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COLLEGIATE AVIATION AND FAA AIR TRAFFIC CONTROL TRAINING PARTNERSHIPS: A REVIEW OF LITERATURE

Jose R. Ruiz and Lorelei E. Ruiz

INTRODUCTION

The U.S. Air Traffic Control (ATC) system is one of the most complex structures in the world. The mission of the ATC system is to promote the safe, orderly, and expeditious flow of air traffic in the U.S. National Airspace System (NAS). The ATC system is composed of a vast network of surveillance systems, automated data processing systems, communications equipment, navigation systems, and ATC facilities (Government Accounting Office [GAO], 1998).

In 1999, U.S. Air Traffic Control Towers (ATCTs) recorded aircraft traffic activity counts of 68.2 million. U.S. Air Route Traffic Control Centers (ARTCCs) handled 44.7 million aircraft operating under Instrument Flight Rules (IFR) (Federal Aviation Administration [FAA], 2000b). Twenty-four million of these IFR aircraft represent more than 665 million domestic and international air carrier passengers (FAA, 2000b). The FAA forecasts that by the year 2011, ATCTs will handle 86.9 million aircraft operations, an increase of 27.4 percent, and ARTCCs will handle 59.4 million aircraft, an increase of 32.8 percent (FAA, 2000b).

In an effort to address the anticipated increase in aircraft operations, the FAA will have invested nearly 42 billion dollars between 1982 and 2004 toward modernizing the components of the ATC system. "Through its modernization program, FAA is upgrading and replacing equipment and facilities-such as controller workstations and airport towers-and developing new technologies-such as digital communications-to help improve the safety, efficiency and capacity of the NAS" (GAO, 1998, p. 4).

As the FAA negotiates challenges associated with the modernization of the ATC system, it must also address critical issues related to workforce training. Addressing a pending air traffic controller shortage, both GAO (1997) and NATCA (1997) note the replacement hiring that occurred in the early 1980s due to the firing of striking controllers. As those controllers reach retirement age, the concern is that too few active and fully trained controllers will be available to fill workforce requirements needed to deal with an evolving National Airspace System (NAS).

As previously indicated, the ATC system is in the midst of a massive modernization and reorganization effort. The manner in which pilots and air traffic controllers function in the ATC environment of the future will differ enormously from the present ATC system. To accommodate increasing numbers of air traffic in the NAS, the FAA is in the process of not only modernizing the ATC system, but of redefining fundamental principles associated with ATC.

A paradigm shift of this magnitude has forced the FAA to consider innovative methods for recruiting and training qualified ATC applicants. The time of reliance on the military and the FAA Academy as the primary sources of new recruits for the air traffic control system has passed. Three FAA-collegiate aviation partnership-training programs have emerged over the last 20 years: the Air Traffic Co-operative Education Program (ATCEP), the Airway Science Curricula Program (AWS), and the Air Traffic-Collegiate Training Initiative (AT-CTI) Program.

Purpose of the Study

Previous research failed to yield one principal source of information related to efforts on the collegiate level to help fill the ATC training void. The purpose of the study was to report on collegiate aviation and FAA air traffic controller training partnership programs.

Methodology

Two methods were utilized in this study. An extensive review of literature was conducted to explore the venues in which initial ATC training is conducted by collegiate aviation in partnership with the FAA. Personal

interviews were also conducted with educators experienced with collegiate air traffic control training.

Airway Science Curricula Program

The FAA introduced the AWS program in 1982 for the purpose of creating a broad cadre of qualified personnel to assume technical occupations in the aviation industry. ATC staffing issues resulting from the PATCO strike of 1981 and J. Lynn Helms, former FAA Administrator, served as the catalyst for the creation of the AWS program.

An AWS Task Force was formed in 1981 at the request of Administrator Helms to design a generic curriculum for the proposed AWS program. The University Aviation Association (UAA) was asked to appoint task force members who would be representative of college and university aviation programs throughout the United States. Because the AWS program was a baccalaureate curriculum, the original task force represented institutions offering that degree. Shortly thereafter, it was recognized that community colleges granting the associate degree might participate in the program by offering lower division course work in the core curriculum. As a result, a community college representative was appointed to the task force (UAA, 1990).

Sixty colleges and universities initially participated in the program. A grant component was added to the program after a short period of time. Congressionally provided funds were awarded to participating educational institutions in support of their AWS curriculum. Currently, there are 57 post-secondary education institutions offering approved baccalaureate AWS programs in five areas of concentration. These areas are: Airway Science Management (to train air traffic controllers), Airway Computer Science, Aircraft Systems Management, Airway Electronic System, and Aviation Maintenance Management (UAA, 1997).

The objectives of the AWS program were to provide for:

1. The recruitment/hiring of individuals who have completed or have the equivalent of a model college-level curriculum of general studies, mathematics, science and technology, management, and aviation courses.

2. The evaluation of the concept that individuals with this background recruited for FAA occupations are better able to perform functions of the job than individuals recruited through existing methods.

3. The assessment of the performance, job attitudes, and potential of airway science individuals versus those of individuals employed by current procedures.

4. The determination of the impact of this program on the employment in career professions of females and minority candidates (OPM, 1983).

In a study conducted by Bowen (1990), *A Measurement of the Effectiveness of the Airway Science Program To Meet Federal Aviation Administration Workforce Needs,* he stated the AWS program had failed to meet its workforce goals. Data were gathered from interviews with AWS program coordinators at 20 of 32 colleges and universities participating in the program.

The study identified four major concerns with the program as perceived by AWS program coordinators. The concerns mentioned by program coordinators included: (a) the FAA and the UAA should be more open-minded toward the needs of the participating institutions and delegate more responsibility for curriculum design to the institutions; (b) the FAA had failed to provide program graduates with employment as air traffic controllers in the numbers originally promised to AWS institutions; (c) inadequate and inequitable distribution of funds and (d) difficulty in attracting new students for the AWS program than for other academic programs (Bowen, 1990).

A study conducted by Broach (1991), *Air Traffic Control Specialists in the Airway Science Curriculum Demonstration Project 1984-1990: Third Summative Report,* was a quantitative study that sought to compare the performance, job attitudes, retention rates and perceived supervisory potential of graduates from AWS programs with those of individuals recruited through traditional means in the ATCS occupation. The report concluded that controllers hired from the AWS register expressed significantly more interest in an aviation-related career than controllers hired by traditional means. "There were no differences between the groups with respect to attitudes toward automation, rated managerial potential, interpersonal skills, minority and female retention rates, and job satisfaction" (p.17). Overall, the performance of AWS program hires was about the same as that of traditionally hired controllers.

The Airway Science Management curricula (ATC specialization) required students to enroll in up to an additional two semesters of study with no guarantee of employment as a FAA air traffic controller. In addition to increased expenses associated with two more semesters of study, the student was kept from entering the workforce for

that additional period of time. These issues had a negative impact on marketing of the AWS program and the recruitment of students. Management of the AWS program was delegated to the University Aviation Association (UAA) in 1994. The ATC component of the AWS program was terminated in the mid-1990's.

Air Traffic Co-operative Education Program

Co-operative education or co-op, as it is often referred to, is a program for students enrolled in an academic institution that provides for alternating classroom academics with a job in industry. The two assignments are planned and supervised co-operatively in a manner that contributes to the student's development in his or her chosen profession (Kiteley, 1997).

In 1984, the FAA developed the Air Traffic Co-operative Education Program (ATCEP) in partnership with collegiate aviation. The goal of the program was "...to meet its [FAA] short-term and long-term staffing needs in the air traffic control options" (FAA, 1984, p.1). To qualify for the program, a student had to meet the following qualifications:

1. Be enrolled in a curriculum leading to a bachelor's degree on a full-time basis (usually 12 semester hours or the equivalent), and must be pursuing a baccalaureate degree. If enrolled in a two-year participating institution, the student must transfer to a four-year participating institution in the pursuance of a baccalaureate degree.

2. Be enrolled in the institution's co-operative education program.

3. Be recommended to the FAA by the appropriate staff of the educational institution.

4. Be a citizen of the United States of America or a native of a country which owes permanent allegiance to the United States (e.g., American Samoa).

5. Not the son or daughter of an employee of the FAA (except under unusual circumstances set forth in Appendix G of Chapter 213 of the Federal Personnel Manual).

6. Be 16 years of age or over.

7. Be maintaining at least a 2.0 overall average on a 4.0 scale or the equivalent, grade C or above, in all major fields of study and must have a record as a student that in all respects is predictive of graduation.

8. Pass the aptitude examination with a score of 70 or better.

9. Meet medical requirements.

10. Meet security requirements. (FAA, 1984, p. 3)

In an interview with Dr. T. Bowman (personal communications, January 17, 2002), he mentioned "modifications in the air traffic controller hiring process, like the introduction of a new air traffic control pre-training screen program introduced in 1994, resulted in the elimination of the ATC co-op program." The FAA suspended the ATCEP in 1993.

Air Traffic - Collegiate Training Initiative Program

While both AWS and ATCEP were created to provide initial controller training and attract college-level students to a career as a controller, reviews of current training programs suggested that collegiate training could go further.

In 1988, the FAA commissioned two comprehensive studies to review its system for training air traffic controllers (Means, Mumaw, Roth, Schlager, McWilliams, Gagne', Rice, Rosenthal, & Heon, 1988 and Northern NEF, Inc., 1988). One of the more provocative recommendations of the Northern NEF study was that non-federal, post-secondary institutions be selected to develop and test academic programs for training fundamental skills and knowledge related to ATC. The scheme was named the Collegiate Training Initiative-Air Traffic Control Specialist Program. (Morrison, Fotouhi & Broach, 1996, p. 1)

The program name was eventually changed to the Air Traffic Collegiate Training Initiative (AT-CTI) and will be referred to as such throughout the rest of the study. As of October 2001, 975 students had graduated from the AT-CTI program and 590 had been hired as FAA air traffic controllers (FAA, 2001d).

Objectives of the Program

The objectives of the AT-CTI program were not found in a single source. As the program has evolved, so have the objectives of the program. Four objectives were identified, and include the following:

1. Test the concept that non-federal, post-secondary educational
institutions can develop, deliver and implement air traffic control recruiting, selection and training programs (Morrison, Fotouhi & Broach, 1996).

2. Attract females and minorities to careers in air traffic control (Morrison, Fotouhi & Broach, 1996).

3. Develop a more educated work force in the FAA

(FAA, 2000a).

    4. Use collegiate aviation as one of the primary means of meeting the future needs of the FAA for air traffic control specialists (ATCS) (FAA, 1998b).

Selection as an AT-CTI Institution

    Post-secondary institutions interested in offering Air Traffic Control training/education under the AT-CTI program submitted a formal proposal for the FAA's consideration.

    The FAA rated the proposals they received on a number of factors, such as capability to develop a valid ATC training program, the employment of advanced training methodologies, and a strategy for aggressively recruiting minority and female students. (Morrison, Fotouhi & Broach, 1996, p. 2)

    Implementation of the AT-CTI program began in 1989, with approval and funding for two programs: the Minneapolis Community and Technical College Air Traffic Control (MCTC ATCT) Program, formerly known as the Mid-America Aviation Resource Consortium (MARC), Eden Prairie, Minnesota; and Hampton University, Hampton, Virginia. In 1991, FAA Order 3120.26 established the AT-CTI program (Broach, 1998).

    Three additional schools were selected for the program in 1991, bringing the total to five institutions:

    1. Minnesota Air Traffic Control Training Center (MCTC ATCT), Eden Prairie, MN;

    2. Hampton University (HU), Hampton, VA;

    3. Community College of Beaver County (CCBC), Monaca, PA;

    4. University of North Dakota (UND), Grand Forks, ND; and

    5. University of Alaska Anchorage (UAA), Anchorage, AK. (Morrison, Fotouhi & Broach, 1996, p. 2)

Revised AT-CTI Program

    AT-CTI program graduates who were hired by the FAA were assigned to air traffic field facilities and entered into developmental training. As a result of numerous evaluations and collected data, the FAA modified and expanded the program to allow additional post-secondary educational institutions. The revised AT-CTI program focused on the development of a broad-based knowledge of the: air traffic management system, FAA, aviation industry, and principal topics covered in many existing aviation degree programs.

    It is not intended, as in the current [AT]-CTI program, that program graduates will be assigned directly to field facilities. Instead, the revised program will require that all graduates attend the FAA Academy for specific equipment techniques and skills training. (FAA, 2000a, p.1)

    Post-secondary educational institutions participating in the revised AT-CTI program had the option of continuing in the program. However, any student enrolled in the revised program after August 1997, upon successful completion of the AT-CTI program, was required to attend the FAA Academy and successfully complete the skills and equipment training. Under this approach, the FAA assured that all new controllers entering a field facility had received standardized training on current equipment and were well versed in existing policies, procedures, and requirements.

    The FAA expanded the number of institutions participating in the AT-CTI program to 13, including:

    1. College of Aeronautics, Flushing, NY

    2. Community College of Beaver County, Beaver Falls, PA

    3. Daniel Webster College, Nashua, NH

    4. Dowling College, Oakdale, NY

    5. Embry-Riddle Aeronautical University, Daytona Beach, FL

    6. Hampton University, Hampton, VA

    7. Inter American University of Puerto Rico, San Juan, PR

    8. Miami-Dade Community College, homestead, FL

    9. Middle Tennessee State University, Murfreesboro, TN

    10. Mount San Antonio College, Walnut, CA

    11. Purdue University, West Lafayette, IN

    12. University of Alaska Anchorage, Anchorage, AK

    13. University of North Dakota, Grand Forks, ND (FAA, 2001)

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Minneapolis Community & Technical College Air Traffic Control (MCTC ATCT) Program

The MCTC ATCT is no longer classified as an AT-CTI institution. According to Mr. Tom Buzzard, MCTC ATCT Program Manager, (personal communications, January 10, 2002) in 1995 the MCTC ATCT program was removed from the AT-CTI program and awarded a contract by the FAA to provide initial air traffic controller training. The MCTC ATCT program is 18 weeks long and very intensive, combining classroom instruction with realistic "hands on" ATC simulation. Unlike AT-CTI program graduates, MCTC ATCT graduates are assigned directly to an ATC facility rather than proceeding to the FAA Academy for additional training. As of October 2001, 571 MCTC ATCT graduates had been hired by the FAA (FAA, 2001d).

Advantages Associated with the AT-CTI Program

A study conducted by Morrison, Fotouhi & Broach (1996, p. 37) cites "even a cursory examination reveals that the AT-CTI institutions have developed methods and technologies that are different from the FAA and different from each other". The study further mentions "...AT-CTI institutions are in fact developing and implementing diverse approaches and technologies related to ATC training".

A variety of arguments have been made in favor of delegating initial ATC training to collegiate aviation. What follows is a summary of justifications mentioned in the report by Morrison, Fotouhi & Broach (1996):

1. The knowledge and skills acquired through a college education promote better performance and flexibility on the job. At a general level, a college education is thought to produce a "deeper and wider knowledge base" in ATC-related subjects. This knowledge base is considered essential to cope with anticipated increases in controller workload.

2. Additional ATC training programs expand the current pipeline of trained air traffic controllers. This expansion is viewed in terms of both the greater numbers required to meet staffing requirements in the NAS and in diversity to include a greater proportion of minorities and females in the profession. Colleges/universities are viewed as an excellent venue to increase controller workforce diversity.

3. Collegiate training promotes professionalism among the controller workforce. It has been argued that the level of controller education should be congruent with the

responsibilities and civil service rank (GS-12 to GS-14) associated with the job.

4. In a collegiate training environment students also assume costs related to their education, resulting in reduced costs to the federal government for entry-level ATC training.

5. Collegiate training programs have access to technical training expertise that can lead to the development of innovative approaches to training. (p.1)

AT-CTI Curriculum

AT-CTI program institutions are expected to develop their own curriculum. Institutional curriculum must address specific behavioral objectives and academic standards outlined by the FAA. For example, the Aeronautics and Transportation Department at Mount San Antonio College in Walnut, California offer an Associate Degree in Aviation Science that was developed to meet AT-CTI curriculum requirements. The degree program requires that students enroll in the following coursework:

1. AERO 23 - Primary Pilot Ground School/4 Units
2. AERO 24 – Navigation/3 Units
3. AERO 26 - Aviation Weather/3 Units
4. AERO 27 - Aviation Safety and Human Factors/3 Units
5. AERO 29 - Federal Aviation Regulations/2 Units
6. AERO 30 - Instrument Ground School/3 Units
7. AIRT 41 - Aircraft Recognition and Performance/2 Units
8. AIRT 42 - Air Traffic Control Environment/3 Units
9. AIRT 43 - Air Traffic Control Team Skills/1.5 Units
10. CIS 10A - Computer Information Systems/3.5 Units
11. Tran 17 - Air Transportation/3 Units (Mount San Antonio College, 2001, p. 76)

The manner in which FAA behavioral objectives are integrated into program curricula is determined by each university/college in conjunction with FAA approval. Specifically, the FAA (1998a) recommends the inclusion of activities that promote learning not only at the rote level, but also require the student to apply acquired knowledge to a variety of real-life scenarios. However, each school is encouraged to develop creative and interesting instructional activities that address program standards. Students in

UAA's AT-CTI curriculum take four flying-related classes in the course of their training, while students at UND and CCBC are required to earn a FAA Private Pilot Certificate; the FAA Academy lacks the resources to require or provide this additional training (Morrison, Fotouhi & Broach, 1996).

AT-CTI Graduate - FAA Employment Selection Process

Upon graduation, AT-CTI program graduates are considered for employment in air traffic control towers and air traffic control en-route centers. Graduates are not guaranteed employment with the FAA, but become part of the hiring pool being considered for employment by the FAA.

Prior to 1997, AT-CTI graduates hired by the FAA were assigned directly to an air traffic control facility. Post-1997 graduates hired by the FAA are required to attend the FAA Academy for specific equipment, techniques and skills training. As of October 2001, the AT-CTI program and the MCTC ATCT program produced 1161 graduates that had been hired as FAA air traffic controllers (FAA, 2001d).

The selection process for AT-CTI graduates applying for positions within the FAA as air traffic controllers is as follows:

1. AT-CTI schools submit names of students enrolled in their AT-CTI program to FAA, Aviation Careers (AMH-300). Names are maintained in the AT-CTI database for tracking purposes until graduation and recommendation.

2. The FAA authorized pre-employment test is given just after enrollment in an AT-CTI program. The purpose of the test is to determine whether an individual has the aptitude to become an air traffic control specialist. Prior to testing, an individual must complete and submit a citizenship paper stating that he/she is a United States citizen. Individuals who are not United States citizens will not be allowed to test. After achieving a qualifying score on the FAA authorized pre-employment test, individuals are notified of their results. If an individual achieves a qualifying score, he/she is asked to complete several forms, which include geographic preference sheet and self identify veterans' preference sheet.

3. Upon successful completion of a FAA approved AT-CTI program, individuals who receive a school recommendation and who meet basic qualification requirements, including age limit and achieving a qualifying score on the FAA authorized pre-employment test, are made eligible in the AT-CTI database from which they may receive employment consideration. Candidates who do not receive a recommendation will not be considered under this program, and their names will be removed from the AT-CTI database. Recommendations, by school officials, may only be obtained once through the AT-CTI program.

4. When it has been determined that air traffic controller vacancies can be filled from the AT-CTI database, a region contacts the Aviation Careers Division for a list of eligible graduates for that geographic location.

5. Referral lists are issued based on the graduates' primary geographic preference and GPA with veterans' preference rules applied. Note that second and third geographic preferences are only utilized if there is a shortage in that location.

6. Candidates who are being considered for employment by the hiring region will begin the pre-employment process, i.e., suitability, medical, and security clearances. If selected by the agency, employees will attend the FAA Academy in Oklahoma City for training.

7. Candidates who were referred but not selected are returned to the AT-CTI database for future referral unless the candidate's eligibility expires, the candidate reaches age 31, the candidate declines a position, or the candidate is selected, whichever comes first.

8. Eligibility under this program is good for 2 years from the candidate's graduation date, or the candidate reaches age 31, or the candidate declines a position, or the candidate is selected, whichever comes first.

9. Individuals may not reapply through this program if removed for failure to meet any qualification requirements or failure to receive recommendation from authorized school officials. (FAA, 2001a, p. 1)

Summary

The evolution of the U.S. aviation industry has resulted in an air traffic control system that is the safest and most complex in the world. As more aircraft are introduced into the system, the implementation of advanced air traffic

control systems and the need for highly trained, highly qualified personnel are paramount to maintaining the high level of air safety enjoyed throughout the United States. The need to train increasing numbers of air traffic controllers to meet FAA staffing requirements remains at the forefront of the agency's most pressing imperatives.

As controllers hired in the early 1980s near retirement age, the FAA must consider expanding its options in the area of controller training. In the past and present, the FAA has relied on collegiate aviation to supplement air traffic controller recruitment and training efforts. The Airway Science Program and Air Traffic Co-operative Education Program enjoyed moderate success, but are no longer viewed as viable methods of supplementing the air traffic controller workforce. The AT-CTI and MCTC ATCT programs have evolved from these previous FAA-collegiate aviation partnerships, and appear to be the future of initial air traffic controller training. ✈

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