are denied reenlistment in-rate to pursue a COOL credential before separating. Under current C-Way rules, sailors receive their final denial for reenlistment in-rate when they have no more than 10 months remaining on their contract. As a consequence, the Navy would need to waive the requirement of at least one year remaining on sailors' contracts to participate in COOL for these sailors. More research is required to determine if some credentials are more likely to result in civilian employment than others, however.

Finally, we conclude that more accurate measures of the effect of COOL on advancement, retention, and unemployment will not be possible until COOL has existed longer and under more normal conditions. It is not clear how sailors learn about COOL, and whether the dissemination of information regarding its availability differs by important factors that are associated with any or all of the three outcomes (e.g., by race, ethnicity, gender, marital status, education). And, as we noted, participants to date could be considered "early adopters" and therefore may differ in significant ways from sailors who participate in the future, as COOL becomes more well known. It is also not clear what long-term effects PTS (now called C-Way) or mid-career retention boards will have on sailor retention behavior and their motivation for participating in COOL. Therefore, we recommend that the Navy revisit the effectiveness of COOL regarding advancement, retention, and unemployment in a few years.

Appendix A: Top 10 Certificates Each Fiscal Year

Table 10 ranks the 10 most common certificates that were applied for by non-Information Assurance Workforce personnel, in descending order from the most to least common each fiscal year.

Table 10. Number of applications for the 10 most popular certificates each FY

FY	Certification Title	Percentage passing
2008	Certified in Homeland Security Level I, II, & III (CHS-I, II, & III)	974
	Hazard Analysis & Critical Control Point (HACCP)	474
	Certified Professional Food Manager (CPFM)	470
	Certified Food Executive (CFE)	375
	Certified in Homeland Security Level IV (CHS-IV)	304
	Certified in Homeland Security Level V (CHS-V)	227
	Master Certified Food Executive (MCFE)	103
	Certified Anti-Terrorism Specialist (CAS)	83
	CompTIA Security+ Certification	53
	Emergency Medical Technician - Basic	36
2009	Certified in Homeland Security Level I, II, & III (CHS-I, II, & III)	2,122
	Hazard Analysis & Critical Control Point (HACCP)	672
	Certified Professional Food Manager (CPFM)	671
	Certified Food Executive (CFE)	636
	Certified Anti-Terrorism Specialist (CAS)	510
	Certified in Homeland Security Level IV (CHS-IV)	469
	Certified in Homeland Security Level V (CHS-V)	379
	Sensitive Security Information, Certified (SSI)	268
	Certified in Disaster Preparedness (CDP-1)	209
	Fiber Optics Installer (FOI)	91

2010	Certified in Homeland Security Level I, II, & III (CHS-I, II, & III)	1,493
	Certified Anti-Terrorism Specialist (CAS)	384
	Certified in Homeland Security Level V (CHS-V)	326
	Fiber Optics Installer (FOI)	322
	Certified in Homeland Security Level IV (CHS-IV)	315
	Certified in Disaster Preparedness (CDP-1)	260
	CompTIA Security+ Certification	237
	Sensitive Security Information, Certified (SSI)	227
	Certified Pharmacy Technician	116
	Certified Surgical Technologist (CST)	113
2011	Certified in Homeland Security Level I, II, & III (CHS-I, II, & III)	1,185
	CompTIA A+ Certification	961
	Microsoft Certified Professional (MCP)	884
	CompTIA Security+ Certification	527
	Certified Anti-Terrorism Specialist (CAS)	356
	Certified in Homeland Security Level IV (CHS-IV)	349
	Certified in Disaster Preparedness (CDP-1)	317
	Fiber Optics Installer (FOI)	286
	Sensitive Security Information, Certified (SSI)	266
	Certified Surgical Technologist (CST)	223
2012	CompTIA A+ Certification	1,494
	Microsoft Certified Professional (MCP)	1,409
	Certified in Homeland Security Level I, II, & III (CHS-I, II, & III)	1,206
	CompTIA Security+ Certification	1,160
	Certified in Homeland Security Level IV (CHS-IV)	603
	Certified in Disaster Preparedness (CDP-1)	434
	Sensitive Security Information, Certified (SSI)	331
	Fiber Optics Installer (FOI)	259
	Certified in Homeland Security Level V (CHS-V)	231
	Certified Anti-Terrorism Specialist (CAS)	187
2013	CompTIA A+ Certification	1600
	Certified in Homeland Security Level I, II, & III (CHS-I, II, & III)	1342
	CompTIA Security+ Certification	1154
	Certified in Homeland Security Level IV (CHS-IV)	613
	Certified in Disaster Preparedness (CDP-1)	439
	Sensitive Security Information, Certified (SSI)	390
	Certified in Homeland Security Level V (CHS-V)	372
	Fiber Optics Installer (FOI)	289

	CompTIA Network+ Certification	187
	Certified Pharmacy Technician	159
2014	CompTIA Security+ Certification	697
	CompTIA A+ Certification	674
	Certified in Homeland Security Level I, II, & III (CHS-I, II, & III)	553
	Certified in Homeland Security Level IV (CHS-IV)	282
	Certified in Disaster Preparedness (CDP-1)	214
	Fiber Optics Installer (FOI)	164
	Sensitive Security Information, Certified (SSI)	150
	Certified in Homeland Security Level V (CHS-V)	126
	CompTIA Network+ Certification	113
	Emergency Medical Technician - Basic	40

Appendix B: Certificate Exam Pass Rates by Fiscal Year

In Table 11, we report the percentage of exams that were passed and the number of exams taken for each certificate title each fiscal year by non-IA sailors. We report only those certificates for which at least 50 applications were made that year. The certificates are rank-ordered from highest pass rate to lowest.

Table 11. Pass rate of exams with at least 50 applicants in that FY

FY	Certification Title	Percentage passing
2008	Certified in Homeland Security Level I, II, & III (CHS-I, II, & III)	100
	Certified in Homeland Security Level IV (CHS-IV)	100
	Certified Anti-Terrorism Specialist (CAS)	100
	Certified in Homeland Security Level V (CHS-V)	99
	Certified Professional Food Manager (CPFM)	97
	Hazard Analysis & Critical Control Point (HACCP)	92
	Master Certified Food Executive (MCFE)	92
	Certified Food Executive (CFE)	89
2009	Certified in Homeland Security Level I, II, & III (CHS-I, II, & III)	100
	Certified in Disaster Preparedness (CDP-1)	100
	Certified in Homeland Security Level IV (CHS-IV)	100
	Certified in Homeland Security Level V (CHS-V)	100
	Certified Executive Chef (CEC)	100
	Certified Anti-Terrorism Specialist (CAS)	100
	Certified Master Anti-Terrorism Specialist (CMAS)	100
	Sensitive Security Information, Certified (SSI)	98
	Certified Professional Food Manager (CPFM)	97
	Fiber Optics Installer (FOI)	91
	Hazard Analysis & Critical Control Point (HACCP)	90
	Certified Pharmacy Technician	88
	Certified Food Executive (CFE)	85

	CompTIA Security+ Certification	79
2010	Certified in Homeland Security Level I, II, & III (CHS-I, II, & III)	100
	Certified Anti-Terrorism Specialist (CAS)	100
	Certified in Homeland Security Level V (CHS-V)	100
	Nationally Certified Psychiatric Technician 1	100
	Certified Master Anti-Terrorism Specialist (CMAS)	100
	Certified in Homeland Security Level IV (CHS-IV)	100
	Certified in Disaster Preparedness (CDP-1)	100
	Sensitive Security Information, Certified (SSI)	98
	Certified Pharmacy Technician	95
	Fiber Optics Installer (FOI)	93
	CompTIA Network+ Certification	77
	CompTIA Security+ Certification	71
	Medical Laboratory Technician (MLT(ASCP))	68
	CompTIA A+ Certification	60
	Certified Surgical Technologist (CST)	33
2011	Certified in Homeland Security Level I, II, & III (CHS-I, II, & III)	100
	Certified Anti-Terrorism Specialist (CAS)	100
	Certified Pharmacy Technician	100
	Certified Master Anti-Terrorism Specialist (CMAS)	100
	Certified in Homeland Security Level IV (CHS-IV)	99
	Certified in Disaster Preparedness (CDP-1)	98
	Sensitive Security Information, Certified (SSI)	98
	Certified in Homeland Security Level V (CHS-V)	97
	Fiber Optics Installer (FOI)	93
	CompTIA Security+ Certification	74
	CompTIA Network+ Certification	70
	Microsoft Certified Professional (MCP)	66
	Medical Laboratory Technician (MLT(ASCP))	66
	CompTIA A+ Certification	62
	Certified Surgical Technologist (CST)	46
2012	Certified in Homeland Security Level I, II, & III (CHS-I, II, & III)	100
	Certified in Homeland Security Level IV (CHS-IV)	100
	Certified Anti-Terrorism Specialist (CAS)	100
	Entry Level Tender/Diver	100
	Certified in Disaster Preparedness (CDP-1)	99
	Certified Pharmacy Technician	99
	Sensitive Security Information, Certified (SSI)	97

	Certified in Homeland Security Level V (CHS-V)	96
	Fiber Optics Installer (FOI)	92
	CompTIA Security+ Certification	79
	CompTIA Network+ Certification	78
	Emergency Medical Technician - Basic	72
	CompTIA A+ Certification	69
	Certified Surgical Technologist (CST)	62
	Microsoft Certified Technology Specialist (MCTS)	51
	Microsoft Certified Professional (MCP)	42
	Cisco Certified Network Associate Routing and Switching (CCNA)	41
2013	Certified in Disaster Preparedness (CDP-1)	99
	Certified in Homeland Security Level I, II, & III (CHS-I, II, & III)	99
	Certified in Homeland Security Level IV (CHS-IV)	99
	Certified Corrections Officer (CCO)	98
	Sensitive Security Information, Certified (SSI)	98
	Certified Pharmacy Technician	94
	Fiber Optics Installer (FOI)	92
	Certified in Homeland Security Level V (CHS-V)	86
	CompTIA Security+ Certification	86
	PSI Certified Associate Business Coordinator (PCABC)	85
	CompTIA Network+ Certification	75
	CompTIA A+ Certification	70
	Microsoft Certified Technology Specialist (MCTS)	59
2014	Certified in Homeland Security Level I, II, & III (CHS-I, II, & III)	100
	Certified in Homeland Security Level IV (CHS-IV)	100
	Certified in Disaster Preparedness (CDP-1)	99
	Sensitive Security Information, Certified (SSI)	99
	Fiber Optics Installer (FOI)	96
	CompTIA Security+ Certification	87
	CompTIA A+ Certification	85
	CompTIA Network+ Certification	75

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