

8-2012

A Comparison of Air Traffic Control Knowledge and Performance

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A COMPARISON OF AIR TRAFFIC CONTROL KNOWLEDGE AND
PERFORMANCE

A Research Paper Presented to the Graduate
Faculty of the Department of STEM Education and
Professional Studies at Old Dominion University

In Partial Fulfillment of the Requirements for
the Degree Master of Science in Occupational
and Technical Studies

By

Mark Anthony Powell

August 2012

SIGNATURE PAGE

This research paper was presented by Mark Anthony Powell under the direction of Dr. John Ritz for SEPS 636, Problems in Occupational and Technical Studies. The report was submitted to the Graduate Program Director as partial fulfillment of the requirements for the Degree of Master of Science in Occupational and Technical Studies.

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CHAPTER I

INTRODUCTION

Air traffic control (ATC) is a service provided by ground-based controllers who direct aircraft on the ground and in the air. The primary purpose of ATC is to separate aircraft to prevent collisions, to organize and expedite the flow of traffic, and to provide information and other support for pilots when able. Air traffic controllers have an incredibly large responsibility while on duty. This profession is widely recognized as one of the most challenging and stressful in the world (Markee, 2011). ATC in the United States plays a vital role in national security, and it may become the direct responsibility of the Department of the Navy.

The ATC School at Naval Air Technical Training Center (NATTC) has the mission of providing the professional ATC technical training necessary to meet validated Fleet requirements through a continuum of professional and personal growth for Sailors and Marines (NATTC, 2012). As an ongoing initiative to ensure continued safety and to maintain a safe and orderly flow of air traffic in the terminal area of the National Airspace System (NAS), senior Air Traffic Controllers are assigned to the Advanced Radar Air Traffic Control (ARATC) Course. The purpose of this study was to determine if there is a significant difference in the knowledge and performance of ARATC course graduates and controllers who did not receive this specialized training.

STATEMENT OF THE PROBLEM

The problem of this study was to compare the expectations and skill level of graduates of the Advanced Radar Air Traffic Control (ARATC) Course with the students

receiving On-the-Job Training (OJT) to determine whether it is necessary for controllers to attend the ARATC course at the ATC School.

RESEARCH HYPOTHESIS

To guide this study, the following hypothesis was established:

H₀: There will be no significant difference between the knowledge and performance of graduates of the Air Traffic Control Approach Course and the students receiving On-the-Job Training (OJT) at Naval Air Station Oceana, Virginia.

BACKGROUND AND SIGNIFICANCE

The Naval Air Technical Training Center (NATTC) located in Pensacola, Florida, graduates approximately 15,000 Navy and Marine students yearly. The largest part of this student body is comprised of enlisted personnel attending "A" schools designed to provide them with the knowledge and skill levels required to perform as technicians at the third class petty officer level. Advanced "C" schools provide higher level technical knowledge for senior petty officers and specialty schools offer specific skills not peculiar to any one rating (NATTC, 2012).

ARATC is an advanced "C" school designed to deliver instruction in terminal radar approach control procedures, including technical knowledge and practical application to Navy and Marine Corps journeyman-level Air Traffic Controllers. The ARATC course provides Air Traffic Controllers with complex classroom and laboratory instruction in Naval Air Traffic Control, terminal area procedures, and radar/non-radar rules and regulations prior to reporting for duty at a one of the Navy's eight Terminal Radar Approach Control (TRACON) facilities (NATTC, 2012).

A steady increase in the submission of Aviation Hazard Reports (HAZREPs) due to air traffic incidents resulting in less than the applicable separation between two or more aircraft, or between an aircraft and terrain or obstacles, as required by FAA Order 7110.65 and supplemental instructions within the terminal area, was the determining factor by the Chief of Naval Operations (CNO) to put an emphasis on advanced ATC training such as the ARATC course (Johnson, 2009).

The Approach Control (AP) position, which is the most grueling and mentally demanding of all qualifications in the ATC profession, is the highlight of the ARATC course of instruction, and it has garnered most of the scrutiny of the CNO due to the number of incidents being reported. The AP qualification certifies a controller to direct aircraft in the airport's critical terminal area. AP controllers are responsible for the coordination and control of all instrument traffic within the Air Traffic Control Facility (ATCF) area of jurisdiction. According to Naval Air Training and Operating Procedures Standardization (NATOPS) 00-80T-114, Air Traffic Control Manual, the primary duties of an AP controller include: Issuing ATC clearances and advisory information to aircraft under approach control jurisdiction, maintaining radar surveillance of assigned areas and providing radar service to aircraft as required, determining the separation and sequence to be used between aircraft, initiating/accepting radar handoffs to/from adjacent sectors/facilities, and providing assistance and priority of services to aircraft in emergency situations (Gaddis, 2009).

NATOPS is a program that issues policy and procedural guidance of the (CNO), and it prescribes general flight and operating instructions and procedures applicable to the operation of all US naval aircraft and related activities. This program is applicable to all

Navy and Marine Corps aviation personnel, and it stipulates that, whenever possible, veteran controllers en-route to a Navy TRACON should attend the ARATC course (Gaddis, 2009).

The significance of this study is to prove that there is no noteworthy difference in the knowledge and performance of ARATC graduates and non-graduates. The findings of this study will challenge the notion that in a military hindered by monetary and personnel restraints, that it is practical to send air traffic controllers to a four-week course when the equivalent knowledge can be obtained after reporting on station for duty. Thusly, the U.S. Navy will conserve approximately twenty thousand dollars for each air traffic controller by basically eliminating the ARATC course and directing them to their designated TRACON.

LIMITATIONS

The limitations of this study were as follows:

1. This study was limited to students at the Air Traffic Control (ATC) School located at the Naval Air Technical Training Center (NATTC), Pensacola, FL, and students receiving OJT in the training syllabus at Naval Air Station (NAS) Oceana, VA, from January 1, 2007, to December 31, 2011.
2. All participants of this study are active duty, U.S. Navy air traffic controllers.
3. All participants are between pay-grades E-4 and E-6.

ASSUMPTIONS

In this study, there were several factors the researcher assumed to be true and correct. The assumptions were as follows:

1. NAS Oceana will be, at minimum, the second duty station for all participants.

2. All trainees have prior practical air traffic control experience.
3. All trainees completed the same qualification cycle and received comparable training.
4. All trainees experienced the same complexity of operations during training.
5. All NAS Oceana instructors are teaching in accordance with the On-the-Job Training Instruction (OJTI).

PROCEDURES

This study will begin with the researcher conducting a training record review to assess and compare the requisite knowledge and proficiency level of ARATC graduates controllers with those of non-graduate controllers qualified on the Approach Control (AP) position at NAS Oceana. The Naval Air Station Oceana Training Branch Manager and the researcher will then perform a data collection, which will include: Final qualification examination scores. Finally, the information will be statistically compared to ascertain whether or not there is a difference in the knowledge and performance of ARATC course graduates and controllers who did receive ARATC training.

DEFINITION OF TERMS

The following significant terms, acronyms, and definitions are provided to assist the reading in clarifying words specific to this study:

"A" schools - Schools designed to provide enlisted Navy with the knowledge and skill levels required to perform as technicians at the third class petty officer level in their chosen career field.

Advanced Radar Air Traffic Control (ARATC) - Advanced terminal radar approach control procedures, including technical knowledge and practical application provided on Approach Control, Arrival Control, and Departure Control operating positions.

Air Traffic Control Facility (ATCF) - Any of the component airspace control facilities primarily responsible for providing air traffic control services and, as required, limited tactical control services.

Air Traffic Control Facility Officer (ATCFO) - Responsible for the overall management of the ATCF.

Approach Control (AP) - An Air Traffic Controller who is responsible for coordination and control of all instrument traffic within the Air Traffic Control Facility (ATCF) area of jurisdiction.

“C” schools - Schools that provide higher level technical knowledge for senior petty officers and specialty schools offering specific skills not peculiar to any one rating.

FACMAN - Facility Manual.

Naval Air Station (NAS) - A Navy airbase consisting of permanent land-based operations locations for military aviation assets. Such bases are used to house naval aviation squadrons and their support commands.

National Airspace System (NAS) - The most complex aviation system in the world consisting of thousands of people, procedures, facilities, and equipment that enables safe and expeditious air travel in the United States and over large portions of the world's oceans.

Naval Air Technical Training Center (NATTC) - Responsible for providing enlisted personnel attending "A" schools with the knowledge and skill levels required to perform as technicians at the apprentice level. Provides Advanced “C” school students with higher level technical knowledge for senior petty officers.

Naval Air Training and Operating Procedures Standardization (NATOPS) - Prescribes general flight and operating instructions and procedures applicable to the operation of all U.S. naval aircraft and related activities.

On-the-Job Training (OJT) - Employee training at the place of work while he or she is doing the actual job.

On-the-Job Training Instructor (OJTI) - A professional trainer or an experienced employee serving as a course instructor using hands-on training.

Ratings - United States Navy ratings are general occupations that consist of specific skills and abilities.

Total Training Days (TTD) - Total number of calendar days a trainee is allotted to achieve a qualification.

Trainee - A person that is being trained.

OVERVIEW

In summary, Chapter I began by stating the problem, which was to compare the skill level of Navy Air Traffic Controllers attending the Advanced Radar Air Traffic Control (ARATC) Course and On-the-Job Training (OJT) students. This chapter stated the limitation of the study, which imposes a restriction to graduates of the Naval Air Technical Training Center' (NATTC), Air Traffic Control School, and OJT students at Naval Air Station (NAS) Oceana. This chapter presented the highlights of NATCC, the ATC School, and the ARATC Course. Also discussed were specific assumption related to this study and data collection procedures.

Chapter II will provide the reader with supplementary literature emphasizing the importance of aviation safety, mental domain, teamwork, and training. Chapter III will

focus on the methods used to collect and analyze data. Chapter IV will outline the findings of the study, while Chapter V present the summary, conclusion, and recommendations for future research on this research topic.

CHAPTER II

REVIEW OF LITERATURE

The problem of this study was to compare the expectations and skill level of graduates of the Advanced Radar Air Traffic Control (ARATC) Course with the students receiving On-the-Job Training (OJT) in air traffic control, to determine whether it is necessary for controllers to attend the ARATC course at the ATC School. The main purpose of the review of literature is to provide additional context for the problem statement. The first section of this chapter will focus on aviation safety. Respectively, the second and third segments will examine the mental domain and learning effects of teamwork. The fourth and fifth sections will highlight key subdivisions of the formal ATC training doctrine employed by Naval Air Station (NAS) Oceana, Virginia.

AVIATION SAFETY

The potential danger of near-midair collisions (NMACs) and the possible loss of personnel and aircraft are areas of attention of the Federal Aviation Administration (FAA), Department of Defense (DOD), and the Naval Safety Center. Thus, the Chief of Naval Operations has directed that a deeper focus be placed on new and innovative training to thoroughly train and educate aviators and controllers in an effort to improve airfield safety.

In the last eight years, midair collisions have cost the Navy and Marine Corps more than \$795 million (Bryan, 2007). Because midair collisions are so costly to naval aviation, there is an obvious need to focus on ways to alleviate the causes that lead to actual collisions. According to the Naval Aviation Safety Program, a NMAC occurs when aircraft pass close-by one another in the air, and as a result, the pilot-in-command

feels the safety of the aircraft or UAV is in jeopardy. The Naval Aviation Safety Program also stipulates that the following criteria be used to determine when a NMAC should be reported:

- A collision was avoided by chance, rather than by a conscious act on the part of the pilot or controller.
- A collision would have occurred had no action been taken.
- Two aircraft inadvertently passed within 500 feet of each other (Johnson, 2009).

The terminal region of an airport is the most critical area and has the most potential for mishaps. The final approach, touchdown, takeoff, and initial climb to the first turn away from the airfield are considered to be the most dangerous phases of flight for NMACs. A review of the causal factors for midairs and NMACs conducted by Naval Safety Center air-traffic-control analyst, Fredda Bryan, reveal that failure to adhere to procedures, directions, and/or instructions; poor or incomplete communications; poor coordination; complacency; bad scanning techniques; and failure to adequately train or supervise personnel are cited most often. However, Bryan (2007) states, “The loss of situational awareness, though, is the number one causal factor” (p. 1).

MENTAL DOMAIN

All Navy air traffic controller applicants are selected based on the same attributes: A U.S. citizen with a 220+ ASVAB score, vision correctable to 20/20, normal color perception, normal hearing, no speech impediment, and the desire to become skilled in the ATC profession. They should have a good memory and should be able to perform

quick mental math calculations necessary to be successful in the multifaceted world of ATC (Powers, 2012).

One of the main characteristics of complex domains, as related to ATC, is that each task often contains new elements compared to the previous tasks. In other words, each new task can be considered as a transfer task in which the previously acquired knowledge needs to be applied differently. One should note that besides new elements, each learning task contains the basic skills that have to be acquired (e.g., giving headings and altitude commands). Though the variability and complexity of the learning tasks increase during training, each task builds on previous tasks (Salden, 2004).

TEAMWORK

Individuals enrolled in Navy training programs are required to learn extensive amounts of technical material and the procedures required to use this technical information in job situations. Naval employees are typically required to work as part of a team, and other people's lives may depend on their performance (Vasquez, 1993). Air traffic control is no different. In this occupation, success is predicated upon a mixture of mental capacity, encouragement from instructors, and the cooperation of fellow colleagues and mentors. No matter how wide-ranging and unique a training program may be, a trainee will never reach his or her full potential if there is not some degree of cooperative learning.

Cooperative learning is a successful teaching strategy in which small teams, each with students of different levels of ability, use a variety of learning activities to improve their understanding of a subject. Each member of a team is responsible not only for learning what is taught but also for helping teammates learn, thus creating an atmosphere

of achievement (Kagan, 1994). This is a primary concept on which the entire ATC training and standardization program is founded. It is first communicated in “A” school, that regardless of rank, certifications, or qualifications, controllers are fully expected to work together and be accountable for the learning progression of fellow controllers.

AIR TRAFFIC CONTROL FACILITY TRAINING PROGRAM

Following "A" school, air traffic controllers spend one to two years gaining additional skills through on-the-job training at their first duty station. This consists of additional lab, lecture, and individual training leading to certification at that airfield facility. Controllers are stationed in traffic control centers on aircraft carriers or at air traffic control facilities in the United States or overseas (Powers, 2012).

After this initial tour of duty, controllers are expected to have acquired suitable knowledge and ability to successfully handle the duties of a major control position.

According to the Air Traffic Control Manual, the major control positions are:

- Approach Control - Located in the RADAR facility, approach control is responsible for coordination and control of all instrument traffic within the ATCF area of jurisdiction.

- Arrival Control - Accepts radar handoffs from approach control and providing radar ATC services to aircraft as required until the aircraft reaches approach minimums or is handed off to a final controller or adjacent facility, and

- Local control - Located in the ATC tower, local control is responsible for maintaining a continuous visual surveillance of designated airspace and airport movement areas (Gaddis, 2009).

For purpose of this study, the training and qualification track of the approach control position at NAS Oceana will be highlighted. As directed by cognizant authority, whenever possible, veteran controllers en-route to a Navy TRACON should attend the Advanced Radar Air Traffic Control (ARATC) course where they receive instruction in terminal radar approach control procedures, including technical knowledge and practical application. Upon arrival for duty at NAS Oceana, course graduates are blended into a dynamic training syllabus with other graduates and non-graduates to accomplish the same goal.

The objective of the NAS Oceana standardized training plan is to improve training by providing both the trainee and instructor with a comprehensive list of Local Qualification Standards (LQS), which establishes and standardizes performance factors relating to training objectives. This goal is intended to increase the facility capability and flexibility with enhancing career development of each individual controller. LQS line items will be signed off once the trainee demonstrates the minimum qualification level of knowledge and proficiency for the specific LQS line item. For knowledge factors, this means passing a written or oral test in which the trainee demonstrates mastery of the material. For performance factors, this means demonstrating the minimum qualification level proficiency on the specific LQS line item. Only designated OJT instructors on the position concerned are authorized to sign off an LQS. The training branch shall sign off LQS line items that require a written test, drawing, or diagram.

Personnel must ensure that their LQS is completed prior to taking the written exam. Position qualification assessments will not be conducted until written tests are satisfactorily completed. Written test scores for certification are valid for 90 days from

date of test. Minimum passing score is 80%. In the event of a test failure, minimum-passing score on re-test is 90%. In addition to LQs, and to ensure all trainees receive uniform training, NAS Oceana also incorporates Lesson Topic Guides (LTG) into their training structure. LTGs are organized outlines of single topics and are used as blueprints of what is to be accomplished in the lesson (Decker, 2009).

The NAVAIR 00-80T-114 defines the Department of the Navy (DON) ATC maximum training limitations. Due to military obligations, training availability, and traffic workload, controllers are expected to receive no less than three hours of professional training per training day. The Long Range and Short Range Training plans are calculated on each controller obtaining qualification within 70% of the allotted training time (Gaddis, 2009). The equation used to calculate maximum training days for an approach control trainee at NAS Oceana is:

Approach Control at 100 percent:

- a. Allowed Training Hours: 260
- b. Divided by 3 hours of training time per day equals 86.6 days rounded down to 85 of training required.
- c. Add days off to calculate calendar days: 26 days
- d. Equals 111 calendar-training days.
- e. Round down to 110 calendar training days accomplishing 260 hours of training (Decker, 2009).

By using this complex equation, it is expected that every approach control trainees, graduates and non-graduates, achieve full qualification within 110 calendar days or 260 hours. To ensure trainees are progressing appropriately, a Controller Evaluation

Board (CEB) will be conducted when a controller reaches 70% of maximum allowed TTD, which is 85 calendar days (Decker, 2009). A CEB may also be conducted at any time a trainee is not making satisfactory progress or when deemed appropriate by the Air Traffic Control Facility Officer (ATCFO). The board shall be conducted in accordance with instructions set forth in the NAVAIR 00-80T-114 and will examine controller performance, instructor performance, and quality of training program.

ON-THE-JOB TRAINING

On-the-Job-Training (OJT) is performance-oriented skill training wherein the trainee applies knowledge acquired through classroom training, self-study, lab study, and actual hands-on position instruction. The On-the-Job-Training Instructor (OJTI) will be based on experience and quality of professional and air traffic control abilities. The OJTI shall assist the controller under instruction (trainee) in acquiring the knowledge and skills necessary to achieve qualification. Duties, responsibilities, and authority include the following:

1. Ensuring the OJT process includes preferred methods of teaching through a combination of direction, demonstration, and practical application.
2. Being familiar with the trainee's previous training performance.
3. Documenting OJT results on the training evaluation form.
4. Discussing performance as soon as possible after each session, including an overview of the session, identification of strengths and weaknesses, and specific recommendations to improve performance.
5. Satisfying training objectives as specified in the facility/watch team training plan.

6. Keeping the Facility Watch Supervisor informed of the trainee's progress.

Prior to being granted an OJTI designation on any position, a controller must achieve a minimum of 30 days proficiency time on position and will be subject to a thorough Q&A session with appropriate air traffic control and training managers. Potential OJTIs must also be evaluated while administering instruction to a trainee. The ATCFO will be signatory on the OJTI designation letter (Decker, 2009).

SUMMARY

ARATC graduates and non-graduates reporting to NAS Oceana enter the training pipeline at the same level. As the NAS Oceana standardized training stipulates, all controllers are fully expected to maneuver through the training syllabus at an equivalent pace. Also, as noted by the NAS Oceana training plan, there is no expectation or stipulation in place for ARATC course graduates to complete their qualification before non-graduates. In fact, a good portion of the material from the ARATC course is purged from the trainee upon entering the training program, and they are subsequently taught the local ATC methods directly associated with NAS Oceana ATC procedures. In the next chapter, information will be provided on how data were collected during the evaluation of ARATC graduate and non-graduate controllers.

CHAPTER III

METHODS AND PROCEDURES

The objective of this study was to determine whether there will be a significant difference between the knowledge and performance of graduates of the Air Traffic Control Approach Course and the non-graduate students receiving only On-the-Job Training (OJT) at Naval Air Station Oceana, Virginia, after completing the Approach Control training syllabus. This chapter contains information regarding the population studied, the instrument design utilized, the methods employed for gathering data, and the procedures used for data analysis.

POPULATION

The population of this study consisted of 73 air traffic control trainees. There were 41 trainees who were graduates of the Advanced Radar Air Traffic Control (ARATC) Course, Pensacola, Florida. A total of 32 trainees were non-graduates who reported directly to Naval Station Oceana, Virginia, from their previous duty station.

INSTRUMENT UTILIZED

The method selected for data collection was a final qualification examination administered to all air traffic control trainees upon successful completion of the Approach Control (AP) training syllabus, and prior to receiving certification. The examination, which requires a minimum passing score of 80 percent, consists of fifty multiple choice questions, with four distractors for each question. This test was specifically developed to assess the learning objectives from the applicable Local Qualification Standards (LQS) and Lesson Topic Guides (LTG).

METHODS OF DATA COLLECTION

During a thorough training record review by the Naval Air Station Oceana Training Branch Manager and the researcher, final scores from qualification examination for both ARATC graduates and non-graduates were gathered to determine applicable knowledge level for the population.

STATISTICAL ANALYSIS

The final qualification examination scores compiled from the training record review was statistically compared to ascertain whether or not there was a difference in the knowledge and performance of ARATC course graduates and controllers who did receive ARATC training. A two tailed t-test was used to determine if the difference between the means of the two groups was significant.

SUMMARY

A study was conducted comparing the final qualification examination scores of trainees graduating from the Advanced Radar Air Traffic Control Course (ARATC), Pensacola, Florida, and non-graduates at Naval Station Oceana, Virginia, to determine if there was a significant difference in the knowledge and performance of the sample groups. The calculations were analyzed to determine whether or not it is practical and fiscally responsible for the U.S. Navy to send air traffic controllers to a four-week ARATC course when the equivalent knowledge can be obtained subsequent to reporting onboard for duty. Chapter IV will report the findings from the study.

CHAPTER IV

FINDINGS

The problem of this study was to compare the expectations and skill level of graduates of the Advanced Radar Air Traffic Control (ARATC) Course with the students receiving On-the-Job Training (OJT) in air traffic control to determine whether there was a significant difference between their knowledge and performance and to conclude whether it is necessary for controllers to attend the ARATC course at the ATC School. This chapter will provide an overview of the findings as a result of a statistical analysis comparing the sample means of the final qualification examination scores of the two groups of students.

POPULATION ANALYSIS

The sample population involves a combination of enlisted Navy air traffic controllers, between pay-grades E-4 through E-6, having a variation of practical air traffic control training experience. The population consisted of 73 air traffic control trainees, which includes 41 graduates of the Advanced Radar Air Traffic Control (ARATC) Course, Pensacola, Florida, and 32 non-graduates who reported directly to Naval Station Oceana, Virginia, from their previous duty station. All participants were tested after completing the Approach Control training syllabus between January 1, 2007 and December 31, 2011.

FINDINGS

Statistical analysis of the result from the final qualification examination of the two sample groups showed that graduates of the Advanced Radar Air Traffic Control (ARATC) Course achieved a mean of 91.32 on the final qualification examination. The

non-graduates mean was 90.28, which suggested that there was a slight difference in performance between the two groups. With a total sample size of 73 students, the obtained t value was calculated at 3.47. The data were subjected to a two tail t-test and the results are summarized in Table 1.

Table 1

Statistical Analysis of Final Qualification Examination Results

	GRADUATES	NON-GRADUATES
Sample	41	32
Mean	91.32	90.28
Variance	29.62	33.76
Standard Deviation	5.44	5.81
Degree of Freedom	71	
t-value	3.47	
Critical t-value	$p < .01 = 2.67$	

SUMMARY

In this chapter, the results of the research study were presented. These results indicated there was a slight difference in the means of the compared groups. Graduates of the Advanced Radar Air Traffic Control (ARATC) Course achieved a mean of 91.32 on the final qualification examination, whereas, and the non-graduates' mean was on the final qualification examination was 90.28. Chapter V will provide a summary of the research, a conclusion to the research hypothesis, and make recommendations based upon the results of the study for future research.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this study was to compare the expectations and skill levels of graduates of the Advanced Radar Air Traffic Control (ARATC) Course, Pensacola, FL, with the students solely receiving On-the-Job Training (OJT) in air traffic control at Naval Station Oceana, VA, to determine whether it is necessary for controllers to attend the ARATC course at the ATC School. This chapter will summarize the study, draw conclusions based on the findings, and make recommendations for further studies.

SUMMARY

The problem of this study was to compare the expectations and skill level of graduates of the Advanced Radar Air Traffic Control (ARATC) Course with the students receiving On-the-Job Training (OJT) in air traffic control, to determine whether it is necessary for controllers to attend the ARATC course at the ATC School.

The hypothesis stated prior to the collection of data was:

H₀: There will be no significant difference between the knowledge and performance of graduates of the Air Traffic Control Approach Course and the students receiving On-the-Job Training (OJT) at Naval Air Station Oceana, Virginia.

The limitations of this study were as follows:

1. This study was limited to students at the Air Traffic Control (ATC) School located at the Naval Air Technical Training Center (NATTC), Pensacola, FL, and students receiving OJT in the training syllabus at Naval Air Station (NAS) Oceana, VA, from January 1, 2007, to December 31, 2011.
2. All participants of this study are active duty, U.S. Navy air traffic controllers.

3. All participants are between pay-grades E-4 and E-6.

During this study, the following assumptions were made:

1. NAS Oceana will be, at minimum, the second duty station for all participants.

2. All trainees have prior practical air traffic control experience.

3. All trainees completed the same qualification cycle and received comparable training.

4. All trainees experienced the same complexity of operations during training.

5. All NAS Oceana instructors are teaching in accordance with the On-the-Job Training Instruction (OJTI).

The population of this study consisted of 73 air traffic control trainees, 41 graduates of the Advanced Radar Air Traffic Control (ARATC) Course, Pensacola, Florida and 32 non-graduates who reported directly to Naval Station Oceana, Virginia, from their previous duty station. Participants' final grades were collected and then compared, using a two tail t-test, to determine if there was a significant difference in the knowledge level of the two groups.

CONCLUSION

This research sought to ascertain whether or not there was a significant difference in the knowledge and performance of ARATC graduates and non-graduates and to determine whether it was necessary for controllers to attend the ARATC course at the ATC School if the requisite knowledge could be attained through the OJT program established at Naval Air Station Oceana. Furthermore, it was a goal of this study to challenge the notion that in a military hindered by monetary and personnel restraints, that it is practical to send air traffic controllers to a four-week course when the equivalent

knowledge can be obtained after reporting on station for duty. The researcher hypothesized there would not be a significant difference between the two groups' academic success on the final qualification examinations used as a criteria for certification.

The obtained t-value of 3.47 exceeded the .01 confidence level of 2.66. This indicates there was a significant difference between the knowledge and performance of graduates of the Advanced Radar Air Traffic Control (ARATC) Course, Pensacola, Florida, and the non-graduates who reported directly to Naval Station Oceana, Virginia, from their previous duty station. In fact, the mean scores were 1.04 point apart for each sample group. Therefore, the researcher would be justified to reject the hypothesis and conclude that there was a significant difference between the examination scores of graduates ARATC Course and the students solely receiving On-the-Job Training (OJT) at Naval Air Station Oceana, Virginia.

RECOMMENDATIONS

Based on the results and conclusions of this study, the following recommendations were made:

1. Since the mean score were extremely close, expand this study to other seven U.S. Navy Terminal Radar Approach Control (TRACON) facilities to ensure this study's findings reflect the same findings of their study.
2. Conduct further research to ascertain whether or not a significant training advantage can be gained if Air Traffic Controllers who complete ARATC training can circumvent indoctrination, prerequisite instruction, and minor qualifications and

commence training on the Approach Control (AP) position immediately after reporting for duty.

3. Conduct research to determine whether there is a significant loss of acquired knowledge of ARATC course graduates who are obligated to complete the time consuming regimen of indoctrination, prerequisite instruction, and minor qualifications prior to commencing training on the AP control position.

4. If determined that there is a significant loss of acquired knowledge of ARATC course graduates prior to reaching the AP control position, a change would need to be made by Naval Air Training and Operating Procedures Standardization (NATOPS) program manager. With the support of all eight of the U.S. Navy's Terminal Radar Approach Control (TRACON) facilities, make an official change to the NATOPS 00-80T-114, Air Traffic Control Manual, which provides a concession for ARATC course graduates to commence training on the AP control position immediately after reporting for duty.

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