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Navy/Thomas Nelson Community College MLT Training Pilot Evaluation

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Navy/Thomas Nelson Community College MLT Training Pilot Evaluation

In January 1999, the Navy contracted out a portion of its enlisted Medical Laboratory Technician (MLT) training to Thomas Nelson Community College (TNCC) in Hampton, VA. This marked the beginning of a 2-year MLT training pilot study (ending August 2001).

During the development of the pilot, MED-05, Director of Education, Training, and Personnel for the Bureau of Medicine and Surgery, Department of the Navy (BUMED), asked CNA to develop an evaluation plan for the pilot. To accomplish this, CNA worked closely with staff members from the Naval School of Health Sciences (NSHS) Portsmouth (Navy oversight for the TNCC MLT program), NSHS San Diego (in-house MLT training control site for the pilot), and MED-05. The work involved identifying key parameters for measuring the success of the pilot program and developing appropriate survey tools and additional data needed to (1) monitor the ongoing progress of the TNCC MLT program and (2) evaluate the ultimate success of the pilot program relative to in-house training, in terms of actual cost-savings and training output (e.g., student performance). The resulting evaluation plan was documented in a July 1999 CNA Annotated Briefing (CAB).[1]

Throughout the pilot, CNA continued to work in conjunction with NSHS San Diego, NSHS Portsmouth, and MED-05 to collect data in support of the evaluation plan. This briefing documents the results of our evaluation analysis.

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1. Cori R. Rattelman, *Navy/Thomas Nelson Community College MLT Training Pilot: Evaluation Plan*, CAB 99-59, July 1999.

Summary of Findings

- We evaluated the TNCC pilot program against in-house training programs for six broad "measures of success"
- Our results indicate that the TNCC program was associated with
  - Producing higher quality graduates at a lower cost per graduate
  - Estimated savings of 6% to 15% per graduate
- This was achieved while maintaining
  - Student satisfaction with the MLT program and many aspects of military quality of life
  - Military bearing
  - End-user satisfaction

We evaluated the TNCC MLT pilot across six broad areas: quality of graduates, production of graduates, cost, student satisfaction, maintaining military bearing among students, and end-user satisfaction. For each area, outcomes from the TNCC pilot were compared with outcomes of a selected control, or comparison, group (particular Navy in-house training programs).[1]

Our findings show that the TNCC program produced high-quality graduates at a lower per-graduate cost when compared with the in-house MLT training program. Excluding student salaries and controlling for differences in student population between the TNCC and in-house program,[2] we found that

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1. For this analysis, control group refers to a specific Navy in-house training program (NSHS SD MLT) or set of in-house programs (NSHS Portsmouth X-ray Tech and Pharmacy Tech). These programs are meant to represent a comparison point when evaluating specific outcomes. The control sites are not expected to be identical to the experimental site (TNCC) in terms of population characteristic and/or program design (in fact, the pilot was designed to allow the civilian contractor to propose a program that may differ significantly in design from the in-house MLT program, see pp. 5-8 for details). We use regression analysis to control for differences in student population characteristics between the experimental and control groups. Differences in program design reflect the "treatment" received by the experimental group.

2. Enrollee placement in the MLT programs was not random. Compared to TNCC MLT enrollees, enrollees in the in-house MLT program were more likely to be male, to be junior paygrade, and to have come directly from Hospital Corps School, and less likely to have met prerequisites and to have lower Corps School GPAs. Again, using regression analysis, we attempt to statistically control for differences in population demographics that might independently affect the outcome. This allows us to isolate the impact of the "treatment" on student outcomes. A discussion of this methodology follows in the background section of this briefing.

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TNCC cost per graduate was at least 6 percent lower for TNCC—if one included the cost of overhead provided by NSHS Portsmouth (costs that the contractor cannot control). If one looked only at MLT course-specific costs—those costs over which the contractor does have control—we estimate that TNCC cost per graduate is as much as 15 percent lower than the in-house MLT program.[3]

In addition, the TNCC program accomplished this while continuing to be at least as successful as the in-house programs with regard to attrition rates, student satisfaction with the program and most aspects of QOL, incidence of disciplinary action among students, maintaining military bearing, and the satisfaction of MTF lab supervisors working with the program's graduates.

In this briefing, we will walk you through the evaluation plan, methodology, data, and results for each of these areas. Let's begin with some background on the Navy's MLT training program and the development of the pilot.

3. We estimate the total cost of MLT training (at TNCC and NSHS San Diego) over the course of the pilot evaluation to be about $5.9 million—$3,046,000 for NSHS SD and $2,856,000 for TNCC. This cost excludes student salaries (the largest portion of MLT training costs). Appendix E provides a complete cost breakout.

Background: Then and Now

- Historically, MLT was taught at NSHS Bethesda and NSHS San Diego
- For the duration of the 2-year MLT pilot:
  - NSHS Bethesda's MLT program has been temporarily closed, pending the pilot's outcome
  - MLT students were sent to NSHS San Diego and Thomas Nelson Community College (TNCC)
  - NSHS Portsmouth provided oversight for TNCC's MLT program

Before the pilot program, Navy Medicine trained about 130 MLTs annually. This training took place at two sites: NSHS Bethesda and NSHS San Diego.[1] Each of these schoolhouses is collocated with a Navy Medical Center, NMC Bethesda and NMC San Diego, respectively.

The Navy's in-house MLT course runs 369 days with instruction 5 days a week (courses start about every 3 to 4 months). The course is divided into quarters. The first quarter consists of didactic instruction and is followed by clinical lab, didactic, and lab. Didactic instruction is provided in the schoolhouses by Navy enlisted MLTs (supervised by the department head—a Navy Lab Officer). The course quarters dedicated to clinical lab are conducted at the respective Navy Medical Centers under the supervision of the hospital's laboratory supervisor.[2]

MED-05 decided to temporarily close NSHS Bethesda's MLT program (its east coast training site) pending the outcome of the pilot. For the duration of the pilot, it was determined that Bethesda's projected student load (50 to 60 students annually) would attend the TNCC program with Navy oversight provided by NSHS Portsmouth and that NSHS San Diego would continue to train MLT students on the west coast.

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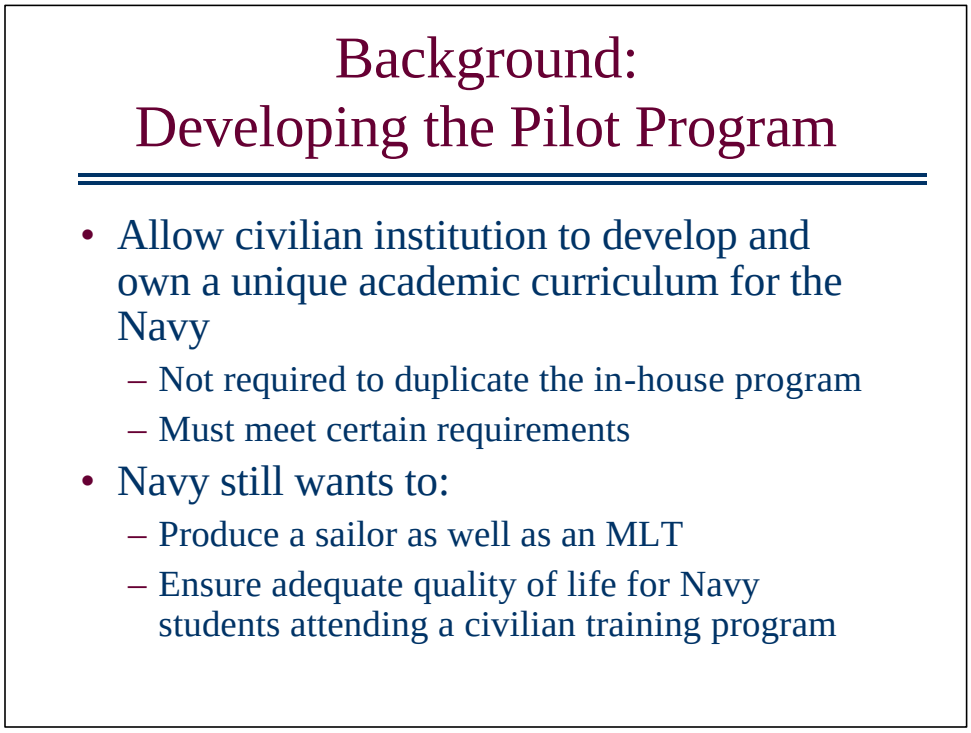
1. NSHS San Diego had a higher annual throughput—approximately 71 students per year vs. 61 students at Bethesda (based on 3-year average input, 1996–1998).

2. Clinical lab consists of rotation through each of the lab's clinical benches.



When BUMED decided to contract out a portion of its MLT training, it chose to give the bidding civilian institutions as much flexibility as possible in designing their proposed academic programs. BUMED established the following requirements for the civilian institutions:

- Produce Navy MLTs within a fixed time frame (369 days).
- Provide capacity for a maximum of 96 students per year.
- Maintain MLT program accreditation.
- Allow curriculum time for Navy-specific training taught by AD instructors.
- Conduct clinical lab portions of the curriculum only at NMC Portsmouth.
- Provide office space for Navy instructors and department head.

Each bidder could decide how to meet these requirements. This meant that the winning civilian institution would own the academic curriculum and that the resulting program might look significantly different from the in-house program (in terms of student/teacher ratios, matriculation plans, didactic/clinical rotations, etc.). Continued program accreditation, as well as an incentive structure based on graduation rates, pass rates on the national MLT certification exam (the ASCP exam), and student satisfaction, would ensure that the resulting program met the Navy's requirements for producing Navy MLTs.[1]

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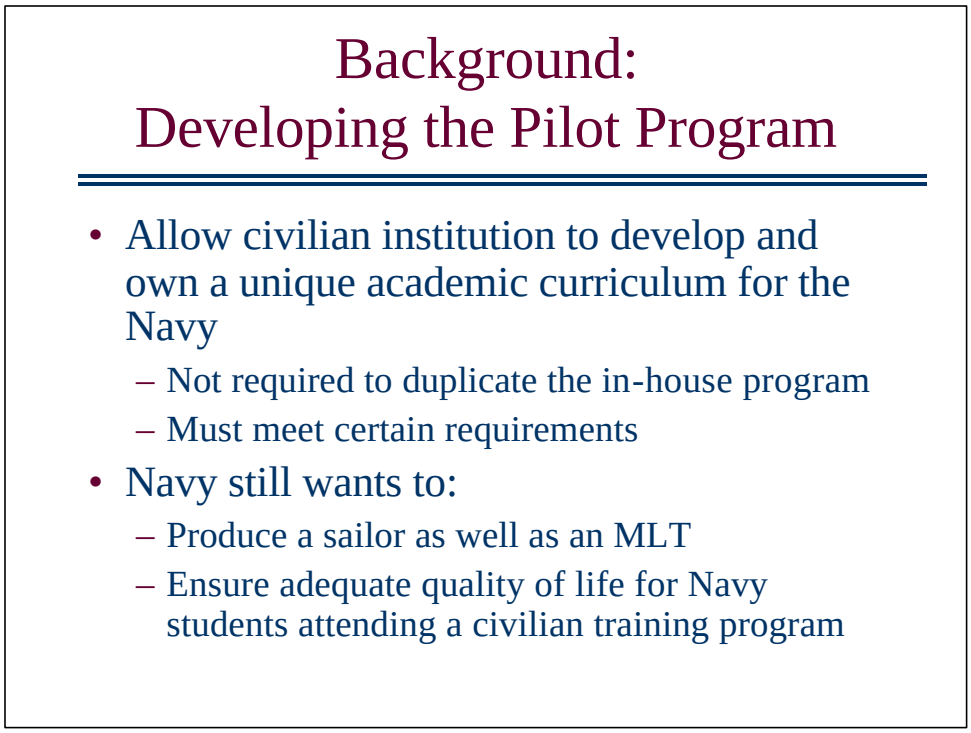
1. To provide the correct incentive structure, the incentive fees for graduation and ASCP exam pass rates were tied together (small incentive for graduation rate and much larger incentive for percentage of graduates that passed the ASCP).



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In addition, BUMED was concerned that contracting out training should not limit its ability to (1) produce sailors as well as MLTs or (2) provide adequate quality of life for the Navy student attending a civilian training program (rather than being trained at a Navy schoolhouse).

To minimize any negative impact that contracting might have on these goals, the pilot implementation team[1] established several key parameters for the pilot program, including the following:

- NSHS military staff are on site at civilian institution.
- NSHS instructors provide Navy-specific training (e.g., Navy Blood Program) at the civilian institution.
- Classes move through the program as a military unit.
- Students are in uniform.
- Attending group PT sessions conducted by military staff is mandatory.
- Use NMC Portsmouth barracks and facilities.
- NSHS Portsmouth provides transportation to contractor's facilities.

1. The implementation team consisted of members from MED-05 (HM/DT Training Programs, Accreditation, Education and Training Analysis, and Evaluation Manager), MLT department heads from NSHS San Diego, Bethesda, and Portsmouth (newly appointed), NSHS Portsmouth Command staff, NMC Portsmouth Laboratory Manager, HM/DT Community Manager and staff, detailing community, NAVMEDLOGCOM Contracting, and CNA.

Background: TNCC's MLT Program

- How does the resulting TNCC MLT program differ from the in-house program?
  - Curriculum (timing and content)
  - Philosophy (education vs. training)
  - Education and experience of instructors
    - Professors from a variety of disciplines
  - Cannot use "set backs" for remediation
  - Can/does make changes continuously to adapt to needs of students

The contract for the MLT pilot program was awarded to Thomas Nelson Community College in July 1998, with a start date of January 1999. Based on the academic program proposed by TNCC, the college would start a class every 6 months for the duration of the contract (a total of four classes). The TNCC MLT course would differ from the in-house program in several ways.

As noted previously, the pilot would be limited to a course length of 369 days and have the capacity to enroll up to 96 students per contract year. TNCC's academic program is taught as 6 months of didactic instruction at the college campus, followed by 6 months of clinical lab at NMC Portsmouth (under the supervision of the hospital's laboratory manager)—as opposed to alternating quarters of didactic and lab modules.

Didactic instruction is provided primarily by the college faculty (civilian professors from a variety of disciplines—mathematics, chemistry, biology, etc.), with the exception of Navy-specific coursework, such as the Navy Blood Program and Military Chemistry. Navy-specific instruction consists of about 32 hours and is taught by the onsite Navy staff.

The TNCC curriculum contains much of the same content as the in-house MLT program (much of this is mandated by the national accreditation process undertaken by both programs). The TNCC program, however, does include additional material, such as a technical writing course, prep and review for the standardized ASCP national MLT certification exam, Internet and

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library research projects, and an emphasis on "critical thinking skills." This parallels the college's overall education philosophy.

TNCC has a proposed remediation plan for students who fall behind. The plan and any process is reviewed periodically by the onsite Navy Department Head/Contracting Officer. Remediation processes at NSHS San Diego include the use of "set backs." A student who falls behind for either academic or nonacademic reasons can be set back provided it is determined that he/she (1) cannot successfully complete the current MLT course but (2) has the potential, with either appropriate remediation and/or just a new start, to successfully complete the next MLT course. In this case, the student attrites from his/her current MLT course and waits for the start of the next course (recall that MLT courses at NSHS SD start about every 3 to 4 months). For the pilot, the set-back option was not available to TNCC. Faced with a faltering student, TNCC staff had only the option of providing remediation or failing (disenrolling) the student.

Because TNCC "owns" the academic curriculum, it can make changes at will to adapt to the needs of the students, such as providing remedial lessons, reviewing lessons/course modules, and changing and reworking module content and timing in response to student surveys and performance. Alternatively, the NSHS MLT program is more fixed. Changing or altering the curriculum in any way requires approval through the chain of command, up to MED-05.

It is important to recognize these program differences as we go through our analysis.

Background: MLT Pilot Evaluation Plan

- For select "measures of success," compare outcomes of TNCC pilot program and control group
- Control for student quality and demographics
- *Cannot control* for individual differences in programs (3-3-3-3 vs. 6-6, student/teacher ratios, active duty vs. civilian instructors, etc.)

In the course of developing the pilot implementation plan, the MLT working group identified several key outcomes, or "measures of success," to determine the success of the MLT pilot program.

Both to monitor the TNCC program and to evaluate the pilot, we measured and compared these selected outcomes for the TNCC MLT pilot program and selected control groups. Depending on the measure of success, the appropriate control group and populations differ. For example, when comparing the quality of MLT graduates, we want to look at TNCC graduates relative to graduates from the Navy's in-house MLT training program at NSHS San Diego. Alternatively, if we are looking at quality-of-life (QOL) issues, we want to compare the experiences of the Navy corpsmen attending TNCC with the experiences of Navy corpsmen attending other C-school courses at NSHS Portsmouth. That is because the QOL goal for the pilot program was to have the Navy's TNCC students be at least as well off as NSHS Portsmouth's students.

To accurately measure the effect of the TNCC pilot program on these outcomes, we must control for those individual characteristics that might independently affect the outcomes (such as age, gender, marital status, years of service, and student quality). For example, if Navy TNCC students are more likely than those at NSHS Portsmouth to be married with dependents, we might find that satisfaction with some aspects of QOL differs between the two

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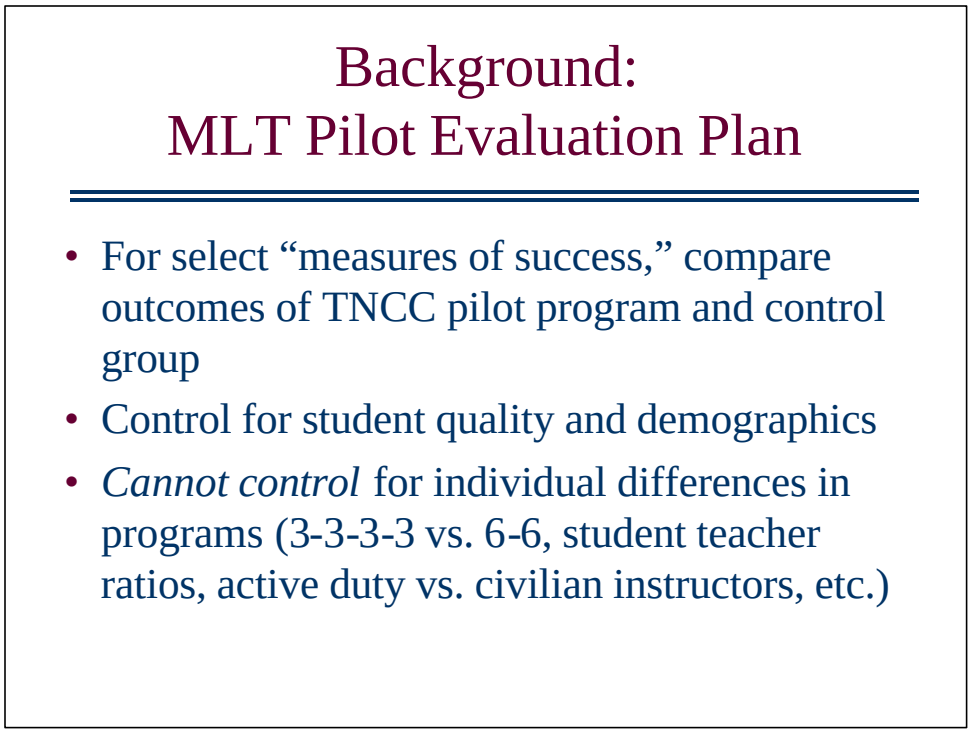

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groups. This difference might be driven by the abundance or lack of services for families rather than any actual differences in access to the available services for these two groups.

When we compare outcomes of the TNCC program and the control group, we cannot individually control for program-specific differences, such as student/teacher ratios, matriculation plans, and 3-month didactic/clinical rotations (3-3-3-3) vs. 6-month rotations (6-6). These program-specific characteristics are perfectly correlated with the location of the program (TNCC or NSHS San Diego) and therefore become part of the overall program differences.

The next set of slides will provide more detailed information on the methodology and data.

Methodology

- For each measure of success, we estimate the probability of an outcome as a function of:
  - Quality and demographic characteristics
  - Treatment group (TNCC vs. NSHS SD or Portsmouth)
  - Startup (first year of pilot vs. second year)
- Statistical significance is determined by the significance test on the treatment control
- We then predict the mean probability of an outcome at the treatment site and control site using the pooled population sample

For each of the selected measures of success, we want to measure the relative difference between success for the population at the TNCC MLT course (the treatment group) and the population, for example, at NSHS San Diego's MLT course (the control group).

Although one might assume random selection criteria for placing students in either the TNCC or NSHS San Diego MLT courses, there is always concern that the population of students attending each of these courses may systematically differ in ways (demographic or student quality characteristics) that might affect their performance and/or satisfaction with the course. Therefore, we want to control for the effects of these characteristics on any outcome measures that we use for our evaluation. To do this, we use a regression model that explicitly controls for differences in demographics and student quality between the treatment and control populations. This allows us to isolate the effect of attending the TNCC MLT course.

Using a multivariate logistic regression model, we estimate the probability of an outcome (such as attrition from course) as a function of the quality and demographic characteristics of the student and his/her peers, whether one was in the treatment or control group, and a startup variable (to distinguish any effects associated with the initiation of a new program—year one vs. year two).

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Whether a statistically significant difference in outcomes exists between the two populations is determined by a significance test on the coefficient estimate for the treatment group.

Using the results from the regression analysis, we are then able to predict how specific individuals (with their unique characteristics) would perform in either setting (the treatment or control environment). This allows us to estimate the mean probability of an outcome at TNCC and the appropriate control site using the pooled population sample.

In essence, this gives us the mean predicted outcome associated with sending the pooled population to TNCC vs. sending the same population to the control site (either NSHS San Diego or Portsmouth). See appendix A for a more detailed discussion of the methodology.

Methodology: Specific Regression Analysis Controls

- Individual student quality
  - AFQT
  - GPA at Hospital Corps School (entry skills training)
  - Force fill
  - Previous basic MLT training
  - College experiance
  - Status of prerequisites (math, science, no waiver)
  - Paygrade
- Peer characteristics, for example
  - Average student quality variables for one's class peers $((\Sigma_{i \text{ for } j} AFQT_i) - AFQT_i) / (n_j - 1)$ where i is enrollee in class j
- Demographics
  - Gender, age, and race/ethnicity
  - Marital status and number of children

What specific characteristics do we control for in our regression analysis? The exact controls used for each measure may vary, but in general we are attempting to control for the quality of each student, the quality of each student's peers, and individual demographics.

For our analysis, individual student quality can be captured with several measures. AFQT represents a general measure of student quality, whereas one's Hospital Corps School GPA is more representative of one's quality in the specific arena of health care. Whether a person was a "force fill," sent directly from Corps School to the MLT program rather than doing a minimum of one tour of duty as a general HM, would indicate his/her experience in the health care field and level of maturity. Another indication would be whether a person was previously trained as a basic MLT. We also have information regarding each MLT student's background with regard to previous college attendance, whether he/she has met the math and science prerequisites for the course, and the student's paygrade.

One's educational experience can be significantly influenced by the characteristics of one's peers. For this reason, we examined the effect of several peer characteristics on outcomes. Specifically, for each of the student quality measures, we calculated the average student quality for one's classmates.

Finally, we control for several demographic characteristics that might affect performance and/or satisfaction. These include gender, race/ethnicity, marital status, whether the student has children, whether family members reside with him/her, and whether the student lives in base housing.

Methodology: Data and Data Sources

- Data sources for quality and demographic controls
  - TNCC and NSHS SD enrollment data
  - TNCC, NSHS SD, and NSHS PTS end-of-course surveys
  - TNCC end-of-didactic-phase survey
  - Enlisted Master File
- Additional data sources include
  - Post-graduation telephone survey
    - Graduates and graduates' supervisors
    - Conducted at 4 and 12 months after graduation
  - Cost data from Navy schools and MED-51

Our analysis required that we collect data from several different sources. Data sources for quality and demographic controls came primarily from data collected at the schoolhouses. Both TNCC and NSHS San Diego's MLT programs provided us with enrollment data for each student, and graduates at TNCC, NSHS San Diego, and selected NSHS Portsmouth courses provided some demographic information via end-of-course surveys.[1] In addition, we matched each MLT student to the Enlisted Master File (EMF) and pulled comparable data.[2] The EMF data were used when student quality and demographic variables for a student were not available through another source (enrollment or survey data).

Additional data sources included post-graduation telephone surveys of graduates and their immediate lab supervisors. These surveys were conducted 4 months and 12 months after graduation and provided data regarding the graduate's satisfaction with the course (from the perspective of having now worked as an entry-level lab technician in a hospital or clinic setting) and the supervisor's satisfaction with the graduate's performance and military behavior.

Finally, cost data were collected from the individual schoolhouses and the Resource Division/Manpower Office for the Assistant Chief for Education, Training, and Personnel (MED-51).

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1. NSHS Portsmouth's X-ray and Pharmacy Technician courses were chosen to be control groups for measures of success dealing with student satisfaction with QOL. These courses were chosen based on course length, student load, and anticipated student characteristics.

2. MLT students were matched to EMF data for the quarter in which they started the course.

Measures of Success

The MLT working group identified and defined the measures of success listed above and outcomes associated with each. In some cases, there may be several outcomes associated with a single measure of success (for example, students were surveyed regarding their satisfaction with 16 different aspects of the MLT course and 15 aspects of military quality of life).

Having defined six broad measures of success, we have to ask the following questions: What if the pilot program does not achieve all of these goals? How will Navy Medicine determine the ultimate success of the program if some of the measures indicate success and others do not? Are some more important than others?

Navy Medicine decided that cost savings subject to *at least maintaining the same graduate quality as NSHS San Diego* should be considered the most important criterion for determining the success of the MLT pilot. The other criteria—student satisfaction with the program and QOL, militarization, and end-user satisfaction—should be used to signal the need for program changes and/or enhancements rather than to determine ultimate success or failure.

Measures of Success

Primary Measures

- Quality of product
  - TNCC has higher pass rate on national registry exam
    - 66% vs. 37% at control site
- Production success
  - TNCC attrition rates at least equivalent to control group (excluding set backs)
  - In some cases TNCC attrition much lower (including set backs, 10% vs. 29% at control site)
- Cost efficiency
  - TNCC cost per graduate is lower than control group
    - 6% lower, including NSHS overhead in model
    - 15% lower, excluding NSHS overhead from model

To determine whether the pilot achieved cost savings subject to *at least maintaining the same graduate quality as NSHS San Diego* requires looking at three separate criteria: quality of product, production success (which is used to determine cost per graduate), and cost efficiency. We refer to these as the "primary" measures of success for this evaluation.

Ultimately, we found that quality in terms of pass rate on a national MLT registry exam was significantly higher for TNCC graduates than for graduates from the in-house MLT program. In terms of production success, we found that the academic attrition rate was, at a minimum, no different from the attrition rate at NSHS San Diego; in some cases (if one included academic set backs as attrition), it was significantly lower.

Using predicted attrition rates to estimate the number of graduates at TNCC and NSHS San Diego, controlling for enrollee characteristics, we estimated the cost per graduate, excluding student salaries. We found that TNCC's per-graduate cost was 6% to 15% lower than that of NSHS San Diego. Therefore, the pilot did achieve cost savings while maintaining attrition and improving the quality of MLT graduates.

Secondary Measures

- Student satisfaction
  - Satisfaction with TNCC program equivalent or higher for all 16 measures
  - Satisfaction with QOL at TNCC equivalent or higher for 11 of 15 measures
- End-user satisfaction
  - No difference between programs observed 4 months after graduation
- Military bearing
  - No difference between programs

Although militarization, and student and end-user satisfaction, will not be used to determine the ultimate success or failure of the MLT pilot, they do reflect significant concerns of Navy Medicine. As stated previously, these "secondary" measures of success have been (throughout the course of the pilot) and should continue to be used to focus the contractor and Navy Medicine on areas for program improvements and/or enhancements.

We found that, for the most part, the TNCC program was successful at maintaining a level of student satisfaction with the program and with QOL equivalent to the satisfaction level of Navy students attending in-house training programs. In addition, we found that 4 months after graduation, graduates' immediate lab supervisors were just as satisfied with the knowledge, technical skills, military bearing, attitude, and overall performance of TNCC graduates as they were with MLT graduates from NSHS San Diego. We will continue to monitor supervisor and graduate satisfaction throughout the graduates' first 12 months as MLTs.

Starting with the next section, we will address each of these six measures of success in turn, discussing in detail the motivation, outcomes, and results of our analysis.

Quality of Product

- How do we measure the quality of TNCC MLT graduates?
- Pass rate on standardized ASCP exam
- Compare with NSHS San Diego pass rates
  - Historical pass rates are not relevant
- Although ASCP was the agreed-on measure for quality…
  - Not an explicit requirement/objective for the in-house program

Certainly, one of the most important criteria for a successful training program is the quality of the graduates it produces. Navy Medicine wants to ensure that the outsourcing of MLT training does not lead to a decline in the quality of its MLTs. There are several ways to measure the quality of the MLT graduates, but the working group concluded that the most objective measure of quality would be performance on the standardized American Society of Clinical Pathologists (ASCP) certification exam.[1]

For the duration of the pilot, Navy MLT graduates from both TNCC and NSHS San Diego took the ASCP exam immediately following graduation. To determine whether there are quality effects, we compare the pass/fail rates of the two programs.[2]

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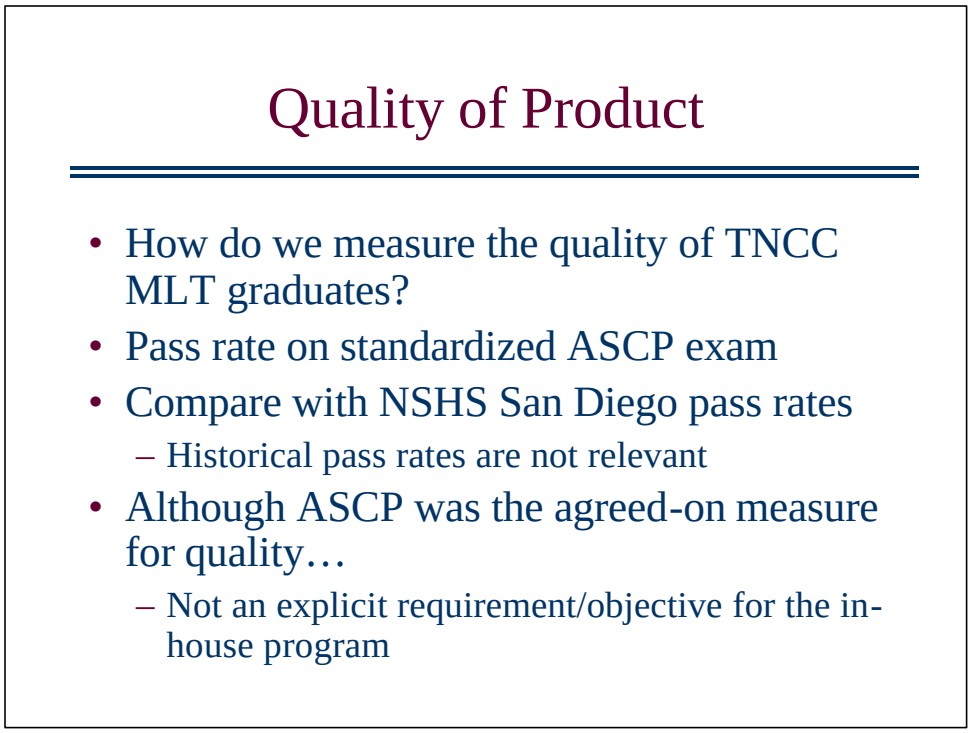
1. Although ASCP certification for civilian technicians is not required by individual states, the federal government, or the Clinical Lab Improvement Act (CLIA), it is fair to say that, in general, ASCP certification is the standard of practice in the civilian sector. For many civilian hospitals, particularly in states with no state licensure requirement, ASCP certification is a condition of employment.

   Some members of the MLT working group voiced concerns that, if a single test were used to quantify the quality of graduates, the schools might simply teach to that exam. The group ultimately decided that teaching to the ASCP exam should produce a competent technician and was perfectly acceptable.

2. The decision was made not to compare current pass rates with those from past Navy graduates. In the past, ASCP was not mandatory. Navy graduates could choose to take the test on their own. Those who chose to take the exam were more likely to be the MLT graduates who believed they had a relatively high chance of passing (a self-selected group).



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Even though members of the Navy's Medical Technologist community agreed that the ASCP was a valid measurement of quality for Navy MLTs, passage of the registry exam has never been stated as the requirement/ objective for the in-house program. Therefore, the NSHS SD curriculum has not been oriented to specifically address this goal—note that TNCC does include a prep and review for the ASCP exam.[3] But, it is our understanding that a comprehensive MLT course should provide the basic knowledge required to pass the ASCP exam.

3. Prep and review for the ASCP included retesting TNCC students at the end of each subject module or block (all course tests and review tests are modeled after the ASCP) and a final exit exam that serves as a mock ASCP. In addition, each TNCC student received the ASCP study guide and a review book at the end of the didactic phase (purchased by TNCC). Finally, at the end of the course, students participate in a review session that may include reviewing their old exams, reviewing material as requested, and having instructors available for question and answer sessions (this prep/review session has had no specific format; rather, it was adapted to the needs/desires of the students in each of the TNCC pilot courses). All prep and review is conducted within the allotted training time frame, and all costs are included within the current contract price.

Comparison of ASCP Pass Rates: NSHS San Diego and TNCC

- Population is MLT program graduates who have taken the ASCP exam
  - TNCC (n=135)
  - NSHS SD (n=121)
- Comparing populations, NSHS SD had:
  - More E-1s/E-2s (23% vs. 6%)
  - More force fills (60% vs. 35%)
  - More basic MLTs (7% vs. 3%)
  - Fewer women (24% vs. 36%)
- Predicted ASCP pass rate for pooled population
  - TNCC 66% NSHS SD 37% (statistically sig.)

The population of interest for this outcome measure is MLT graduates from the TNCC and NSHS SD program who have sat for the ASCP exam.[1] As part of the pilot, all Navy MLT graduates were expected to sit for the exam.[2]

When we compare the characteristics of graduates from the two programs, we find that NSHS SD had more graduates in junior paygrades (started the program as an E-1 or E-2). San Diego graduates were more likely to have come directly from Hospital Corps School (force fills). We also found that San Diego graduates were more likely to have previously been functioning in the fleet as a basic MLT and less likely to be female. Otherwise, there were no statistically significant differences between NSHS SD and TNCC graduates (such as AFQT, Corps School GPA, waivers and prerequisites, previous college, age, marital status, or children).[3]

Controlling for quality and demographic differences of graduates, we find that graduation from TNCC is associated with a higher pass rate on the ASCP exam (predicted TNCC pass rate is over 75% higher than NSHS SD).[4]

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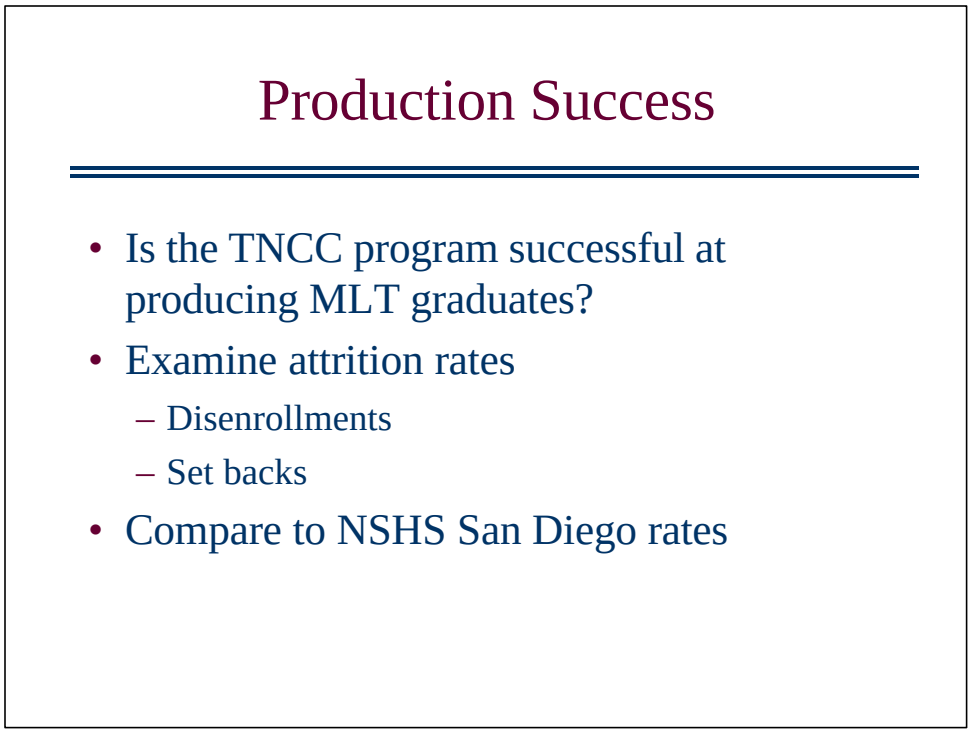
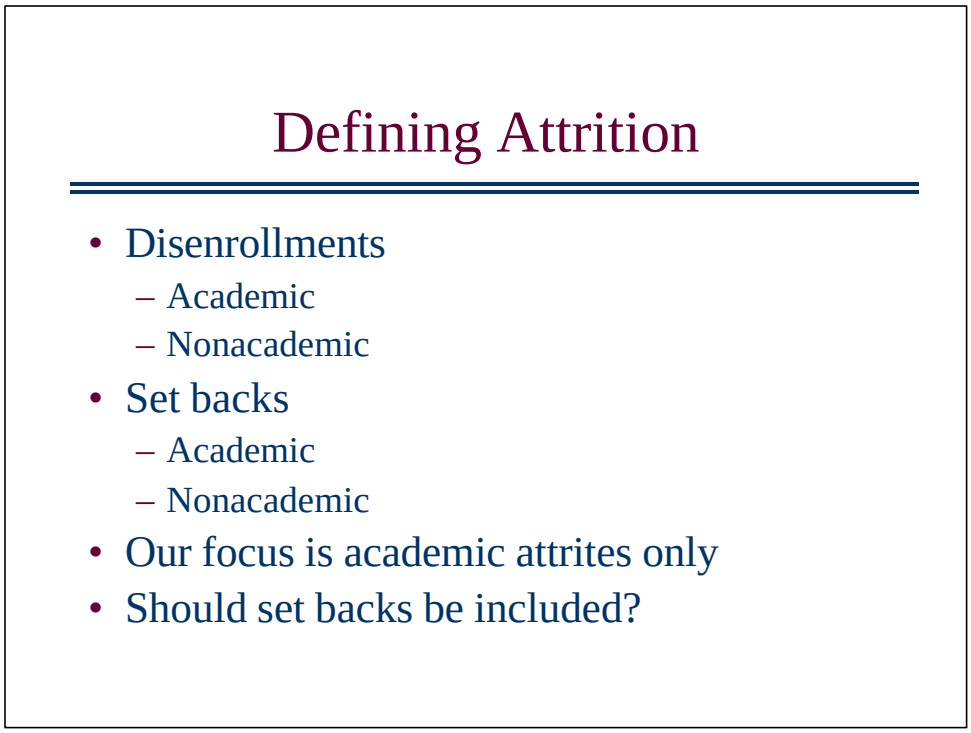
1. This includes graduates from MLT courses that fall within the time frame of the pilot evaluation period. See appendix B for a list of eligible courses. This list applies to all outcome measures discussed in this brief.
2. There were two instances in which graduates were not able to participate—one graduate each from the TNCC MLT program and the NSHS SD MLT program.
3. See appendix C for ASCP comparison population means and regression results.
4. Raw ASCP pass rates (using population means, not adjusted for demographic differences in student population characteristics) were 77% for TNCC and 31% for NSHS SD.



In evaluating the success of a training program, we must look not only at the quality of graduates but also at the program's ability to produce graduates. The program's standards may be very high and its graduates of the utmost quality; however, if the program attrites most of its students, is it a success?

We examined the amount and types of attrition from the TNCC program and compared those with attrition rates at NSHS San Diego. Attrition rates can give us insight into the training program's process for dealing with those students who fall behind academically because of problems with the course material and/or because of personal problems. Navy Medicine believes that its in-house programs are especially good at dealing with such problems. The concern was that, in outsourcing the training program, Navy Medicine would lose this capability.

Attrition rates can also have implications for the program's costs. Attrites increase the cost of producing MLT graduates, but providing all the resources necessary to *eliminate* the risk of academic attrition and/or set backs may lead to exorbitant program cost. We will examine cost issues later in the briefing.



Broadly defined, an attrite is any enrollee who did not successfully complete the MLT course (any nongraduate). Within this definition, there are:

• *Academic attrites*, those who fail to successfully complete the course because they are unable to perform at the required academic level

• *Nonacademic attrites*, those who fail to successfully complete the course for reasons other than academic performance, such as motivation, administrative, legal, medical, or personal issues.

For this analysis, we consider the occurrence of nonacademic attrites to be random (e.g., colorblindness, death, illness, personal and/or administrative matters that interfere with the person's ability to perform, drug/alcohol-related offenses, and motivational issues). Therefore, we evaluate TNCC's production success (or failure) by focusing only on the incidence of academic attrition relative to that of NSHS San Diego (again controlling for differences in student quality and demographics).

Another issue to consider is how to deal with academic set backs. Set backs occur, for example, when a person is struggling in the MLT class, but is judged to have the promise of successfully completing the course if he/she sits out the rest of the quarter (with significant remediation) and starts the next MLT class cycle from the beginning.[1] Set backs have been used extensively at SD, but TNCC has not had the option, making it hard to get a "pure comparable measure of attrition." As a result, we evaluate academic attrition both including and excluding set backs.

1. Other examples of how the set-back concept might be applied will be discussed later.

Incidence and Types of Attrition in Each MLT Program

		NSHS SD		TNCC	
Total Enrollments*:		**202**		**150**	
Set backs:	Academic	42	21%	0	-
	Medical	0	-	0	-
	Other nonacademic	1	0.5%	0	-
Disenrollments:	Academic	22	11%	10	7%
	Medical	6	3%	3	2%
	Other nonacademic	9	4%	1	1%
Unique Enrollments:**		**159**		**150**	
Disenrollments:	Academic	22	14%	10	7%
	Medical	6	4%	3	2%
	Other nonacademic	9	6%	1	1%

* Set backs are counted as two separate enrollments (initial enrollment and secondary enrollment in subsequent course).
** Set backs are counted only once.

We begin by looking at the incidence and types of attrition that occurred in each of the MLT programs.

In the table above, we show attrition rates (by type of attrition)[1] for the population of total enrollees (this includes set backs as attrites, for SD n=202) and for the population of unique students (this excludes set backs from the population, for SD n=159).[2]

In the next set of slides, we will compare attrition rates of the two programs, controlling for individual student quality and demographic characteristics.

1. "Other nonacademic" attrites include those classified as (a) personal and/or family emergencies and (b) motivational, attitude, and misconduct. Of SD's nine other nonacademic disenrollments (DEs), one was personal and eight were motivational, attitude, or misconduct. For TNCC, the one other nonacademic DE was classified as attitude/misconduct.

2. The population for TNCC (n=150) is the same whether we use "total enrollment" or "unique students" because TNCC was not able to use the set-back concept and therefore had no set backs.

Comparison of Academic Attrition Rates: NSHS San Diego and TNCC

- Population is MLT program enrollees, excluding nonacademic attrites (nonacademic attrition rate 6%)
  - TNCC (n=146)
  - NSHS SD (n=186)
- Comparing makeup of two classes
  - NSHS SD enrollees had:
    - Lower Hospital Corps School GPAs (86.4 vs. 87.9)
    - More enrollees missing prerequisites (10% vs. 3%)
    - More force fills (64% vs. 38%)
    - More E-1s/E-2s (30% vs. 10%)
    - More E-6s (3% vs. 1%)
    - Fewer females (20% vs. 36%)

If we are to include set backs as academic attrites, we start with the population of all enrollments to either the NSHS SD or TNCC MLT programs (anyone who starts a course), excluding nonacademic attrites.[1] Again, we exclude nonacademic attrites because we consider these cases to be purely random. It is merely coincidence that a colorblind HM was enrolled in SD's program rather than TNCC (colorblindness is an automatic disqualification for an MLT). The nonacademic attrition rate for the pooled population of enrollees was 6% (16 at NSHS SD and 4 at TNCC). This leaves us with an enrollee population of 332.

Of the 332 enrollees, 146 are TNCC program enrollees and 186 are NSHS SD enrollees. The programs had 10 and 64 academic attrites, respectively. NSHS SD's academic attrites were split between set backs and disenrollments (42 set backs, 22 disenrollments).

Comparing this population of enrollees at each of the two programs, we find that NSHS SD had fewer female enrollees. Other differences were in student quality: SD enrollees had lower Corps School GPAs and were more likely to be junior paygrade and to have come directly from Corps School.[2]

1. The measure "all enrollments" counts set backs twice. Even though the set back represents one unique student in the program, that student is enrolled in two MLT courses before completion of the program (the original course from which he/she is set back and the next available course from which he/she will ultimately pass or fail).
2. See appendix D for academic attrition comparison population means and regression results.

Comparison of Academic Attrition Rates: Results

- Attrition (*including* set backs for SD)
  - Predicted rate for pooled population
    TNCC 10% NSHS SD 29% (statistically sig.)
- Attrition (*excluding* set backs for SD (n=40))
  - TNCC (n=146)
  - NSHS SD (n=144)
  - Comparing characteristics across two classes, GPA differential disappears
  - Controlling for individual characteristics, we find no statistically significant difference

Including set backs in our definition of attrition, we find that, controlling for enrollees' demographic and quality characteristics, enrollment in TNCC is associated with a lower attrition rate. Using regression results to predict attrition associated with sending the pooled population to each of the programs, we estimate the attrition rate to be nearly 3 times as high for NSHS SD as for TNCC (29% academic attrition vs. 10%).[1]

There are problems with including set backs in our model. By doing so, we are counting certain enrollees at San Diego twice—once for their initial enrollment in an MLT course, then as a second observation when they are dropped from that course (as a set back) and are enrolled in the next available MLT course. To accurately deal with this phenomenon, one would want to control for the simultaneity associated with the decision to set back a student and the final outcome of that student in the MLT program (did he/she ultimately pass or fail the course?). This can be done using a bivariate probit model. Unfortunately, because of the limitations of our data (in terms of observations, lack of set backs at TNCC, and limited variables necessary for model identification), bivariate probit analysis was not feasible.

An alternative is to eliminate set backs from our definition of academic attrition and eliminate these observations from the population of interest. Thus, (continued)

1. If we were to consider only those nonacademic attrites classified as medical or family/personal emergency to be random (treating motivational, attitude, or misconduct attrites as nonrandom events), the estimated attrition rates for the pooled population at NSHS SD and TNCC are 32% vs. 11%, respectively.

Comparison of Academic Attrition Rates: Results

- Attrition (*including* set backs for SD)
  - Predicted rate for pooled population
    TNCC 10% NSHS SD 29% (statistically sig.)
- Attrition (*excluding* set backs for SD (n=40))
  - TNCC (n=146)
  - NSHS SD (n=144)
  - Comparing characteristics across two classes, GPA differential disappears
  - Controlling for individual characteristics, we find no statistically significant difference

(continued)

the population becomes the unique number of students in each of the programs (minus nonacademic attrition).[1] Given this definition, we find a total of 290 unique enrollees: 146 at TNCC (unchanged because they do not have set backs) and 144 at NSHS SD. And, the programs academically attrited (or disenrolled) 10 and 22 enrollees, respectively.

Comparison of the individual characteristics of this population of unique enrollees by program indicates that NSHS SD has more junior paygrade enrollees who were less likely to have met prerequisites, and fewer women, but its enrollee population no longer has statistically lower Corps School GPAs.

Using this definition of academic attrition, excluding set backs, we find no statistically significant difference in academic attrition rates between the two MLT programs (controlling for demographic and student quality characteristics).[2]

Although this alternative of excluding set backs allows us to deal with limitations in the data and pilot design, it does overlook the costly impact of using the set-back concept, especially using it to such a large extent. We will look more closely at the impact of set backs in the next slide.

1. The measure know as "unique number of students" counts set backs only once, even though the set-back student was ultimately enrolled in two separate MLT courses.
2. Treating motivational, attitude, and misconduct attrites as nonrandom events, we still find no significant difference in attrition (excluding SBs).

Exploring the Set-Back Concept: Impact on Production

- Significantly reduces the throughput
  - 202 NSHS MLT course enrollees, but 159 unique individuals
- Probability of graduating is lower for set backs than all other SD enrollees
  - 60% vs. 96% (not controlling for population differences)
  - If graduate, probability of passing ASCP is lower
- In this case, using the set-back concept may not have had any impact on the number of graduates

The typical observer would look at NSHS statistics for the duration of the pilot and conclude that the program's throughput was 202 enrollees (compared to TNCC's 150). Although NSHS certainly had the capacity and ability to enroll 202 students in its MLT program, its true throughput was only 159 unique students. This is because over one-fourth of its enrollee population (43 of 202) was set back, or given an opportunity to repeat the course.

How successful is the set-back concept? Excluding nonacademic disenrollments, if we separate NSHS San Diego's unique enrollee population into those who were set back and reenrolled in a class, and those who were never set back (43 and 101, respectively), we find that the probability of set backs eventually graduating from the SD program is significantly lower than for those not set back. Of those who do graduate, their probability of passing the ASCP is lower than for non-set-back graduates (16% vs. 38%).

If NSHS SD had not used the set-back concept, instead disenrolling these 43 students and admitting 43 new enrollees, we could expect this new population of 43 students to have a graduation rate of 61% vs. 60% (assuming that, on average, the new enrollees would have the same characteristics as the original 159 enrollees and attrition rates were constant).[1] In this example, this leads to an increase of .22 of a graduate, or basically no difference.

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1. Of the 159 enrollees, 15 were nonacademic disenrollments (9%). This leaves 144 enrollees, of which 123 graduated (97 of the 101 not set back, 26 of the 43 set back). If the 43 set backs had been disenrolled, the average graduation rate would have been 97/144 = 67%. Applying this graduation rate to a new set of 43 enrollees (minus average nonacademic attrites) yields [43 * (1-.09)] * .67 = 26.22, which is a negligible difference.

Exploring the Set-Back Concept: Impact on Cost

- Three categories of set backs
  - Academic short-term (within first 3 months)
  - Academic long-term (sometime after first 3 months)
  - Nonacademic (personal, medical, administrative)
- Each increases cost of training (adds minimum of 3 months to total training time)
  - Whether a set back eventually completes course (graduates) or fails course
  - 100 days of training time translates to $10,740 in programming rate
  - Additional programming rate cost for 43 set backs = $461,808 (or $3,785 per graduate)

Even though there does not appear to be a difference in the total number of graduates regardless of whether SD used the set-back concept, there is a cost to doing so.

It appears that set backs fall into three categories: (1) students who have trouble from the beginning and are almost immediately set back, (2) those who may successfully complete a portion of the course but may need to repeat a section of material that is covered later in the year, and (3) nonacademic set backs (for personal, medical, or administrative reasons). In most of these cases, setting the student back adds 3 to 4 months to the total training time because they typically start matriculating in the next available class (classes start every 3 to 4 months).[1] Considering a programming rate of $39,200 for each enlisted training billet, 3 months of additional training time adds approximately $10,740 to the total training cost for the student (whether or not he/she ultimately graduates from the course).[2]

Therefore, using the set-back concept may not have negatively affected NSHS SD's MLT outcome (in terms of total graduates for the pilot phase), but it did increase student training costs by an estimated 43*$10,740 = $461,808 (or approximately $3,785 per graduate).

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1. In one case, a student was set back for 6 months. Based on NITRAS data, we found that the average NSHS SD set back (during the pilot study) increased training time by 100 days.
2. For programming rate (the per-enlisted-billet dollar amount that DHP pays to the Navy in the year of execution), we used an average of 2000 and 2001 enlisted programming rates (including PCS, which DHP also pays per billet). Programming rate was provided by N931, based on 1998 and 1999 POMs, respectively.

Exploring the Set-Back Concept: More Limited Application

- Of NSHS SD's 43 set backs
  - 38 were academic short-term (graduate rate 58%)
  - 4 were academic long-term (graduate rate 100%)
  - 1 was nonacademic (graduate rate 100%)
- If NSHS SD used the set-back concept for academic long-term and nonacademic only
  - Unique enrollment would be 197 vs. 159
  - Estimated graduates = 127 (assumes consistency in population characteristics and attrition rates)
  - Additional programming rate cost for 5 set backs = $53,698 (or $423 per graduate)

What if SD had used set backs more judiciously? In the previous slide, we described three categories of set backs: short-term academic, long-term academic, and nonacademic. Looking at each of these, we find that NSHS SD had 38, 4, and 1, respectively. These are small numbers, but the graduation rates associated with each category show that long-term academic and nonacademic set backs appear to be more successful than short-term academic set backs. This is not surprising because short-term academic set backs (those set back within the first 3 months of the course) are less likely to have shown any academic success, whereas long-term academic and nonacademic set backs have probably indicated some academic success or they would have been set back earlier.

So, what if NSHS SD had used a more limited set-back concept, say only for late set backs (those who had been at least partially successful) and nonacademic set backs? Again, assuming consistency in the student population and constant attrition rates, we estimate that this could have increased graduates from 123 to 127.[1] Under this scenario, SD set backs would have increased costs by only $53,698 (or approximately $423 per graduate).[2]

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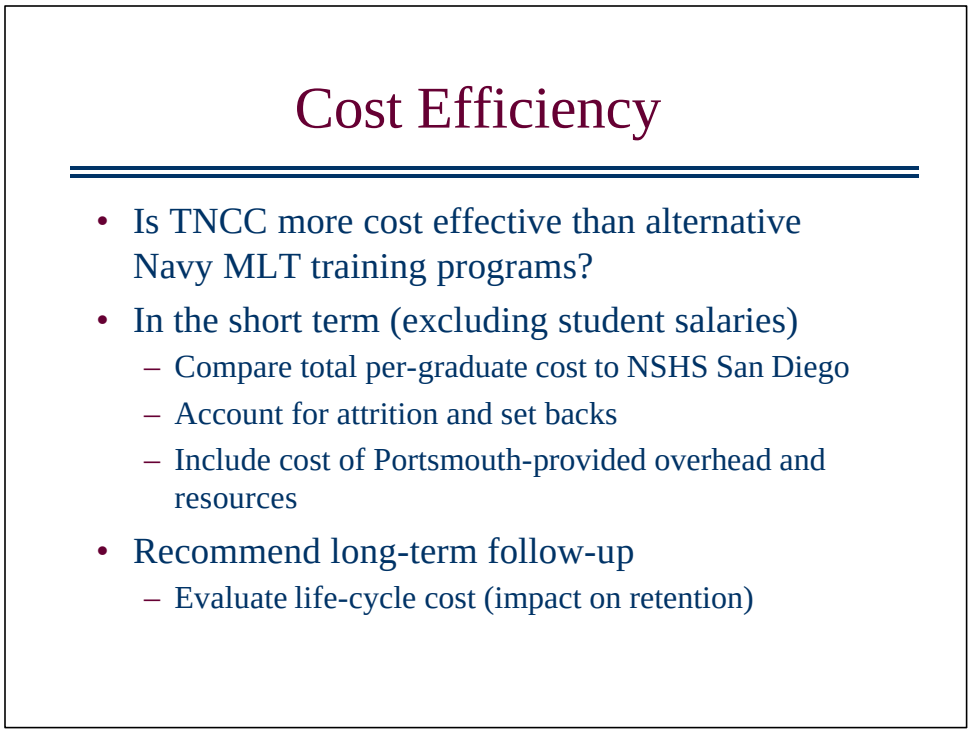
1. If the 38 short-term academic set backs had been disenrolled, the average graduation rate would have been 102/144 = 71%. Applying this graduation rate to a new set of 38 enrollees (minus average nonacademic attrites) yields [38 * (1-.09)] * .71 = 24.55. Adding this to the 102 graduates yields 126.55 total graduates.
2. Cost is calculated as 5 set backs multiplied by 0.274 (or 100 days / 365) of the 2000-2001 average enlisted program rate or $10,740 per SB (0.0274 x $39,200). This total cost of $53,698 is divided by 127 graduates to obtain the per-graduate increase ($53,698 / 127 = $423).



Next, we turn to cost efficiency. Navy Medicine is continuously under pressure to control costs. In fact, cost containment/reduction was the initial motivation for looking at outsourcing options. Therefore, we must ask whether outsourcing MLT training leads to higher or lower overall training cost.

To answer this question in the short term, we compared the total *per-graduate* cost of TNCC and NSHS San Diego MLT programs, excluding student salaries. By looking at cost per graduate rather than total program costs or cost per student, we account for the additional costs associated with attrition. We also include NSHS Portsmouth's provided overhead and resource costs (base operating support, academic and administrative overhead, instructors, and transportation) to the TNCC program.

While the pilot time frame did not allow for it, we recommend evaluating cost efficiency over the long term because there may be long-run cost implications of the TNCC program. Keep in mind that the amortized cost of Navy training goes up or down depending on how many years a trained MLT remains in the Navy. If TNCC's MLT graduates tend to have lower retention than NSHS MLT graduates, the Navy has fewer years to recoup its training investment, increasing the life-cycle cost for TNCC grads. Navy Medicine should commit to following graduates from this pilot program throughout their careers, at least through their first retention decision point.

Method for Comparing Short-Run Costs: NSHS San Diego and TNCC

- Using predicted attrition rates (controlling for enrollee characteristics), we estimate the number of graduates for each program to be:

  *(enrollees – nonacad. attrites) * (1 – predicted acad. attrition rate)*

- Actual cost data were collected from NSHS PTS, NSHS SD, and MED-51
  - Course-specific (AD instructors, classroom expenses, tuition and incentive fee, transportation, TAD/training)
  - Activity-specific (academic and administrative support, G&A, BOS)

When comparing the short-run cost per graduate across programs, we estimated the number of graduates for each program using the predicted attrition rates. This methodology controls for differences in enrollee characteristics (demographics and student quality) that may have existed between the two programs' enrollee populations.

To estimate graduates, we start with the actual number of enrollees in each program (for the total duration of the pilot time frame). We exclude non-academic attrites from each program's enrollee population.[1] Then using each program's predicted academic attrition rate, we estimated the total number of graduates for NSHS San Diego and TNCC.[2]

For program cost, we collect actual cost data from each of the schoolhouses and MED-51. The cost data include MLT course-specific costs (such as AD course instructors, books, lab supplies, tuition, transportation) and activity, or schoolhouse-specific, costs (such as NSHS overhead). For more details on the cost calculations, see appendix E.

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1. Nonacademic attrites are considered to be random (nonacademic attrites for NSHS SD were six medical and nine other (one personal and eight attitude/misconduct); for TNCC, three medical and one other (attitude/misconduct)). See slide on page 23.

2. Recall that the predicted academic attrition rate for each program is calculated using the regression results from the attrition model discussed previously. These rates represent the mean predicted outcome associated with sending the pooled population to TNCC vs. sending exactly the same population to NSHS San Diego.

Comparison of Short-Run Costs: NSHS San Diego and TNCC

- Estimate that TNCC cost per graduate is 6% less than NSHS SD
  - Controlling for enrollee demographic and student quality
  - Excluding student salary (set backs are more costly)
  - Including both course and activity specific costs
- 15% less for course-specific costs
  - $10,285 vs. $12,126
- 5% *more* for activity-specific (NSHS support) cost
  - $11,361 vs. $10,858
  - Contracting institution has no control
- Total TNCC program savings (for estimated 132 graduates) is $176,500 to $243,800

Our estimates indicate that the per-graduate cost for TNCC is 6% less than the per-graduate cost for the Navy's in-house MLT program. Again, our estimates control for attrition differences between the programs due to variation in enrollee demographics and student quality. Also, recall that these estimates do not include student salary, the most expensive portion of training costs for the MLT program.[1] Based on NSHS SD's extensive use of set back, and how set backs affect training cost in terms of increased student salary, we would expect to see this difference in training cost increase significantly.

Finally, these estimates include both course-specific costs (those associated only with the MLT course, such as MLT instructors, tuition, books, transportation) as well as activity-specific costs (those associated with the naval schoolhouses' administration and overhead). To adequately evaluate the TNCC program, we think it is important to separate these two types of costs because the contractor has no control over NSHS overhead.

In fact, when we look at differences in course-specific costs only, TNCC's per-graduate cost advantage rises from 6% to 15% over NSHS San Diego's MLT program. This is because NSHS San Diego has a cost advantage over NSHS Portsmouth when it comes to activity-specific costs.

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1. For example, the total cost to train an MLT at NSHS SD (excluding student salary) is estimated to be $23,162. For this program (which runs 369 days), the student salary in terms of the programming rate is about $39,630 (that is $39,000 * (369/365)), assuming a 100% graduation rate. The student salary per graduate increases as (a) the rate of attrition increases, and (b) as we showed earlier, as the number of set backs increases.

Student Satisfaction

- Examine and compare student's satisfaction with:
  - Individual courses and the program as a whole (TNCC and NSHS San Diego)
  - Quality of life (TNCC and NSHS Portsmouth)
- Measure satisfaction via standardized surveys given at TNCC and the appropriate control site
- Conduct post-graduation survey
  - Did program adequately prepare you for your current job? (TNCC and NSHS San Diego graduates)

In addition to cost and the ability to produce quality graduates, BUMED is determined that a successful program should not lead to lower student satisfaction with the individual courses, the program as a whole, or quality of life while attending C-school. Although the program's failure in any of these areas would not signal an overall failure of the TNCC pilot, it would indicate areas for concentration and improvement in the future.

For our evaluation, student satisfaction was measured at TNCC and control sites using several surveys. Throughout the program, students were asked to evaluate their courses (didactic and clinical), their instructors, access to instructors, and other quality-of-life (QOL) issues (transportation, sick call, PRT, messing, housing/berthing, and military support and requirements available for advancement, career counseling, leave, etc.).

The program's graduates have also had a chance to express their level of satisfaction with the training program once they have had the opportunity to apply their new skills and knowledge at their first duty station. The post-graduation survey (given 4 and 12 months after graduation) asks graduates if they felt as though the training program adequately prepared them for working in the lab (thorough knowledge of theory and technical applications).

As mentioned before, TNCC students' satisfaction with the courses/program was compared with MLT students' satisfaction at NSHS San Diego. TNCC students' satisfaction with QOL was compared with the satisfaction of students attending other courses of similar duration at NSHS Portsmouth (advanced X-ray and Pharmacy Technician C-schools).

Satisfaction with MLT Program: NSHS San Diego and TNCC

- Population is MLT graduates who completed end-of-course survey
  - TNCC (n=125) NSHS SD (n=109)
- Characteristics of students completing the courses are very similar
  - NSHS SD grads are more junior and less likely to be female
- Students were asked, "how satisfied are you with…"
  - Textbooks, equipment, computer and library resources, etc.
  - Instructors and program oversight
  - Classroom environment
  - Program's assistance in preparing you for clinical rotations, to be an MLT, to take registry exam, to get a degree

We begin by looking at the students' satisfaction with the MLT programs. The population of interest is all Navy and TNCC graduates who completed end-of-course surveys (within the pilot time frame). Of the 258 total graduates, 234 responded to the survey.[1]

Student quality and demographic characteristics for graduates from the two programs were fairly similar, with the exception of paygrade and gender. NSHS San Diego graduates were more likely to have started the program as an E-1 or E-2 (47% vs. 29%) and less likely to be female (27% vs. 40%).

In the end-of-course survey, students were asked to rank their satisfaction level with several aspects of the program resources, the instructors and instructor oversight, the classroom environment, and the program's assistance in preparing the student for clinical rotations, to take the ASCP exam to get a degree, and ultimately to be an MLT.[2]

Controlling for population characteristics, we compared whether a student indicated that he/she was satisfied.

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1. The overall response rate for the end-of-course survey (administered by the respective MLT programs) was 91% (slightly higher for TNCC than NSHS SD—92% vs. 89%).

2. Students were asked to rank their satisfaction on a 5-point scale (1=very satisfied, 2=somewhat satisfied, 3=neither satisfied or dissatisfied, 4=somewhat dissatisfied, 5=very dissatisfied). We collapsed responses into a dichotomous indicator variable. This variable was set equal to 1 to indicate a response of somewhat or very satisfied, or to 0 to indicate a response of neither satisfied nor dissatisfied, to very dissatisfied.

Student Satisfaction

Satisfaction with MLT Program

(Statistically Significant Differences)

Satisfaction with	Percent satisfied TNCC	NSHS SD
- Classroom instruction	**92%**	77%
- Instructors' ability	**89%**	78%
- Instructors' preparation	**91%**	67%
- Monitoring of instructors	**83%**	61%
- Preparation for clinical	**82%**	65%
- Preparation for ASCP exam	**72%**	53%
- MLT program overall	**91%**	62%

For 7 of the 16 survey questions dealing with various aspects of the MLT programs, we found that attendance at TNCC was associated with higher rates of satisfaction among graduates (statistically significant controlling for student quality and demographics). These 7 areas are listed above, as are the predicted satisfaction rates associated with sending the pooled MLT graduate population to TNCC versus NSHS San Diego.[1]

Many of these areas deal with the quality of instruction, which is not surprising because this is an area in which we might expect the community college to have an advantage. While the in-house programs rely on fully trained Navy MLTs to teach the course, the college has access to professors that specialize in each of the MLT course modules (biologist, chemist, mathematician, etc.). One might expect this breadth of expertise to lead to a more comprehensive and/or stimulating learning environment.

1. See appendix F for student satisfaction with program comparison population means and regression results.

Satisfaction with MLT Program

(No Statistically Significant Differences)

Satisfaction with	Percent satisfied TNCC	Percent satisfied NSHS SD
- Classroom discipline	no difference	
- Fellow student's interest	no difference	
- Access to instructors	no difference	
- Instruction of clinical rotation	no difference	
- Quality of equipment	no difference	
- Quality of texts	no difference	
- Access to computer lab	no difference	
- Prep to be entry-level MLT	no difference	
- Prep to receive associate degree	no difference	

Although we found no cases in which satisfaction with the program was statistically significantly lower for TNCC graduates, we felt it was important to look at those aspects of the program for which there was no estimated difference in satisfaction among the programs' graduates.

On one hand, consider classroom discipline and access to instructors. Because the in-house programs are considered to be so strong in these areas, there was a great deal of concern whether outsourced training could match them. At least from the graduate's perspective, there appeared to be little difference between the programs, or at least not enough to affect satisfaction.[1]

On the other hand, one might have expected TNCC to have been better at preparing the graduate to receive an associate degree. Again, from the graduate's perspective, there was no difference between the programs.

1. Only graduates were surveyed. One might conjecture that, if all enrollees had been surveyed, the findings might be different (for example, if all those for whom discipline and lack of access to instructors was an issue failed to successfully complete the program and therefore were not surveyed). But, recall that attrition rates at TNCC were either less than or equal to NSHS San Diego's (depending on the measure used).

Student Satisfaction with MLT Program: Post-Graduation

- Would graduates' impression of the program change once they had the opportunity to apply what they had learned?
- MLT graduates who completed 4-month post-graduation survey
  - TNCC (n=130) NSHS SD (n=109)
- Characteristics are very similar among graduates
  - NSHS SD had more graduates who started the program as E-1 to E-3 (60% vs. 28%) and fewer females (23% vs. 38%)

Whereas the end-of-course survey looked at student satisfaction with the program at the point of graduation, the post-graduation survey was designed to measure a graduate's satisfaction with how well the MLT program prepared him/her with the knowledge of theory and principles and the ability to apply that knowledge (technical skill in the lab) as an MLT at his/her first duty station.

The surveys were conducted at two points in time, 4 months and 12 months after graduation. The surveys were administered by telephone to Navy graduates from both TNCC and NSHS San Diego.[1] To date, we have completed the 4-month survey for all MLT graduates. The response rate for this survey was 93% (96% for TNCC and 89% for NSHS San Diego graduates). The 12-month post-graduation surveys will not be completed until September 2002, but we do have interim results based on completed 12-month surveys for 8 of the 10 MLT classes in the pilot.

Focusing on graduates who responded to the 4-month survey, we again see that the only characteristics for which we find statistically significant differences between the two populations (TNCC and NSHS San Diego) are gender (TNCC has more female graduates) and paygrade (TNCC has fewer graduates who began the program as E-1s, E-2s, or E-3s).[2]

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1. Historically, NSHS San Diego and NSHS Bethesda surveyed MLT graduates at their first duty station. These mail-out surveys yielded a poor response rate. To maximize participation during the pilot, we recommended conducting the post-graduation surveys (both a graduate and supervisor version) via telephone.
2. See appendix H for population means and regression results associated with the post-graduation graduate survey .

Comparing Satisfaction with Program Post-Graduation

- At 4 months after graduation, we find no statistically significant difference in graduates' satisfaction with program prep for current job
- Interim findings for 12 months after graduation indicate
  - Higher satisfaction levels associated with graduation from TNCC (statistically significant differences for predicted satisfaction rates for pooled population)
    - Knowledge of theory - TNCC 68% NSHS SD 50%
    - Technical application - TNCC 71% NSHS SD 53%

At 4 months after graduation, we find no statistically significant differences in the graduates' satisfaction with the program (in terms of providing the knowledge of theory and principles and the technical skill required to work in the lab).

Looking at interim findings for the 12-month post-graduation survey, we do find evidence of higher rates of satisfaction associated with graduation from TNCC. Shown above are the predicted satisfaction rates associated with having sent the pooled sample of survey respondents to TNCC versus sending them to NSHS SD.

Satisfaction with QOL: NSHS Portsmouth and TNCC

- Population is:
  - TNCC MLT graduates who completed the end-of-didactic phase survey (n=136)
  - NSHS Portsmouth X-ray and Pharmacy Tech graduates who completed end-of-course surveys (n=261)
- TNCC graduates were more likely
  - To be female (39% vs. 29%)
  - To live off base (56% vs. 41%)
  - Otherwise demographically similar to X-ray and Pharmacy
- We asked,"how satisfied are you with…"
  - Access to services, logistics, support to meet military and personal requirements

We now shift to the students' satisfaction with quality of life (QOL). It was determined early on that, in terms of QOL, the goal for the pilot program was that QOL satisfaction be no less than for Navy students attending training at NSHS Portsmouth. Therefore, the control group for QOL was graduates from NSHS Portsmouth's X-ray Technician and Pharmacy Technician C-schools.

The specific concern with regard to QOL was this: during the time that Navy MLT students were attending courses on the TNCC campus (the 6-month didactic phase), would they be able to maintain the same QOL standards as those students who attended courses on base at the NSHS Portsmouth? TNCC students were surveyed at the end of their didactic phase. Because the control group was surveyed only at the end of the course (capturing graduates only), we limited the TNCC sample to graduates.[1]

Population characteristics for the QOL analysis were limited to demographics (gender, paygrade, marital status, children, whether family accompanied student on training tour, and whether one lived on or off base). Compared to NSHS Portsmouth graduates, TNCC graduates were more likely to be female and to have lived off base.

The QOL portion of the survey asked students to rank their satisfaction with access to services, logistics, and support necessary to meet both military and personal requirements while a student.[2]

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1. Fourteen TNCC surveys were deleted from the QOL analysis because of this criterion.
2. Again, satisfaction rankings were based on a 5-point scale and collapsed to a dichotomous variable (1=somewhat to very satisfied, 0=neither satisfied or dissatisfied to very dissatisfied).

Satisfaction with QOL

(Statistically Significant Differences)

Satisfaction with	Percent satisfied TNCC	NSHS PTS
- Your Welcome Aboard packet	**63%**	39%
- Student lounge	**73%**	56%
- Your locker	**89%**	80%
- Access to adequate meals	**74%**	48%
- Group PT sessions	**58%**	39%
- Quantity and quality of study sessions	40%	**75%**
- Time to handle personal matters	55%	**70%**
- Uniform and civilian attire policy	62%	**77%**
- Opportunity to pursue advancement	39%	**58%**

Of the 15 QOL questions asked on the survey, we found statistically significant differences in the rate of satisfaction for 9 QOL areas (controlling for demographic characteristics). For some, attendance at TNCC was associated with higher rates of satisfaction; for others, TNCC was associated with lower satisfaction rates. The predicted rates of satisfaction associated with having sent the pooled sample to TNCC versus sending them to NSHS SD are shown above.[1]

Though it is not surprising or concerning that TNCC students might be more dissatisfied with the civilian attire policy (given that they attend classes on a civilian campus), what is more concerning is lower satisfaction with regard to:

- Time to handle personal matters, and
- Opportunity to pursue advancement.

Time is an issue for the TNCC MLT students because the program is very challenging and time intensive, and they do spend most of their first 6 months away from the base and base resources. These measures should be watched for future rounds of TNCC students, and TNCC graduates from the pilot phase should be followed to see if there is any negative impact on their rate of advancement.

1. See appendix G for student QOL satisfaction comparison population means and regression results.

Student Satisfaction

Satisfaction with QOL

(No Statistically Significant Differences)

Satisfaction with	Percent satisfied TNCC	NSHS PTS
- Commute	no difference	
- Access to health care	no difference	
- Access to OTC medications	no difference	
- Orientation to TNCC or NSHS	no difference	
- The handling of your pay, etc.	no difference	
- Help overall in meeting your needs	no difference	

As with program satisfaction, we felt it was also important to look at those aspects of QOL for which there was no estimated difference in satisfaction among TNCC and NSHS Portsmouth graduates.

There was no statistically significant difference in satisfaction rates with regard to one's commute, access to health care, access to over-the-counter (OTC) medications, and handling of pay. Again, these were areas that Navy Medicine was especially concerned with, but they do not appear to have been a problem with outsourcing training to a civilian off-base institution.

End-User Satisfaction

- How well do TNCC MLT graduates perform in their jobs?
- Compare supervisor ranking/evaluation of graduates' performance to NSHS graduates
  - Technical skills and knowledge
  - Performance relative to peers
  - Survey of supervisors of NSHS San Diego and TNCC graduates at first duty station (4 and 12 months after graduation)

Next, we look at end-user satisfaction. Navy Medicine did not want to lose sight of one of its major goals for the training program—to provide high-quality Navy MLTs to its hospital, clinic, and deployable platform laboratories (considered the end-user of the training product). We have already looked at one measure of quality (i.e., pass rates on ASCP). Another way to measure the quality of MLT graduates is to look at the satisfaction of the end users with the program's graduates. We measured this using a post-graduation survey of the graduates' immediate supervisors for their first MLT tour of duty. The survey was designed to measure a supervisor's satisfaction with the graduate's knowledge of theory and principles and his/her ability to apply that knowledge (technical skill in the lab). In addition, supervisors were asked to rank the graduate's performance in the lab, relative to his/her peers.[1]

The survey was administered 4 and 12 months following graduation. The thought was that the first survey would measure how well the program prepared the graduates for working in the lab. If there appeared to be problems at that point, the second survey would help to determine whether they were resolved after a full year on the job or if performance differences continued to persist.

The surveys were administered by telephone to the immediate laboratory supervisors of Navy graduates from both TNCC and NSHS San Diego.

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1. Supervisors were asked to rank the graduates on 5-point scale (1=well above satisfactory, 2=above satisfactory, 3=satisfactory, 4=below satisfactory, 5=well below satisfactory). We collapsed responses into a dichotomous indicator variable (1=above to well above satisfactory, 0=satisfactory to well below satisfactory).

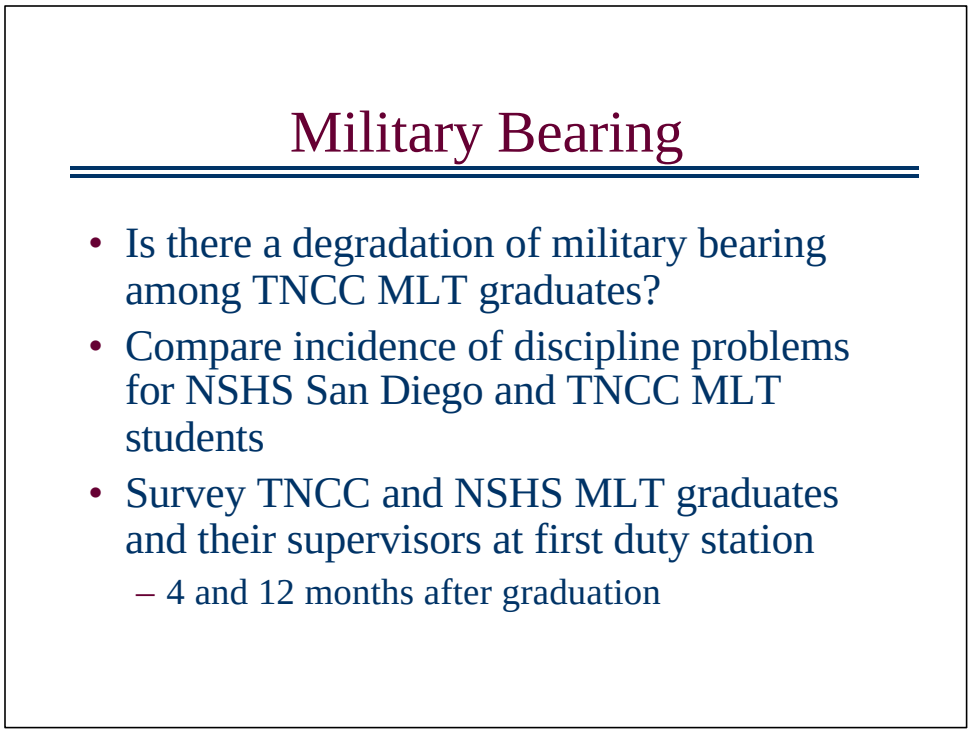
Comparing Supervisor Satisfaction: NSHS San Diego and TNCC

- Population is MLT program graduates (with a completed 4-month post-graduation supervisor survey)
  - TNCC (n=134)
  - NSHS SD (n=112)
- Characteristics are very similar among graduates
  - TNCC had more female graduates (39% vs. 24%)
- Predicted supervisor satisfaction rates for pooled population show no statistically significant differences at 4 months after graduation
  - Looking only for above satisfactory to well above
- Still no statistically significant differences at 12 months after graduation

We focus primarily on the 4-month post-graduation survey of supervisors (because the 12-month survey has not been completed). We were able to successfully survey the supervisors of 246 out of 258 graduates. This represents a response rate of 95%.

Graduates' demographic and student quality characteristics were very similar between the two programs, with the exception of gender. Controlling for graduates' characteristics, we found no statistically significant difference in supervisor satisfaction associated with TNCC versus NSHS San Diego. This result holds for interim results with the 12-month survey (we have completed the 12-month post-graduation survey for 8 of the 10 MLT classes).[1]

1. See appendix I for population means and regression results associated with the post-graduation supervisor survey.



A final area of concern is that outsourced training, conducted at a civilian facility, may have a deleterious effect on the militarization of the active-duty students attending the program. In both the planning and implementation stages of the pilot, great effort was made to design a program that would minimize any loss of military bearing (student sailors live on base, there is an active-duty Navy oversight team with offices on the TNCC campus, and the clinical phase is taught at NMC Portsmouth).

For NSHS San Diego and TNCC MLT students, we compared the number of disciplinary actions that led to the generation of a Minor Offense Report (MOR) or higher (e.g., Disciplinary Review Board, Executive Officer's inquiry (XOI), Mast). The MLT working group concluded that this would be the best way to determine whether there is a difference between the two programs in terms of developing and maintaining a military bearing among the students.

In addition, we surveyed both the graduates and their immediate supervisors regarding the graduates' understanding of and ability to adhere to the appropriate standards of military behavior, bearing, and discipline that were expected at their first post-graduation duty site. These questions were part of the post-graduation telephone surveys conducted with graduates and their immediate supervisors 4 and 12 months following graduation from San Diego and TNCC.

Comparing Disciplinary Action Rates: NSHS San Diego and TNCC

- Population is unique MLT program enrollees (count set backs once)
  - TNCC (n=150 enrolled)
  - NSHS SD (n=159 enrolled)
- Compared with TNCC, NSHS SD enrollees had:
  - More enrollees missing prerequisites (9% vs. 3%)
  - Fewer enrollees with previous college (5% vs. 6%)
  - More E-1, E-2, E-3 enrollees (60% vs. 34%)
  - Fewer female enrollees (20% vs. 36%)
- Predicted disciplinary action rates for pooled population show no statistically significant differences between programs (only 21 disciplinary incidences total)

Starting with the incidence of disciplinary actions, we focus on the set of *unique enrollees* in either the TNCC or NSHS San Diego MLT programs (by unique enrollees we mean that San Diego set backs are only counted once).

Comparing demographic and student quality characteristics of enrollees between the two programs, we find that NSHS SD enrollees were more likely to be missing prerequisites, more likely to be in a junior paygrade, and less likely to have had previous college. San Diego also had fewer female enrollees.

Controlling for both demographic and student quality characteristics, we found no statistically significant difference in the incidence of disciplinary actions for TNCC versus NSHS San Diego enrollees.[1]

Note that disciplinary actions were rare in either program. In total, out of 309 enrollees, only 21 (or less than 7%) were written up for some disciplinary infraction.

1. See appendix J for disciplinary action comparison population means and regression results.

Post-Graduation Surveys: NSHS San Diego and TNCC

- Population is MLT program graduates (with a completed 4-month post-graduate survey)
  - Graduates: TNCC (n=130) NSHS SD (n=109)
  - Supervisors: TNCC (n=134) NSHS SD (n=112)
- Characteristics are very similar among graduates
  - NSHS SD had more graduates who started the program as E-1 to E-3 and fewer females

Turning to the post-graduation surveys, again we focus on the population of graduates with a completed 4-month survey (239 graduates and the supervisors of 246 graduates were successfully surveyed).

Again, graduates from both programs were similar in terms of demographics and student quality, with the exception of gender and paygrade.[1]

1. See appendices H and I for population means and regression results for the post-graduation graduate and supervisor surveys, respectively.

Military Bearing

Comparing Supervisor Satisfaction: NSHS San Diego and TNCC

- Supervisors are asked if graduates are
  - ***Able to adhere to appropriate standards of military behavior, bearing, and discipline***
  - ***Exhibiting the proper attitude toward the job***
- Predicted supervisor satisfaction rates for pooled population show no statistically significant differences
  - Looking only for above satisfactory to well above
- Interim findings for the 12-month survey indicate
  - Lower satisfaction with TNCC graduate's attitude

    TNCC 74% NSHS SD 86% (statistically significant)

For the supervisor survey, the graduate's immediate supervisor was asked to rank (a) the graduate's ability to adhere to the appropriate standards of military behavior, bearing, and discipline and (b) whether he/she exhibits the proper attitude toward the job. Responses were ranked on a 5-point scale (well above average to well below average). We collapsed responses into a dichotomous indicator variable (1=above average to well above average, 0=average to well below average).

At 4 months after graduation, controlling for graduate characteristics, we found no statistically significant difference with the rates of supervisor satisfaction in this area (looking for above-average responses). Interim findings based on the partially completed 12-month surveys, however, did indicate that TNCC was associated with lower rates of supervisor satisfaction with regard to the graduate's attitude toward the job. We will continue to monitor this finding as we complete the 12-month surveys.

Military Bearing

Graduates' Perspective: NSHS San Diego and TNCC

- Graduates are asked
  - ***Have you found it difficult to understand and adjust to the standards of military behavior, bearing, and discipline that were expected at your new command (MTF laboratory)?***
- Predicted response rates for pooled population showed no statistically significant differences between the programs
  - Response rate is percentage of graduates who found it somewhat to very easy to understand and adjust

Graduates were asked to rank how difficult it had been for them to understand and adjust to the standards of military behavior, bearing, and discipline that were expected of them at their new command. Responses were based on a 5-point scale (1=very difficult, 2=somewhat difficult, 3=neither difficult nor easy, 4=somewhat easy, and 5=very easy). We collapsed these responses into a dichotomous variable: 1 indicated a response of somewhat to very easy, and 0 indicated a response of neither difficult nor easy to very difficult.

Controlling for graduate characteristics, we found no statistically significant differences in graduates' ease of adjustment associated with TNCC versus NSHS San Diego (looking at responses of somewhat to very easy). This result was the same when we looked at interim findings for the 12-month post-graduation surveys.

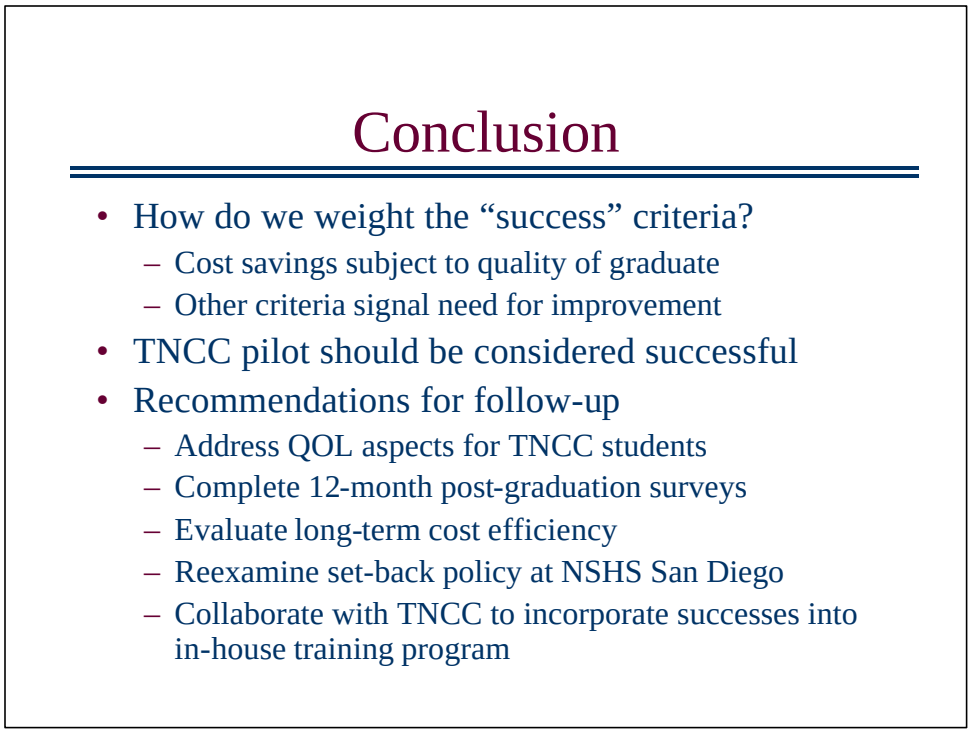
Summary of Findings

- TNCC program associated with
  - Higher ASCP pass rates (quality)
  - Lower per-graduate costs (cost efficiency)
- TNCC is at least as successful as in-house program in terms of
  - Attrition rates (production success)
  - End-user satisfaction
  - Student satisfaction with MLT program
  - Student satisfaction with many aspects of QOL
  - Military bearing
    - As of 4-month post-graduation survey, no difference, but continue to monitor supervisor satisfaction with 12-month post-graduation survey

We have looked at the TNCC pilot program using several different outcome measures. In summary, we found that the TNCC program produces high-quality graduates at a lower per-graduate cost when compared with the in-house MLT training program.

The TNCC program accomplishes this while continuing to be at least as successful as the in-house program with regard to attrition rates, satisfaction of MTF lab supervisors working with the program graduates, student satisfaction with the program and most aspects of QOL, incidence of disciplinary action among students, and graduates' military bearing.[1]

1. For military bearing, 4-month post-graduation graduate and supervisor surveys showed no statistically significant difference with regard to military bearing. Interim results from the 12-month post graduation supervisor survey do indicate statistically lower satisfaction with TNCC graduates' attitude toward the job. We will continue to monitor this as we complete the 12-month post-graduation surveys for the remainder of MLT courses included in the pilot evaluation (to date, 12-month post-graduation surveys have been completed for about half of the population).



To determine the success or failure of the TNCC pilot program, Navy Medicine had to establish the importance, or weight, that should be given to each of the outcome measures being monitored. It was determined that cost savings would be considered the most important criterion, subject to *at least maintaining the same graduate quality as NSHS San Diego*. The other criteria—militarization, student satisfaction with the program, QOL, and end-user satisfaction—should be used to signal the need for program changes and/or enhancements rather than to determine the ultimate success or failure of the pilot.

Based on our evaluation, the TNCC pilot clearly achieved cost-efficiency while maintaining quality. Therefore, we recommend that the pilot be considered a success. In addition, we recommend:

- Addressing those aspects of QOL for which TNCC student satisfaction was lower than NSHS Portsmouth's satisfaction (through additional monitoring, analysis, and focus groups)
- Continuing to monitor satisfaction of supervisors and graduates until all classes have reached the 12-month post-graduation mark
- Conducting long-term evaluation to determine impact of outsourced training on life-cycle training costs (follow graduates at least through their next reenlistment decision)
- Reevaluating the policy and use of the set-back concept for remediation at NSHS San Diego
- For areas in which the pilot program was particularly successful, identifying lessons learned that could be adopted by the in-house training program.

Appendix A: Logistic regression and estimated probabilities

Many of the outcomes evaluated in this analysis are measured as dichotomous variables, such as the 0/1 measure of satisfaction with the MLT program, or the 0/1 indicator for an event, such as academic attrition or disciplinary action. To estimate the probability of each outcome conditional on individual student quality and demographic characteristics, we use the logistic model. The logistic model takes the form:

$$\log\left[\frac{P}{1-P}\right] = \alpha + \beta_1 X_1 + \beta_1 X_1 + \ldots + \beta_k X_k \qquad (1)$$

where P is the probability of some event, such as being satisfied or attriting from the program. X represents the k independent variables—individual student quality and demographic characteristics; α and β represent coefficients to be estimated. Using the estimated coefficients, we can calculate the predicted probability of an event as:

$$P = \frac{1}{(1 + exp(\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k))} \quad . \qquad (2)$$

For each outcome measure, the vector of independent variables includes:

- Treatment group indicator (indicates whether the student attended Thomas Nelson Community College (TNCC) or the control site)
- FY 1999 indicator (indicates whether the student attended C-school during the first year of the pilot—the startup phase)
- Selected demographic and student quality variables as appropriate for the specific outcome and population of interest.

By conditioning our estimates on individual characteristics, we control for the effect that any differences in these characteristics might have on the outcome. The coefficient on the treatment variable represents the estimated

effect of the pilot program (or treatment), holding all other characteristics constant. Combined with the significance test on the estimated coefficient, we determine whether the TNCC program is associated with a significant positive or negative effect on the outcome measure, relative to the control group.

For each outcome, we estimate the logistic regression model (equation 1) for the pooled population (students or graduates from both TNCC and the appropriate control group, either NSHS SD or NSHS Portsmouth). Using the estimated coefficients, we calculate the predicted probability for each student in the pooled population twice: once turning the treatment variable on (=1) for the entire population, and the second time turning the treatment variable off (=0) for the entire population.[1] The means of the resulting two sets of probabilities reflect the average predicted probability of sending the pooled population to TNCC versus sending that same population (with exactly the same characteristics) to the control site, controlling for all the characteristics included as independent variables (X's).

1. To calculate the predicted probabilities, we use equation 2 with the actual *X* values for each student as well as the estimated α and β's.

Appendix B: Detailed accounting of courses included in pilot evaluation

The pilot phase was determined by the time line required to complete four TNCC MLT courses. The first course started in January 1999. The fourth and final TNCC MLT course included in the pilot had a completion date of July 2001. The complete set of courses in the pilot evaluation fall into three groups:

- The treatment group—TNCC MLT courses started between January 1999 and July 2000
- The MLT program control group—NSHS San Diego MLT courses started between January 1999 and July 2000
- The quality-of-life (QOL) control group—NSHS Portsmouth selected C-schools
  - — Pharmacy Technician courses started between January 1999 and January 2001
  - — X-ray Technician courses started between September 1998 and May 2000.

Table 1 lists the specific courses in each group (the convening date, graduation date, student load, and number of graduates).[1]

1. For NSHS Portsmouth X-ray and Pharmacy Technicians, we do not have specific data on student load (course enrollees) and graduates. For NSHS Portsmouth graduates, we report the number of end-of-course graduate surveys received. Data reported for NSHS SD and TNCC MLT courses were provided by the respective MLT programs.

Table 1. Eligible courses for TNCC MLT pilot evaluation

Class		Convening date	Graduation date	Student load	Graduates[1]
Treatment group					
MLT TNCC	99005	04-Jan-99	17-Jan-00	18	18
MLT TNCC	99010	01-Jul-99	13-Jul-00	47	42
MLT TNCC	00005	04-Jan-00	16-Jan-01	44	39
MLT TNCC	00010	03-Jul-00	16-Jul-01	41	37
Total				150	136
MLT in-house program control group (NSHS San Diego)					
MLT SD	99010	17-Feb-99	17-Mar-00	35	23
MLT SD	99015	27-May-99	28-Jun-00	23	14
MLT SD	99020	02-Sep-99	04-Oct-00	40	21
MLT SD	00005	09-Dec-99	24-Jan-01	41	25
MLT SD	00010	29-Mar-00	27-Apr-01	36	21
MLT SD	00015	05-Jul-00	03-Aug-01	27	18
Total				202	122
QOL control group (NSHS Portsmouth)					
Pharm	P-135	05-Jan-99	13-Jun-99	n.a.	31
Pharm	P-136	05-Apr-99	15-Sep-99	n.a.	n.a.
Pharm	P-137	23-Jun-99	17-Dec-99	n.a.	31
Pharm	P-138	22-Sep-99	23-Mar-00	n.a.	36
Pharm	P-139	03-Jan-00	21-Jun-00	n.a.	31
Pharm	P-140	03-Apr-00	13-Sep-00	n.a.	26
Pharm	P-141	26-Jun-00	14-Dec-00	n.a.	17
Pharm	P-142	22-Sep-00	23-Mar-01	n.a.	20
Pharm	P-143	03-Jan-01	21-Jun-01	n.a.	18
Adv X-ray	53	28-Sep-98	21-Oct-99	n.a.	14
Adv X-ray	54	19-Apr-99	21-May-00	n.a.	18
Adv X-ray	55	25-Oct-99	16-Nov-00	n.a.	6
Adv X-ray	56	15-May-00	07-Jun-01	n.a.	13
				n.a.	261

1. We did not have data on NSHS Portsmouth Pharmacy Tech and X-ray Tech graduates. Numbers reported are graduate respondents to the Pharmacy and X-ray Technician end-of-course surveys.

Appendix C: Population statistics and logistic regression results for ASCP comparison

For quality of product, we compare the American Society of Clinical Pathologists (ASCP) registry exam pass rates of TNCC MLT graduates and NSHS San Diego MLT graduates.[1] Tables 1 and 2 provide population means and logistic regression results.[2]

Table 1. Population means: TNCC and NSHS SD graduates that sat for the ASCP

Variable	NSHS SD (n=121)	TNCC (n=135)	Pooled (n=256)
Passed ASCP exam[a]	0.33	0.71	0.53
Student quality:			
- Was set back[a]	0.21	0.00	0.10
- AFQT score	65.22	65.33	65.28
- A-school GPA	88.18	88.56	88.38
- Has basic MLT NEC[a]	0.07	0.03	0.05
- Missing some prerequisite[a]	0.07	0.03	0.05
- Had previous college	0.58	0.65	0.62
Demographic:			
- Gender (female)[a]	0.24	0.39	0.32
- Race (not Caucasian)	0.69	0.66	0.67
- Age in years	23.77	24.50	24.16
- Married	0.39	0.45	0.42
- Has children	0.33	0.39	0.36

a. Difference in population means is statistically significant.

1. All MLT graduates from TNCC and NSHS San Diego were expected to sit for the ASCP exam as part of the pilot evaluation. One graduate from each program did not sit for the exam. Therefore, these observations were excluded from the population of interest for product quality.

2. Force fill and paygrade were not included in the ASCP model. There was significant correlation between force fill, paygrade, and age. Controlling for all three or any combination of two did not add any explanatory value to the model. Age was the only variable that was individually significant.

Table 2. Logistic regression results: pass ASCP exam (=1)

Variable	Coefficient	Standard Error
Constant	-14.0499[a]	3.5672
Treatment group (TNCC=1)	**1.6485[a]**	0.3674
FY 1999 (startup)	0.6679[c]	0.3687
Student quality:		
- Was set back	-0.3836	0.6721
- AFQT score	0.0571[a]	0.0132
- A-school GPA	0.0796[b]	0.0416
- Has basic MLT NEC	0.6843	0.7842
- Missing some prerequisite	-1.0046	0.8352
- Had previous college	-0.7283[c]	0.3828
Demographic:		
- Gender (female)	1.5519[a]	0.4091
- Race (not Caucasian)	0.5907	0.3756
- Age in years	0.0704[c]	0.0431
- Married	0.6090	0.4290
- Has children	-0.1768	0.4365
Mean predicted pass rate[d]:		
- TNCC	0.66	
- NSHS San Diego	0.37	

a. Coefficient significant at the .01 level.

b. Coefficient significant at the .05 level.

c. Coefficient significant at the .10 level.

d. Differences in predicted rates of satisfaction associated with the two MLT programs are determined to be statistically significant if the "treatment" coefficient is significant.

Appendix D: Population statistics and logistic regression results for academic attrition comparison

For production success, we compare the rates of academic attrition across the two MLT programs (TNCC and NSHS San Diego). Because the set-back concept was available only at NSHS San Diego, we calculate attrition using two different models:[1]

- Academic attrition among all enrollees, where academic attrition includes set backs (SBs) and disenrollments (DEs). In determining the population of "all enrollees," we count students who were SB as two separate enrollments (once in original class, outcome SB, and once in the subsequent class, outcome graduate or fail course).
- Academic attrition among unique enrollees (or unique student population). Here academic attrition includes only DEs. In determining the population of "unique enrollees," we count students who were SB as only one enrollment (or one unique student). To do this, we exclude observations for which the class outcome was an SB.

The following tables provide population means and logistic regression results for these two attrition models. Tables 1 and 2 refer to academic attrition for *all enrollees* (includes set backs). Tables 3 and 4 refer to academic attrition for *unique enrollees* (excluding set backs).

1. In both models, we exclude observations (students or enrollees) that resulted in nonacademic (medical, attitude, legal, etc.) attrition. We assume that nonacademic attrition is purely random.

Table 1. Population means for TNCC and NSHS SD enrollees (excluding nonacademic attrition)

Variable	NSHS SD (n=186)	TNCC (n=146)	Pooled (n=332)
Academic Attrition (includes SB and DE)[a]	0.34	0.07	0.22
Student quality:			
- Was set back[a]	0.23	0.00	0.13
- AFQT score	63.13	64.92	63.92
- A-school GPA[a]	86.50	87.81	87.08
- Has basic MLT NEC	0.05	0.03	0.04
- Missing some prerequisite[a]	0.10	0.03	0.07
- Had previous college[a]	0.53	0.63	0.58
Demographics:			
- Paygrade of E-3 to E-6[a]	0.70	0.90	0.79
- Gender (female)[a]	0.20	0.36	0.27
- Race (not Caucasian)	0.69	0.65	0.67
- Married	0.37	0.43	0.40
- Has children	0.31	0.37	0.34
Quality of peers:			
- % of classmates having basic MLT NEC[a]	0.05	0.03	0.04
- % of classmates with previous college[a]	0.52	0.62	0.57

a. Difference in population means is statistically significant.

Table 2. Logistic regression results: academic attrition including set backs

Variable	Coefficient	Standard Error
Constant	28.9776[a]	4.5008
Treatment group (TNCC=1)	**-2.1700[a]**	0.6742
FY 1999 (startup)	0.3594	0.5743
Student quality:		
- Was set back	-0.5633	0.4640
- AFQT score	0.0069	0.0140
- A-school GPA	-0.3343[a]	0.0515
- Has basic MLT NEC	-1.4985	1.2452
- Missing some prerequisite	1.4327[b]	0.5964
- Had previous college	-0.3789	0.3998
Demographics:		
- Paygrade of E-3 to E-6	-0.7250[c]	0.4060
- Gender (female)	-0.9669[c]	0.5576
- Race (not Caucasian)	-0.4662	0.4490
- Married	-0.5298	0.4709
- Has children	-0.1369	0.4965
Quality of peers:		
- % of classmates having basic MLT NEC	5.9846	5.5566
- % of classmates with previous college	-0.9694	2.2259
Mean predicted academic attrition rate[d]:		
- TNCC	0.10	
- NSHS San Diego	0.29	

a. Coefficient significant at the .01 level.

b. Coefficient significant at the .05 level.

c. Coefficient significant at the .10 level.

d. Differences in predicted rates of satisfaction associated with the two MLT programs are determined to be statistically significant if the "treatment" coefficient is significant.

Table 3. Population means for TNCC and NSHS SD unique enrollees[a] (excluding nonacademic attrition)

Variable	NSHS SD (n=144)	TNCC (n=146)	Pooled (n=290)
Academic attrition (DEs only)[b]	0.15	0.07	0.11
Student quality:			
- Was set back[b]	0.30	0.00	0.15
- AFQT score	64.38	64.92	64.65
- A-school GPA	87.21	87.81	87.51
- Missing some prerequisite[b]	0.08	0.03	0.06
- Had previous college	0.55	0.63	0.59
Demographics:			
- Paygrade of E-3 to E-6[b]	0.73	0.90	0.81
- Gender (female)[b]	0.22	0.36	0.29
- Race (not Caucasian)	0.68	0.65	0.67
- Married	0.39	0.43	0.41
- Has children	0.32	0.37	0.35
Quality of peers:			
- % of classmates having basic MLT NEC[b]	0.05	0.03	0.04
- % of classmates with previous college[b]	0.51	0.62	0.57

a. The population of unique enrollees counts set backs only once (thus enrollments that end in a set back are excluded from the sample).

b. Difference in population means is statistically significant.

Table 4. Logistic regression results: academic attrition excluding set backs

Variable	Coefficient	Standard error
Constant	41.8812[a]	8.4989
Treatment group (TNCC=1)	**1.4193**	1.1862
FY 1999 (startup)	-0.4246	1.0240
Student quality:		
- Was set back	2.6901[a]	0.8376
- AFQT score	0.0123	0.0240
- A-school GPA	-0.4853[a]	0.0987
- Missing some prerequisite	0.7371	0.9107
- Had previous college	-0.2226	0.6810
Demographics:		
- Paygrade of E-3 to E-6	-1.3159[b]	0.6304
- Gender (female)	-1.2435	1.0249
- Race (not Caucasian)	-1.3572[c]	0.7872
- Married	-0.5431	0.7433
- Has children	-0.2315	0.7649
Quality of peers:		
- % of classmates having basic MLT NEC	9.7896	9.3801
- % of classmates with previous college	-6.3501[c]	3.7915
Mean predicted academic attrition rate[d]:		
- TNCC	0.10	
- NSHS San Diego	0.11	

a. Coefficient significant at the .01 level.

b. Coefficient significant at the .05 level.

c. Coefficient significant at the .10 level.

d. Differences in predicted rates of satisfaction associated with the two MLT programs are determined to be statistically significant if the "treatment" coefficient is significant.

Appendix E: Cost comparison methodology and supporting analysis

The following tables provide details of the costing methodology for MLT programs at NSHS San Diego and TNCC (overhead provided by NSHS Portsmouth).

Tables 1 and 2 break down the costs associated with MLT training at NSHS SD (table 1) and TNCC (table 2). In addition, table 2 provides a comparison between the two programs (percentage difference). Costs in these tables are divided into:

- Activity specific—those overhead costs that are spread across all courses taught at or through the specific NSHS (academic, administrative, and base operating support, and G&A). All activity-specific cost data (and activity specific student load data) were provided by MED-51.
- Course specific—those costs associated directly with the teaching and administration of the MLT courses. These include active duty Navy MLT instructor and/or course oversight and any associated TAD/training dollars for these people, MLT student expenses (lab agents, books, equipment, reproduction, etc.), tuition, and transportation.[1]

1. AD Navy instructor/oversight data (numbers and composite pay) were provided by MED-51. TAD and training budget for TNCC AD Navy instructors/oversight was provided by TNCC contract officer (none reported for NSHS SD). MLT student expenses for NSHS SD and TNCC were provided by MED-51 and TNCC contract officer, respectively. NSHS SD tuition (paid to George Washington University) was reported by NSHS Bethesda (responsible party for GW contract). Tuition for TNCC includes total invoice cost (tuition, books, office space, graduation ceremony, etc.) and contract incentive fee paid to TNCC (data provided by TNCC contract officer). Transportation cost is pertinent to TNCC program only and was provided by TNCC contract officer.

Additional data in the table include:

- Each Activity's (NSHS) average daily student load (ADS)—used to determine the per-student academic and administrative support costs.
- Course length in days—used to determine the G&A and BOS support cost per student (because both are reported in per student daily rate).[2]
- Three course-specific student measures
  - — Unique enrollees, a number that reflects the unique student load for NSHS SD by counting those students who were set back (enrolled in an initial class and set back to be enrolled in a subsequent class) only once. This measure is required to determine the total tuition cost for NSHS SD because tuition is paid only once for each student, regardless of whether he/she is set back.
  - — Estimated graduates, based on our analysis of academic attrition rates. We start with each program's actual enrollment, delete those enrollees who were attrited for nonacademic reasons (medical, administrative, attitude, etc.), and then apply the predicted academic attrition rate for each program (predicted rates reflect the academic attrition rate we would expect to see by sending the pooled population to TNCC vs. NSHS SD—controlling for enrollee demographic and student quality characteristics). This measure is used to calculate the per-graduate cost for all course-specific cost factors.
  - — Actual graduates, provided for comparison only—not used for any cost calculations.

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2. Course length reported by MED-51 did not reflect actual course length as reported in NITRAS (rather it reflected the NITRAS planned course length). As a result of a TNCC error, the four TNCC pilot courses that we evaluated were actually on average 20 days shorter than the NSHS SD course (this represents approximately 14 training days). Twenty days is equivalent to $2,148 in student programming rate dollars (using average of FY2000 and FY2001 programming rate of $39,200). Additionally, this would reduce those NSHS PTS/TNCC costs that are calculated as a daily rate (G&A overhead per student and base operating support per student). Because this was an error and will be/has been corrected for subsequent TNCC courses, we did not include these savings in our analysis.

Finally, for all course-specific data provided to us by fiscal year or contract year, we had to determine what portion of the FY or CY costs were applicable to the pilot phase courses (those courses that fell within the pilot evaluation; see appendix A for a complete listing). To do this, we had to determine the amount of overlap between pilot evaluation courses and non-pilot-evaluation courses. These data are provided in table 3. We determine the amount of overlap in terms of enrollees (percentage of total enrollees in FY or CY that are represented by pilot evaluation vs. non-pilot-evaluation courses).

Table 1: NSHS SD MLT training cost based on estimated graduation rates (controlling for enrollee characteristics)[a]

	NSHS San Diego				
	1999	**2000**	**2001**	**Ave. or tot.**	**Per grad.**
Activity Specific:				Average	
Activity Academic Support[b]	$1,424,355	$1,066,025	$1,632,728	$1,374,369	$3,175
Activity Administrative Support[b]	$2,316,226	$2,222,350	$1,838,086	$2,125,554	$4,910
Annual Activity ADS Load[c]	417.00	475.30	406.50	432.93	
Subtotal:					$8,084
				Average	
G&A overhead per Student (daily)[d]	$3.61	$3.12	$4.09	$3.61	$1,331
Base Operating Support per Student (daily)[d]	$5.99	$4.51	$1.23	$3.91	$1,443
Course Length (days)[e]	369	369	369	369.00	
Subtotal:					$2,774
Activity Subtotal:					$10,858
Course Specific:	(0.38*FY99)	(0.97*FY00)	(0.5*FY01)	Total	
AD Navy Instructors[b]	$264,283	$511,069	$265,023	$1,040,374	$7,849
Classroom Expenses (SMART)[f]	$79,657	$237,335	$130,594	$447,585	$3,377
Tuition (GW for SD / TNCC for PTS)[g]	-	-	-	$119,250	$900
Transportation (TNCC only)	$0	$0	$0	$0	$0
TAD and Training (TNCC only)	$0	$0	$0	$0	$0
Unique Enrollees (count set backs once)				159	
Estimated Graduates (for entire pilot)				133	
Actual Graduates (for comparison only)				122	
Course Subtotal:					$12,126
Total Activity and Course Specific:					
Total					$22,984

Table Notes:
a) Does not include student salary and , therefore, does not capture cost associated with set backs.
b) Source MED-51: AD Navy staffing data from NSHS Activity Manning Documents (AMDs). Staffing is multiplied by Navy composite pay (specific to each grade and FY) to calculate total cost of AD staff.
c) Source MED-51 (AOB - NITRAS).
d) Source MED-51 (SMART). These rates were provided as daily, and in some cases weekly, per student rates. We report them in daily, per student, rates. These rates are multiplied by course length (in days) to compute the per-student cost.
e) Source MED-51 (DAYS - NITRAS).
f) Source MED-51 (SMART): Includes supply cost (all EOE not "W, Q, U, A, 1"), equipment cost (EOE "W"), purchased services (EOE "Q"), and civilian pay (EOE, "U"). Based on discussions with NSHS San Diego comptroller, it was determined that equipment costs (capital investments) should be averaged over a 5-year time horizon. MED-51 provided equipment costs for FY1997-FY2001 (the average being $105, 772). This 5-year average was substituted for eachFY-specific equipment cost when calculating NSHS SD's classroom expenses for FY1999-FY2001.
g) Tuition for NSHS SD is paid to Georg Washinton University at a rate of $750 per enrollee (set backs are not charged tuition twice). Total tuition is equal to $750 x "unique enrollees." The total tuition is then divided by "estimated graduates" to get a per-graduate rate.

Table 2: NSHS PTS/TNCC MLT training cost based on estimated graduation rates (controlling for enrollee characteristics)[a]

	NSHS PTS/TNCC					
	1999	**2000**	**2001**	**Ave. or tot.**	**Per grad.**	**Percentage Difference[b]**
Activity Specific:				Average		
Activity Academic Support[c]	$386,748	$427,225	$324,421	$379,465	$1,688	
Activity Administrative Support[c]	$1,133,664	$1,502,025	$1,906,864	$1,514,184	$6,736	
Annual Activity ADS Load[d]	200.00	245.50	228.90	224.80		
Subtotal:					$8,424	-4%
				Average		
G&A overhead per Student (daily)[e]	$4.00	$2.92	$3.57	$3.50	$1,290	
Base Operating Support per Student (daily)[e]	$4.14	$5.24	$4.01	$4.46	$1,647	
Course Length (days)[d]	369	369	369	369.00		
Subtotal:					$2,937	-6%
Activity Subtotal:					$11,361	-5%
Course Specific:	(1*FY99)	(1*FY00)	(0.57 * FY01)	Total		
AD Navy Instructors[c]	$204,965.00	$213,375.00	$120,831.45	$539,171.45	$4,086	
Classroom Expenses[f]	$5,000.00	$5,000.00	$1,691.76	$11,691.76	$89	
Tuition (GW for SD / TNCC for PTS)[g]	-	-	-	$783,006.43	$5,934	
Transportation (TNCC only)[h]	$4,056.00	$4,166.40	$3,107.64	$11,330.04	$86	
TAD and Training (TNCC only)[I]	$4,600.00	$4,600.00	$2,635.68	$11,835.68	$90	
Unique Enrollees (count set backs once)				150		
Estimated Graduates (for entire pilot)				132		
Actual Graduates (for comparison only)				136		
Course Subtotal:					$10,285	15%
Total Activity and Course Specific:						
Total					$21,646	6%

Table Notes:
a) Does not include student salary and , therefore, does not capture difference in cost associated with set backs at NSHS SD.
b) Percent difference is equal to (SD-PTS)/SD). Therefore, positive value indicates the percentage by which the NSHS PTS/TNCC program costs are less than SD.
c) Source MED-51: AD Navy staffing data from NSHS Activity Manning Documents (AMDs). Staffing is multiplied by Navy composite pay (specific to each grade and FY) to calculate total cost of AD staff.
d) Source MED-51 (NITRAS).
e) Source MED-51 (SMART). These rates were provided as daily, and in some cases weekly, per student rates. We report them in daily, per student, rates. These rates are multiplied by course length (in days) to compute the per-student cost.
f) Source TNCC program director/contract officer: Reported as supplies and equipment for Navy-specific training.
g) Source TNCC program director/contract officer: Tuition for TNCC includes all invoice costs and incentive award fees. Total tuition is reported for the 4 TNCC MLT pilot courses. The total tuition is then divided by "estimated graduates" to get a per-graduate rate.
h) Source TNCC program director/contract officer, via Comptroller Head, Financial Management Code 11.
i) Source TNCC program director/contract officer. Reflects Navy budget for TNCC AD instructors TAD and Training (not captured in SMART).

Table 3: Non-pilot courses overlap with pilot courses (by percentage of enrollees in FY)*

		Class months in FY			Total	Enrollee in FY		
Start	**End**	**1999**	**2000**	**2001**	**enrollees**	**1999**	**2000**	**2001**
NSHS San Diego MLT								
Apr-98	Apr-99	7.0			23	12		
Jul-98	Jul-99	10.0			23	18		
Nov-98	Nov-99	11.0	2.0		23	19	4	
Feb-99	Feb-00	7.5	5.5		35	20	15	
Jun-99	Jun-00	4.0	9.0		23	7	16	
Sep-99	Sep-00	1.0	12.0		40	3	37	
Dec-99	Jan-00		10.0	4.0	41		29	12
Apr-00	01-Apr		6.0	7.0	36		17	19
Jul-00	01-Jul		3.0	10.0	27		6	21
Oct-00	01-Nov			11.0	18			15
01-Feb	01-Feb			8.0	26			16
01-May	01-May			5.0	38			15
01-Aug	01-Aug			2.0	37			6
Total enrollees in FY:						80	123	103
In pilot time frame:						30	120	52
Out of pilot time frame:						50	4	52
Percent of total in pilot:						38%	97%	50%
TNCC MLT								
Jan-99	Jan 00	9.0	4.0		18	12	6	
Jul-99	Jul-00	3.0	10.0		47	11	36	
Jan-00	Jan-02		9.0	3.5	44		32	12
Jul-00	Jul-02		3.0	9.5	41		10	31
Jan-01	Jan-02			9.0	33			23
Jul-01	Jul-02			3.0	41			9
Total enrollees in FY:						23.3	83.2	75.8
In pilot time frame:						23.3	83.2	43.5
Out of pilot time frame:						0.0	0.0	32.3
Percent of total in pilot:						100%	100%	57%

* Grey shading indicates courses that are not included in the pilot evaluation (but may overlap with the pilot time frame--January 1999 to August 2001).

Appendix F: Population statistics and logistic regression results for student *satisfaction with program* (end-of-course survey)

For satisfaction with the MLT program, we compare rates of satisfaction with several aspects of the MLT program across TNCC MLT graduates and NSHS San Diego MLT graduates. Satisfaction was measured using an end-of-course (EOC) survey instrument. Table 1 lists those questions that dealt specifically with student's satisfaction with the MLT program.

Table 1. End-of-course survey questions: satisfaction with MLT program

Short name	Survey question, "How satisfied are you with…"
Quality of instruction:	The quality of the instruction in the classroom
Instuctors prep:	The instructor's preparation and organization
Instuctors ability:	The instructor's ability to explain how the course's subject matter applies to the job of an MLT
Monitoring of inst:	The monitoring and supervision of the instructors by the supervising staff
Access to inst:	Access to instructors
Access to computer:	Access to the Computer Lab at NSHS
Quality of equip:	The quality of the educational equipment, including visual aids and laboratory equipment
Quality of texts:	The quality of the textbooks
Clinical rotations:	The quality of instruction during clinical rotations
Prep for clinical:	Program's adequacy in preparing you for clinical rotations
Prep to be MLT:	The program's assistance in preparing you to be an entry level lab technician
Prep for ASCP exam:	The program's assistance in preparing you to take the Registry Exam
Prep for A.A. degree:	The program's assistance in preparing you to receive an Associate degree
Fellow students:	The belief that your fellow students wanted to be in this particular program
Discipline:	The good order and discipline of the classroom environment
Overall:	The MLT program overall

Valid responses to the survey questions were measured on a 5-point Likert scale (1=very satisfied, 2=somewhat satisfied, 3=neither satisfied or dissatisfied, 4=somewhat dissatisfied, 5=very dissatisfied). For our analysis, satisfaction responses were collapsed into a dichotomous variable where satisfaction was determined to be a response of somewhat to very satisfied (1 or 2) versus not satisfied (a response of 3, 4, or 5).

Tables 2 and 3 provide population means and logistic regression results for each aspect of program satisfaction.

Table 2. Population means: TNCC and NSHS SD graduates with completed EOC survey

Variable	NSHS SD (n=109)	TNCC (n=125)	Pooled (n=234)
Very to somewhat satisfied with orders upon graduation	0.72	0.78	0.75
Student quality:			
- A-school GPA	88.07	88.40	88.24
- A-school GPA is above average for one's classmates	0.50	0.50	0.50
- Missing some prerequisite	0.06	0.02	0.04
- Had previous college	0.57	0.64	0.61
Demographics:			
- Paygrade of E-1 - E-3[a]	0.47	0.29	0.37
- Gender (female)[a]	0.27	0.40	0.34
- Age in years[a]	23.50	24.48	24.03
- Race (not Caucasian)	0.67	0.66	0.67
- Married	0.39	0.45	0.42
- Has children	0.53	0.62	0.58
- Resides with family	0.29	0.36	0.33
- Lives on base	0.44	0.41	0.42

a. Difference in population means is statistically significant.

Table 3. Logistic regression results: somewhat to very satisfied with …

	Quality of instruction		Instructors' prep		Instructors' ability	
Variable	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**
Constant	1.9256	4.4044	4.4488	4.0938	-4.2530	4.1342
Treatment group (TNCC=1)	**1.3023[b]**	**0.6137**	**1.7911[a]**	**0.5797**	**0.9109[c]**	**0.5599**
FY 1999 (startup)	1.0748[c]	0.5703	0.5870	0.4798	-0.2518	0.4938
Very to somewhat satisfied with orders upon graduation	0.2975	0.4862	0.9681[b]	0.4545	0.4042	0.4592
Student quality:						
- A-school GPA	-0.0167	0.0490	-0.0724	0.0463	0.0387	0.0461
- A-school GPA is above average for one's classmates	0.2959	0.4706	1.1168[a]	0.4527	0.3850	0.4371
- Missing some prerequisite	-0.7349	0.8219	-0.9140	0.8245	-0.4439	0.9075
- Had previous college	-0.1227	0.4910	-0.9651[b]	0.4746	-0.2246	0.4699
Demographics:						
- Paygrade of E-1 - E-3	0.2201	0.5103	0.3240	0.4815	0.9455[c]	0.5131
- Gender (female)	0.6721	0.4890	0.7964[c]	0.4739	0.6428	0.4858
- Age in years	-0.0200	0.0588	0.0467	0.0569	0.0410	0.0635
- Race (not Caucasian)	0.4788	0.4616	0.8179[c]	0.4282	0.5645	0.4409
- Married	0.2777	0.6136	-0.2999	0.5590	0.4380	0.6008
- Has children	0.3465	0.3316	0.3706	0.3172	0.2927	0.3152
- Resides with family	-0.4766	0.6543	-0.2096	0.6144	-0.3464	0.6164
- Lives on base (in San Diego)	-0.2716	0.5413	0.2496	0.5324	-1.1150[b]	0.5473
- Lives on base (in Portsmouth)	-0.0267	0.8228	-0.8418	0.6954	0.3299	0.7804
Mean predicted rate of satisfaction[d]:						
- TNCC	0.92		0.91		0.89	
- NSHS San Diego	0.77		0.67		0.78	

a. Coefficient significant at the .01 level.

b. Coefficient significant at the .05 level.

c. Coefficient significant at the .10 level.

d. Differences in predicted rates of satisfaction associated with the two MLT programs are determined to be statistically significant if the "treatment" coefficient is significant.

Table 3. Logistic regression results: somewhat to very satisfied with … (continued)

	Monitoring of inst		Access to inst		Access to computer	
Variable	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**
Constant	3.2582	3.5024	-0.3558	4.3884	3.8350	3.2044
Treatment group (TNCC=1)	**1.2306[a]**	**0.4826**	**0.6684**	**0.6179**	**0.1962**	**0.4057**
FY 1999 (startup)	-0.0399	0.3941	0.2126	0.5247	-0.951[a]	0.3459
Very to somewhat satisfied with orders upon graduation	0.6214	0.3883	1.2230[a]	0.4641	0.2702	0.3576
Student quality:						
- A-school GPA	-0.0444	0.0399	-0.0094	0.0507	-0.0416	0.0367
- A-school GPA is above average for one's classmates	0.4966	0.3755	0.6150	0.4705	-0.0177	0.3368
- Missing some prerequisite	1.2457	1.1212	-0.1457	1.1603	-0.4177	0.7849
- Had previous college	-0.8198[b]	0.4032	-0.6617	0.4949	-0.4296	0.3589
Demographics:						
- Paygrade of E-1 - E-3	-0.1042	0.4134	0.4908	0.5203	-0.1669	0.3825
- Gender (female)	0.4712	0.4062	0.0636	0.4872	0.5832[c]	0.3591
- Age in years	0.0171	0.0464	0.0493	0.0616	-0.0157	0.0414
- Race (not Caucasian)	0.9471[a]	0.3731	0.7932[c]	0.4476	0.5463[c]	0.3384
- Married	-0.1074	0.4761	0.2053	0.5957	0.5911	0.4325
- Has children	-0.1311	0.2535	-0.1484	0.3376	-0.0289	0.2268
- Resides with family	0.2425	0.5253	0.8904	0.6881	0.1328	0.4725
- Lives on base (in San Diego)	-0.0648	0.4846	-0.2814	0.6106	0.9568[b]	0.4963
- Lives on base (in Portsmouth)	-0.8268	0.5352	-0.7627	0.6413	-0.0667	0.4446
Mean predicted rate of satisfaction[d]:						
- TNCC	0.83		0.89		0.61	
- NSHS San Diego	0.61		0.81		0.57	

a. Coefficient significant at the .01 level.

b. Coefficient significant at the .05 level.

c. Coefficient significant at the .10 level.

d. Differences in predicted rates of satisfaction associated with the two MLT programs are determined to be statistically significant if the "treatment" coefficient is significant.

Table 3. Logistic regression results: somewhat to very satisfied with … (continued)

	Quality of equip		Quality of texts		Clinical rotations	
Variable	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**
Constant	7.0770	4.7091	8.9585	6.1077	8.5284[a]	3.4835
Treatment group (TNCC=1)	**-0.1797**	**0.5945**	**1.2261**	**0.8147**	**0.1108**	**0.4270**
FY 1999 (startup)	1.1994[b]	0.5479	1.0090	0.7631	-0.2170	0.3688
Very to somewhat satisfied with orders upon graduation	1.1126[b]	0.4731	0.9991[c]	0.5972	0.8779[a]	0.3648
Student quality:						
- A-school GPA	-0.0984[c]	0.0531	-0.1370[b]	0.0681	-0.1230[a]	0.0401
- A-school GPA is above average for one's classmates	0.2068	0.4571	0.7303	0.5770	0.7319[b]	0.3527
- Missing some prerequisite	-1.5271[c]	0.8497	-0.4792	1.2509	-1.4785[b]	0.7644
- Had previous college	-0.7508	0.4854	-0.6117	0.5966	-0.3638	0.3701
Demographics:						
- Paygrade of E-1 - E-3	-0.1003	0.5132	-0.1677	0.6270	0.0468	0.3973
- Gender (female)	0.9367[c]	0.4921	0.2413	0.5759	0.1561	0.3686
- Age in years	0.0910	0.0626	0.1445	0.0937	0.0764[c]	0.0462
- Race (not Caucasian)	0.4735	0.4395	1.4317[a]	0.5577	0.6636[b]	0.3377
- Married	1.0443[c]	0.6224	0.4669	0.7686	0.0377	0.4464
- Has children	-0.4088	0.3084	-0.2598	0.4010	0.1108	0.2426
- Resides with family	0.0484	0.6766	0.1799	0.8767	-0.0427	0.5046
- Lives on base (in San Diego)	-0.3112	0.6015	-0.8139	0.6549	0.1226	0.4968
- Lives on base (in Portsmouth)	-0.2858	0.6225	-0.2695	1.0345	-0.3254	0.4644
Mean predicted rate of satisfaction[d]:						
- TNCC	0.83		0.94		0.67	
- NSHS San Diego	0.85		0.85		0.65	

a. Coefficient significant at the .01 level.

b. Coefficient significant at the .05 level.

c. Coefficient significant at the .10 level.

d. Differences in predicted rates of satisfaction associated with the two MLT programs are determined to be statistically significant if the "treatment" coefficient is significant.

Table 3. Logistic regression results: somewhat to very satisfied with … (continued)

	Prep for clinical		Prep to be MLT		Prep for ASCP exam	
Variable	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**
Constant	1.2397	3.5375	-1.4725	4.3102	2.9769	3.4189
Treatment group (TNCC=1)	**0.9307[b]**	**0.4531**	**0.8986**	**0.5774**	**0.9481[b]**	**0.4510**
FY 1999 (startup)	0.3073	0.4063	0.1414	0.4950	0.2633	0.3734
Very to somewhat satisfied with orders upon graduation	0.8362[b]	0.3878	0.9615[b]	0.4454	0.3338	0.3661
Student quality:						
- A-school GPA	-0.0333	0.0403	0.0017	0.0494	-0.0423	0.0385
- A-school GPA is above average for one's classmates	0.5440	0.3797	-0.0383	0.4414	0.0427	0.3569
- Missing some prerequisite	0.2795	0.8800	-0.5804	0.9586	-0.5751	0.7905
- Had previous college	-0.7771[b]	0.4032	-0.3834	0.4552	0.4328	0.3680
Demographics:						
- Paygrade of E-1 - E-3	-0.2781	0.4236	-0.3836	0.4836	-0.4674	0.3953
- Gender (female)	0.1911	0.4024	0.5281	0.4648	0.5835	0.3847
- Age in years	0.0426	0.0484	0.0326	0.0622	-0.0027	0.0456
- Race (not Caucasian)	0.9043[a]	0.3692	1.2631[a]	0.4374	0.8106[b]	0.3584
- Married	0.0145	0.4824	0.5052	0.6117	0.7191	0.4768
- Has children	0.0637	0.2624	0.4067	0.3722	-0.0660	0.2434
- Resides with family	0.2132	0.5351	0.7431	0.7078	-0.2550	0.5238
- Lives on base (in San Diego)	0.6189	0.4974	-0.4620	0.5484	-0.9205[c]	0.4825
- Lives on base (in Portsmouth)	0.2298	0.5504	0.1417	0.6873	-1.0017[b]	0.5003
Mean predicted rate of satisfaction[d]:						
- TNCC	0.82		0.87		0.72	
- NSHS San Diego	0.66		0.76		0.53	

a. Coefficient significant at the .01 level.

b. Coefficient significant at the .05 level.

c. Coefficient significant at the .10 level.

d. Differences in predicted rates of satisfaction associated with the two MLT programs are determined to be statistically significant if the "treatment" coefficient is significant.

Table 3. Logistic regression results: somewhat to very satisfied with … (continued)

	Prep for A.A. degree		Fellow students		Discipline		Overall	
Variable	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**
Constant	2.6424	3.2898	-2.8204	3.2054	1.5613	3.4412	-0.8297	3.9763
Treatment group (TNCC=1)	**0.4147**	**0.4285**	**0.6542**	**0.4175**	**-0.2610**	**0.4511**	**2.0706[a]**	**0.5881**
FY 1999 (startup)	0.1272	0.3623	-0.5652	0.3568	0.3355	0.3904	-0.3381	0.4583
Very to somewhat satisfied with orders upon graduation	0.5164	0.3589	0.6541[c]	0.3528	0.4750	0.3922	1.1071[a]	0.4185
Student quality:								
- A-school GPA	-0.0340	0.0374	0.0159	0.0366	0.0024	0.0397	-0.0156	0.0448
- A-school GPA is above average for one's classmates	0.5414	0.3434	-0.4368	0.3360	-0.1462	0.3717	0.1607	0.4176
- Missing some prerequisite	1.3607	1.1150	0.7025	0.9108	1.1909	1.1231	-0.4377	0.8687
- Had previous college	-0.5330	0.3639	-0.3018	0.3611	-0.6312	0.4104	-0.5782	0.4357
Demographics:								
- Paygrade of E-1 - E-3	0.1219	0.3806	0.8296[b]	0.3867	0.5431	0.4200	-0.3177	0.4696
- Gender (female)	0.5575	0.3656	-0.2021	0.3531	0.6622[c]	0.3966	0.1195	0.4499
- Age in years	-0.0039	0.0416	0.0426	0.0429	-0.0850[b]	0.0440	0.0681	0.0602
- Race (not Caucasian)	0.2622	0.3431	0.7007[b]	0.3427	1.2133[a]	0.3659	1.1051[a]	0.4202
- Married	0.5473	0.4334	-0.0540	0.4269	-0.3093	0.4690	0.7493	0.5717
- Has children	-0.1697	0.2347	-0.1205	0.2317	0.4773[c]	0.2644	-0.1926	0.2976
- Resides with family	0.5123	0.4810	0.7222	0.4761	0.2884	0.5208	0.0339	0.6060
- Lives on base (in San Diego)	-0.4131	0.4641	-0.1139	0.4733	-0.1475	0.5416	-0.0909	0.5032
- Lives on base (in Portsmouth)	-0.9003[b]	0.4511	-0.6362	0.4572	0.1202	0.4981	-0.5982	0.6954
Mean predicted rate of satisfaction[d]:								
- TNCC	0.68		0.68		0.70		0.91	
- NSHS San Diego	0.59		0.54		0.74		0.62	

a. Coefficient significant at the .01 level.

b. Coefficient significant at the .05 level.

c. Coefficient significant at the .10 level.

d. Differences in predicted rates of satisfaction associated with the two MLT programs are determined to be statistically significant if the "treatment" coefficient is significant.

Appendix G: Population statistics and logistic regression results for student *satisfaction with quality of life* (end-of-course survey)

For satisfaction with quality of life (QOL), we compare rates of satisfaction with several aspects of QOL across TNCC MLT graduates and selected NSHS Portsmouth (PTS) C-school graduates (X-ray and Pharmacy Technicians). Satisfaction was measured using an end-of-course (EOC) survey instrument.[1] Table 1 lists those questions that dealt specifically with the student's satisfaction with several aspects of QOL while attending C-school.

Table 1. End-of-course survey questions: satisfaction with QOL

Short name	Survey question, "How satisfied are you with…"
Orientation:	The check-in and orientation at NSHS
Attire policy:	Uniform and civilian attire policies
Commute:	The commute between your living quarters and the school house
PT sessions:	The quantity and quality of group PT sessions
Study sessions:	The quantity and quality of group and mandatory night study sessions
Your locker:	The quality of and accessibility to your locker
Student lounge:	The student lounge, including the refrigerator
Welcome aboard packet:	Your Welcome Aboard packet, including info about the school and the community
Access to meals:	Access to adequate meals
Access to health care:	Access to health care, including sick call
Access to OTC meds:	Access to over-the-counter medications
Personal time:	The amount of time off you received to attend to personal matters
Support for advancement:	The support available to help pursue opportunities for military advancement
Handling financial issues:	The handling of your pay, allowances, travel claims, and other financial issues
Overall staff's help:	The school house staff's help overall in meeting your needs

1. NSHS PTS graduates were surveyed at the end of their course (EOC). TNCC MLT students were surveyed at the end of their didactic phase (first six months taught on the TNCC campus) and again at the EOC. For QOL, we compared NSHS PTS graduates' EOC responses to TNCC graduates responses to the end-of-didactic phase survey. This will capture TNCC graduates satisfaction with QOL while attending courses off of the NMC PTS base. We used TNCC responses from graduates only (therefore, 10 end-of-didactic phase survey respondents—those that did not graduate—were deleted from the population sample).

Valid responses to the survey questions were measured on a 5-point Likert scale (1=very satisfied, 2=somewhat satisfied, 3=neither satisfied nor dissatisfied, 4=somewhat dissatisfied, 5=very dissatisfied). For our analysis, satisfaction responses were collapsed into a dichotomous variable where satisfaction was determined to be a response of somewhat to very satisfied (1 or 2) versus not satisfied (a response of 3, 4, or 5).

Tables 2 and 3 provide population means and logistic regression results for each aspect of program satisfaction.

Table 2. Population means: TNCC and NSHS PTS graduates with completed EOC survey

Variable	NSHS PTS (n=261)	TNCC (n=136)	Pooled (n=397)
Demographics:			
- Paygrade of E-1 - E-3	0.45	0.38	0.42
- Gender (female)[a]	0.29	0.39	0.33
- Married	0.49	0.42	0.46
- Has children	0.37	0.35	0.37
- Resides with family	0.34	0.32	0.34
- Lives off base[a]	0.41	0.56	0.46

a. Difference in population means is statistically significant.

Table 3. Logistic regression results: somewhat to very satisfied with …

	Orientation		Attire policy		Commute	
Variable	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**
Constant	0.7212[a]	0.2874	1.4884[a]	0.3111	1.0237[a]	0.2814
Treatment group (TNCC=1)	**-0.4291**	**0.3100**	**-0.7292[a]**	**0.3224**	**0.3423**	**0.3154**
FY 1999 (startup)	0.3083	0.2378	-0.2657	0.2402	-0.3330	0.2206
Demographics:						
- Paygrade of E-1 - E-3	-0.1398	0.2607	-0.0595	0.2736	-0.7613[a]	0.2487
- Gender (female)	0.0576	0.2612	0.1369	0.2723	-0.1418	0.2476
- Married	0.6991[b]	0.3079	0.0763	0.3208	-0.0896	0.2852
- Has children	-0.3300	0.2935	0.0128	0.2960	-0.0419	0.2718
- Resides with family	-0.0014	0.3338	-0.6917[b]	0.3388	-0.0656	0.3048
- Lives off base and attends TNCC	0.0059	0.3827	0.1317	0.3877	-0.3619	0.3904
Mean predicted rate of satisfaction[d]:						
- TNCC	0.64		0.62		0.67	
- NSHS PTS	0.73		0.77		0.61	

a. Coefficient significant at the .01 level.

b. Coefficient significant at the .05 level.

c. Coefficient significant at the .10 level.

d. Differences in predicted rates of satisfaction associated with the two MLT programs are determined to be statistically significant if the "treatment" coefficient is significant.

Table 3. Logistic regression results: somewhat to very satisfied with … (continued)

	PT sessions		Study sessions		Your locker	
Variable	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**
Constant	-0.8400[a]	0.2796	1.0489[a]	0.2981	0.9684[a]	0.3358
Treatment group (TNCC=1)	**0.9775[a]**	**0.3093**	**-1.4333[a]**	**0.3105**	**1.0082[b]**	**0.4644**
FY 1999 (startup)	0.2408	0.2226	-0.2588	0.2371	-0.2435	0.2734
Demographics:						
- Paygrade of E-1 - E-3	-0.0563	0.2509	0.0602	0.2664	0.3140	0.3142
- Gender (female)	-0.4019	0.2508	0.2173	0.2692	0.1086	0.3109
- Married	0.5198[c]	0.2868	0.4100	0.3109	0.5779	0.3652
- Has children	0.4336	0.2748	-0.3616	0.2949	-0.2838	0.3485
- Resides with family	-0.4419	0.3055	0.0163	0.3296	0.4848	0.3913
- Lives off base and attends TNCC	0.0695	0.3785	-0.3666	0.3891	-0.7992	0.5469
Mean predicted rate of satisfaction[d]:						
- TNCC	0.58		0.40		0.89	
- NSHS PTS	0.35		0.75		0.79	

a. Coefficient significant at the .01 level.

b. Coefficient significant at the .05 level.

c. Coefficient significant at the .10 level.

d. Differences in predicted rates of satisfaction associated with the two MLT programs are determined to be statistically significant if the "treatment" coefficient is significant.

Table 3. Logistic regression results: somewhat to very satisfied with … (continued)

	Student lounge		Welcome aboard packet		Access to meals	
Variable	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**
Constant	0.4659[c]	0.2828	-0.8944[a]	0.2793	0.0354	0.2786
Treatment group (TNCC=1)	**0.7857[b]**	**0.3299**	**0.9701[a]**	**0.3054**	**1.1154[a]**	**0.3260**
FY 1999 (startup)	-0.9276[a]	0.2298	0.0693	0.2216	-0.6871[a]	0.2282
Demographics:						
- Paygrade of E-1 - E-3	0.3073	0.2573	0.3648	0.2486	-0.1998	0.2530
- Gender (female)	-0.5796[b]	0.2543	-0.0007	0.2464	-0.2338	0.2548
- Married	0.1379	0.2919	0.3705	0.2847	0.2654	0.2927
- Has children	0.3113	0.2832	0.2905	0.2724	0.3402	0.2771
- Resides with family	0.3094	0.3132	-0.0823	0.3038	0.2377	0.3087
- Lives off base and attends TNCC	-0.0932	0.4095	0.1830	0.3797	0.2037	0.4180
Mean predicted rate of satisfaction[d]:						
- TNCC	0.73		0.63		0.74	
- NSHS PTS	0.58		0.39		0.48	

a. Coefficient significant at the .01 level.

b. Coefficient significant at the .05 level.

c. Coefficient significant at the .10 level.

d. Differences in predicted rates of satisfaction associated with the two MLT programs are determined to be statistically significant if the "treatment" coefficient is significant.

Table 3. Logistic regression results: somewhat to very satisfied with … (continued)

	Access to health care		Access to OTC meds		Personal time	
Variable	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**
Constant	-0.2086	0.2690	0.2975	0.2672	1.3476[a]	0.2938
Treatment group (TNCC=1)	**0.1572**	**0.3040**	**-0.0512**	**0.2970**	**-0.7344[a]**	**0.3059**
FY 1999 (startup)	-0.4129[c]	0.2215	-0.4070[c]	0.2157	-0.1201	0.2299
Demographics:						
- Paygrade of E-1 - E-3	0.0484	0.2443	0.1045	0.2410	-0.7796[a]	0.2562
- Gender (female)	-0.7483[a]	0.2493	-0.2830	0.2389	-0.2817	0.2560
- Married	0.1141	0.2799	0.0937	0.2756	-0.0639	0.2964
- Has children	0.1299	0.2650	0.1995	0.2648	-0.0756	0.2853
- Resides with family	0.3909	0.2962	0.2366	0.2958	0.2254	0.3217
- Lives off base and attends TNCC	0.2627	0.3750	-0.0846	0.3684	0.2873	0.3795
Mean predicted rate of satisfaction[d]:						
- TNCC	0.46		0.56		0.55	
- NSHS PTS	0.41		0.57		0.70	

a. Coefficient significant at the .01 level.

b. Coefficient significant at the .05 level.

c. Coefficient significant at the .10 level.

d. Differences in predicted rates of satisfaction associated with the two MLT programs are determined to be statistically significant if the "treatment" coefficient is significant.

Table 3. Logistic regression results: somewhat to very satisfied with … (continued)

	Support for advancement		Handling financial issues		Overall staffs' help	
Variable	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**
Constant	0.8079[a]	0.2774	0.0580	0.2666	0.9108[a]	0.3059
Treatment group (TNCC=1)	**-0.7775[a]**	**0.3054**	**-0.0270**	**0.3013**	**0.5484**	**0.3704**
FY 1999 (startup)	-0.1988	0.2194	-0.3068	0.2174	0.3521	0.2539
Demographics:						
- Paygrade of E-1 - E-3	-0.5069[b]	0.2483	-0.1771	0.2416	-0.2045	0.2782
- Gender (female)	-0.4895[b]	0.2436	-0.3147	0.2423	-0.0783	0.2754
- Married	0.0856	0.2824	-0.3622	0.2803	0.1730	0.3192
- Has children	-0.4210	0.2723	-0.0588	0.2644	-0.2416	0.3062
- Resides with family	0.2889	0.3016	0.1720	0.2977	0.2837	0.3425
- Lives off base and attends TNCC	-0.2163	0.3822	0.3813	0.3697	-0.3426	0.4561
Mean predicted rate of satisfaction[d]:						
- TNCC	0.39		0.42		0.81	
- NSHS PTS	0.58		0.41		0.73	

a. Coefficient significant at the .01 level.

b. Coefficient significant at the .05 level.

c. Coefficient significant at the .10 level.

d. Differences in predicted rates of satisfaction associated with the two MLT programs are determined to be statistically significant if the "treatment" coefficient is significant.

Appendix H: Population statistics and logistic regression results for post-graduation survey of *MLT graduates*

The post-graduation survey of MLT graduates was designed to measure a graduate's satisfaction with how well the MLT program prepared him/her to be a Navy MLT at his/her first duty station (would one's satisfaction with the program change over time?). Using the post-graduation survey of MLT graduates, we compare rates of satisfaction with the MLT program across TNCC MLT graduates and NSHS San Diego MLT graduates. Survey questions are shown in table 1.

Table 1. Post-graduation survey of MLT graduates

Short name	Survey question
Knowledge:	In your opinion, how well did the Navy's MLT Program Prepare you in the knowledge required of an entry-level MLT? (1=well above satisfactory /5=well below satisfactory)
Technical skills:	In your opinion, how well did the Navy's MLT Program Prepare you in the technical skills required to perform as an an entry-level MLT? (1=well above satisfactory /5=well below satisfactory)
Military behavior:	After spending a year in the MLT program, did you find it difficult to understand and adjust to the standards of military behavior, bearing, and discipline that were expected of you? (1=very difficult/5=very easy)

Valid responses to the survey questions were measured on a 5-point Likert scale (1=very satisfied/difficult, 2=somewhat satisfied/difficult, 3=neither satisfied/difficult nor dissatisfied/easy, 4=somewhat dissatisfied/easy, 5=very dissatisfied/easy). For our analysis, satisfaction responses were collapsed into a dichotomous variable where satisfaction was determined to be

a response of somewhat to very satisfied (or easy) versus not satisfied (or not easy).

The graduate survey was conducted by telephone 4 months and 12 months after graduation. To date, we have completed the 4-month survey for all MLT graduates in the pilot study. The 12-month surveys are still being conducted. Therefore, tables 2 and 3 provide population statistics and logistic regression results for the 4-month survey only.

Table 2. Population means: TNCC and NSHS SD graduates with completed 4-month post-graduation survey

Variable	NSHS SD (n=109)	TNCC (n=130)	Pooled (n=239)
Student quality:			
- AFQT score	64.20	65.34	15.04
- A-school GPA	88.18	88.41	4.40
- Had previous college	0.58	0.66	0.48
Demographics:			
- Gender (female)[a]	0.23	0.38	0.49
- Race (not Caucasian)	0.67	0.65	0.48
- Age in years	23.69	24.51	4.39
- Married	0.41	0.45	0.50
- Has children	0.31	0.38	0.49
Quality of peers:			
- Average AFQT of classmates[a]	62.82	65.15	1.74

a. Difference in population means is statistically significant.

Table 3. Logistic regression results: 4-month post-graduation survey of graduates

	Knowledge		Technical skills		Military behavior	
Variable	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**
Constant	8.0956	6.6195	5.5270	7.7514	5.1490	6.9571
Treatment group (TNCC=1)	**0.2940**	**0.3702**	**0.6203**	**0.4283**	**0.2163**	**0.3901**
FY 1999 (startup)	0.4352	0.3470	0.7453[c]	0.4120	0.7051[b]	0.3662
Student quality:						
- AFQT score	0.0002	0.0103	-0.0038	0.0116	0.0044	0.0107
- A-school GPA	-0.0245	0.0355	-0.0098	0.0395	-0.0254	0.0367
- Had previous college	0.3258	0.3249	-0.1562	0.3696	0.3196	0.3393
Demographics:						
- Gender (female)[a]	-0.2042	0.3375	-0.5415	0.3651	-0.0461	0.3479
- Race (not Caucasian)	-0.4732	0.3307	0.0107	0.3587	-1.2389[a]	0.3728
- Age in years	0.0083	0.0343	-0.0364	0.0364	0.0181	0.0363
- Married	-0.3294	0.3629	-0.2077	0.3985	0.0321	0.3783
- Has children	-0.3829	0.3744	-0.2444	0.4120	-0.1398	0.3931
Quality of peers:						
- Ave. AFQT of classmates[a]	-0.0828	0.0973	-0.0388	0.1142	-0.0389	0.1021
Mean predicted rate of satisfaction/ease[d]:						
- TNCC	0.69		0.80		0.70	
- NSHS San Diego	0.93		0.70		0.66	

a. Coefficient significant at the .01 level.

b. Coefficient significant at the .05 level.

c. Coefficient significant at the .10 level.

d. Differences in predicted rates of satisfaction associated with the two MLT programs are determined to be statistically significant if the "treatment" coefficient is significant.

Appendix I: Population statistics and logistic regression results for post-graduation survey of *MLT graduates' supervisors*

The post-graduation survey of MLT graduates' immediate supervisors was the instrument used to measure the "end-users'" satisfaction with MLT graduates in terms of knowledge, technical skills, military behavior, job attitude, and overall performance. Survey questions are shown in table 1.

Table 1. Post-graduation survey of supervisors

Short name	Survey question
Knowledge:	In your opinion, how well did the Navy's MLT Program prepare this sailor in the knowledge required of an entry-level MLT? (1=well above satisfactory /5=well below satisfactory)
Technical skills:	In your opinion, how well did the Navy's MLT Program prepare this sailor in the technical skills required to perform as an an entry-level MLT? (1=well above satisfactory /5=well below satisfactory)
Military behavior:	In your opinion, does this sailor adhere to appropriate standards of military behavior, bearing, and discipline? (1=well above satisfactory /5=well below satisfactory)
Attitude:	In your opinion, does this sailor exhibit the proper attitude toward the job? (1=well above satisfactory /5=well below satisfactory)
Performance rank:	Overall, in comparison to other entry-level MLTs, how well is this sailor performing? (1=well above satisfactory /5=well below satisfactory)

Valid responses to the survey questions were measured on a 5-point Likert scale (1=well above satisfactory, 2=above satisfactory, 3=satisfactory, 4=below satisfactory, 5=well below satisfactory). For our analysis, supervisor's responses were collapsed into a dichotomous variable where a value

of 1 indicates above satisfactory performance (supervisor response of 1 or 2) and 0 indicates satisfactory to well below satisfactory performance (a supervisor response of 3, 4, or 5).

Supervisors of MLT graduates from TNCC and NSHS San Diego were surveyed 4 months and 12 months after graduation. To date, we have completed the 4-month survey for all MLT graduates in the pilot study. The 12-month surveys are still being conducted. Therefore, this appendix provides population statistics and logistic regression results for the 4-month survey only. These are presented in tables 2 and 3.

Table 2. Population means: TNCC and NSHS SD graduates with completed 4-month post-graduation survey of supervisors

Variable	NSHS SD (n=112)	TNCC (n=134)	Pooled (n=246)
Student quality:			
- AFQT score	64.25	65.04	64.68
- A-school GPA	88.16	88.42	88.30
- Had previous college	0.58	0.66	0.62
Demographics:			
- Gender (female)[a]	0.24	0.40	0.33
- Race (not Caucasian)	0.68	0.66	0.67
- Age in years	23.71	24.47	24.13
- Married	0.39	0.46	0.43
- Has children	0.32	0.39	0.36
Quality of peers:			
- Average AFQT of classmates[a]	62.78	65.13	64.06

a. Difference in population means is statistically significant.

Table 3. Logistic regression results: 4-month post-graduation survey of supervisors

	Knowledge		Technical skills		Military behavior	
Variable	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**
Constant	-5.6483	6.1798	7.7650	6.2469	-3.8784	7.6404
Treatment group (TNCC=1)	0.2191	0.3472	0.4317	0.3514	-0.1864	0.4358
FY 1999 (startup)	-0.2590	0.3249	0.3732	0.3270	-0.0213	0.4000
Student quality:						
- AFQT score	0.0242[b]	0.0102	0.0145	0.0099	0.0045	0.0122
- A-school GPA	0.0075	0.0338	0.0079	0.0336	0.0076	0.0417
- Had previous college	-0.3866	0.3154	-0.3948	0.3148	-0.1992	0.3850
Demographics:						
- Gender (female)[a]	0.2588	0.3273	0.1808	0.3201	0.0459	0.3948
- Race (not Caucasian)	0.8637[a]	0.3174	0.4760	0.3130	-0.4470	0.4090
- Age in years	0.0347	0.0346	0.0296	0.0342	0.0924[c]	0.0482
- Married	0.2102	0.3457	-0.1091	0.3438	0.0362	0.4249
- Has children	0.0318	0.3578	0.7354[b]	0.3621	0.1764	0.4475
Quality of peers:						
- Ave. AFQT of classmates[a]	0.0397	0.0905	-0.1624[c]	0.0929	0.0417	0.1110
Mean predicted rate of above satisfactory responses[d]:						
- TNCC	0.64		0.64		0.80	
- NSHS San Diego	0.59		0.55		0.82	

a. Coefficient significant at the .01 level.

b. Coefficient significant at the .05 level.

c. Coefficient significant at the .10 level.

d. Differences in predicted rates of satisfaction associated with the two MLT programs are determined to be statistically significant if the "treatment" coefficient is significant.

Table 3. Logistic regression results: 4-month post-graduation survey of supervisors (continued)

	Attitude		Performance rank	
Variable	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**
Constant	-6.5736	8.0994	-11.3862[c]	6.7839
Treatment group (TNCC=1)	-0.5958	0.4743	-0.1496	0.3827
FY 1999 (startup)	0.0828	0.4211	0.5282	0.3476
Student quality:				
- AFQT score	0.0128	0.0131	0.0199[c]	0.0108
- A-school GPA	0.0592	0.0438	0.0697[b]	0.0358
- Had previous college	-0.1939	0.4033	0.0174	0.3284
Demographics:				
- Gender (female)[a]	0.2183	0.4199	0.4557	0.3441
- Race (not Caucasian)	-0.4663	0.4372	0.2446	0.3338
- Age in years	0.0982[c]	0.0517	0.0360	0.0368
- Married	-0.0305	0.4437	0.2492	0.3630
- Has children	0.2692	0.4676	-0.3505	0.3738
Quality of peers:				
- Ave. AFQT of classmates[a]	0.0072	0.1169	0.0547	0.0989
Mean predicted rate of above satisfactory responses[d]:				
- TNCC	0.79		0.67	
- NSHS San Diego	0.87		0.70	

a. Coefficient significant at the .01 level.

b. Coefficient significant at the .05 level.

c. Coefficient significant at the .10 level.

d. Differences in predicted rates of satisfaction associated with the two MLT programs are determined to be statistically significant if the "treatment" coefficient is significant.

Appendix J: Population statistics and logistic regression results for incidence of disciplinary action comparison

To evaluate whether the MLT pilot program had any deleterious effect on military bearing of its students, we use several measures, one being the incidence of disciplinary actions. For this measure, we compare the rate of disciplinary actions that led to the generation of a Minor Offense Report (MOR) or higher (e.g., Disciplinary Review Board, XOI, Mast) among TNCC and NSHS San Diego MLT students. Tables 1 and 2 provide population means and logistic regression results.

Table 1: Population means for TNCC and NSHS SD unique enrollees[a]

Variable	NSHS SD (n=159)	TNCC (n=150)	Pooled (n=309)
Disciplinary action rate	0.07	0.07	0.07
Student quality:			
- AFQT score	63.94	64.99	64.45
- A-school GPA	87.09	87.88	87.47
- Missing some prerequisite[b]	0.09	0.03	0.06
- Had previous college[b]	0.53	0.63	0.58
Demographics:			
- Paygrade of E-1 to E-3[b]	0.60	0.34	0.47
- Gender (female)[b]	0.21	0.36	0.28
- Race (not Caucasian)	0.69	0.66	0.67
- Married	0.37	0.43	0.40
- Has children	0.30	0.37	0.33
- Age in years	23.47	24.17	23.81

a. The population of unique enrollees counts set backs only once (thus enrollments that end in a set back are excluded from the sample).
b. Difference in population means is statistically significant.

Table 2. Logistic regression results: incidence of disciplinary action

Variable	Coefficient	Standard error
Constant	-2.3576	4.7571
Treatment group (TNCC=1)	0.7714	0.5243
FY 1999 (startup)	-1.5173[b]	0.6513
Student quality:		
- AFQT score	-0.0050	0.0185
- A-school GPA	0.0050	0.0559
- Missing some prerequisite	0.2895	0.8534
- Had previous college	-0.1421	0.5479
Demographics:		
- Paygrade of E-1 to E-3	0.8721	0.6310
- Gender (female)	-1.6252[b]	0.8021
- Race (not Caucasian)	0.6895	0.6029
- Married	-0.6670	0.6647
- Has children	0.4401	0.6901
- Age in years	-0.0391	0.0693
Mean predicted disciplinary action rate[d]:		
- TNCC	0.10	
- NSHS San Diego	0.05	

a. Coefficient significant at the .01 level.

b. Coefficient significant at the .05 level.

c. Coefficient significant at the .10 level.

d. Differences in predicted rates of satisfaction associated with the two MLT programs are determined to be statistically significant if the "treatment" coefficient is significant.

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