



North Texas Aviation Education Initiative

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS

An Analysis of the Gap Existing Between Aviation Workforce Needs and Supply for North Central Texas

September 2009



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AN ANALYSIS OF THE GAP EXISTING BETWEEN AVIATION WORKFORCE NEEDS AND SUPPLY FOR NORTH CENTRAL TEXAS

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A. GLOSSARY

This section defines acronyms and abbreviations used throughout the document.

Term	Description
A&P	Airframe & Powerplant
ATC	Air Traffic Control
AT-CTI	Air Traffic Collegiate Training Initiative
BLS	U.S. Bureau of Labor Statistics
CIP	Classification of Instructional Programs
FAA	Federal Aviation Administration
FY	Fiscal Year
NAICS	North American Industry Classification System
NCTCOG	North Central Texas Council of Governments
SOC	Standard Occupational Classification
THECB	Texas Higher Education Coordinating Board
TWC	Texas Workforce Commission



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B. INTRODUCTION

The North Texas Aviation Education Initiative under development by the North Central Texas Council of Governments (NCTCOG) requires, as an integral part of its foundation, an analysis of the existing gap between the current and projected aviation workforce needs and supply for North Central Texas, the 16-county area of Collin, Dallas, Denton, Ellis, Erath, Hood, Hun, Johnson, Kaufman, Navarro, Palo Pinto, Parker, Rockwall, Somervell, Tarrant, and Wise counties. Utilizing the extensive research and databases developed early in this project, two matrices have been created; one reflects the industry's future needs and supply for the State of Texas and one addresses these same projections for the region. This analysis will, in turn, be used to support the development and implementation of a public education program, geared toward a four-year degree plan with a flight component.

C. MATRIX DEVELOPMENT

The primary source for the matrix data is the Texas Workforce Commission (TWC) which, in addition to collecting its own, utilizes data secured from the U.S. Bureau of Labor Statistics (BLS) and the Texas Higher Education Coordinating Board (THECB). Stratifications according to the North American Industry Classification System (NAICS) allowed for the study of primary job classifications found in the aviation industry today. Ultimately, eight job titles were selected that were identified as being aviation specific and readily available in the employment data. In order to focus even more clearly on aviation, it was determined that these jobs are, or can be, supplied by graduates of aviation-specific academic programs. The academic programs, according to their Classification of Instructional Programs (CIP) code, are shown in Exhibit 1.



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Exhibit 1: Aviation Academic Programs by CIP Code

- 15 Engineering Technologies/Technicians
 - 15.0801 Aeronautical/Aerospace Engineering Technology/Technician

- 47 Mechanic and Repair Technologies/Technician
 - 47.0607 Airframe Mechanics and Aircraft Maintenance Technology/Technician

 - 47.0608 Aircraft Powerplant Technology/Technician

 - 47.0609 Avionics Maintenance Technology/Technician

- 49 Transportation and Materials Moving
 - 49.01 Air Transportation
 - 49.0101 Aeronautics/Aviation/Aerospace Science and Technology, General
 - 49.0102 Airline/Commercial/Professional Pilot and Flight Crew
 - 49.0104 Aviation/Airway Management and Operations
 - 49.0105 Air Traffic Controller
 - 49.0106 Airline Flight Attendant
 - 49.0108 Flight Instructor
 - 49.0199 Air Transportation, Other

- 52 Business, Management, Marketing, and Related Support Services
 - 52.0209 Transportation/Transportation Management

Source: U.S. Department of Education, Classification of Instructional Programs – 2010



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The selection of job titles was further clarified by reviewing the occupational crosswalk that links academic programs with job titles/Standard Occupational Classification (SOC) codes. Exhibit 2 shows the link between the academic programs in aviation and the specific jobs that they are intended to supply as defined by their SOC code and job title.

Exhibit 2: Classification of Instructional Programs – Standard Occupational Classification Crosswalk

15.0801 Aeronautical/Aerospace Engineering Technology/Technician 17-3021.00 Aerospace Engineering and Operations Technicians
47.0607 Airframe Mechanics & Aircraft Maintenance Technology/Technician 49-2091.00 Avionics Technicians 49-3011.00 Aircraft Mechanics and Service Technicians 51-2011.00 Aircraft Structure, Surfaces, Rigging, and Systems Assemblers
47.0608 Aircraft Powerplant Technology/Technician 49-3011.00 Aircraft Mechanics and Service Technicians 51-2011.00 Aircraft Structure, Surfaces, Rigging, and Systems Assemblers
47.0609 Avionics Maintenance Technology/Technician 49-2091.00 Avionics Technicians 51-2011.00 Aircraft Structure, Surfaces, Rigging, and Systems Assemblers 53-6051.01 Aviation Inspectors
49.0101 Aeronautics/Aviation/Aerospace Science & Technology, General 11-3071.01 Transportation Managers 11-3071.02 Storage and Distribution Managers
49.0102 Airline/Commercial/Professional Pilot and Flight Crew 53-2011.00 Airline Pilots, Copilots, and Flight Engineers 53-2012.00 Commercial Pilots
49.0104 Aviation/Airway Management and Operations 11-3071.01 Transportation Managers 11-3071.02 Storage and Distribution Managers 53-1011.00 Aircraft Cargo Handling Supervisors
49.0105 Air Traffic Controller 53-2021.00 Air Traffic Controllers 53-2022.00 Airfield Operations Specialists
49.0106 Airline Flight Attendant 39-6031.00 Flight Attendants
49.0108 Flight Instructor 53-2011.00 Airline Pilots, Copilots, and Flight Engineers 53-2012.00 Commercial Pilots
49.0199 Air Transportation, Other No CIP titles match
52.0209 Transportation/Transportation Management 11-3011.00 Administrative Services Managers 11-3071.01 Transportation Managers 11-3071.02 Storage and Distribution Managers 11-9199.99 Managers, All Other 13-1081.00 Logisticians

Source: Occupational Information Network (www.onetcenter.org) / U.S. Department of Education, Classification of Instructional Programs - 2010



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The primary jobs selected for inclusion in the matrices are those that represent most of the main functions and largest number of employees in the aviation industry. This grouping, by design, is not an exhaustive list of the available supply of primary jobs. An analysis of additional aviation professions that have high public profiles but have no related academic programs in the state is also included in this report. These are flight attendants and aerospace engineering and operations technicians. Air traffic controllers (SOC 53-2021) are not included in this matrix design for reasons discussed in a following section of this report.

Matrix Description

Two matrices were developed for a snap-shot look at education needs and supplies; one for the State of Texas and one for North Central Texas. The matrix configuration is described in this section. Please refer to Exhibit 3 while reading this discussion.



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Exhibit 3: Aviation Education Needs/Supply Matrix – Texas

SOC/Title	Employment Levels		10-yr Change	Annual Need = Growth + Replacement	Recent Graduates Academic Year 2005	Future Outlook of Academic Supply
	2006	2016				
17-3021 Aerospace Engineering and Operations Technicians	691	818	127	18	n/a	n/a
39-6031 Flight Attendants	10,550	13,050	2,500	435	n/a	n/a
49-2091 Avionics Technicians	2,350*	2,800*	450	70	296	Sufficient
49-3011 Aircraft Mechanics and Service Technicians	17,150*	21,250*	4,100	580	457	Deficient
51-2011 Aircraft Structure, Surfaces, Rigging, and Systems assemblers	3,454	4,064	610	129	457	Sufficient
53-2011 Airline Pilots, Copilots, and Flight Engineers	7,800	9,900	2,100	440	83	Deficient
53-2012 Commercial Pilots	2,350	3,050	700	140	83	Deficient
53-2022 Airfield Operations Specialists	400	550	150	20	5	Deficient

Source: Texas Workforce Commission. Note: Employment Data for 17-3021 and 51-2011 are for 2004/2014. n/a => No academic programs available/No determination made.

Notes for reviewing the matrix.

1. Standard Occupational Classification is abbreviated SOC.
2. *Employment data for 17-3021 (avionics technicians) and 51-2011 (aircraft mechanics, service technicians) is for 2004/2014.
3. No academic programs are available (na).
4. No determination is made (na).
5. If the "Supply" number is between the numbers of "Recent Graduates" and "Need", projected academic supply for the future is considered "Sufficient."
6. If the "Need" number exceeds the "Recent Graduates" by more than 10 percent, the projected academic supply for the future is considered "Deficient."



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Eight job titles with their SOC codes are utilized because they are identified by TWC data as being the most closely associated with the air transportation industry. They are the job titles linked to academic programs in aviation, and they are the aviation-specific titles that have emerged from the four NAICS areas examined. For each of these job titles, a corresponding baseline (2006) level of employment is included along with a projected level of employment (2016). The difference between these two employment levels is shown in the “Change” column and represents the 10-year need. A “Need” column exists to show what the project need is going forward from 2006 to 2016 on an annual basis. This “Need” represents the change in employment due to growth and the need to replace existing workers due to retirement/attrition. These are represented in one column and are on an annual basis.

Additionally, recent graduate information is provided as linked by the CIP/SOC crosswalk. Data provided by the TWC incorporates data from other sources. “Recent Graduates” is the academic supply number and is the metric viewed vis-a-vis the “Need.” These recent graduates are from academic institutions in their respective areas, Texas (Exhibit 3) and North Central Texas (Exhibit 4). Additional academic supply numbers are discussed in another section.

From the current and projected levels of employment and a measure of the recent graduates that pertain to each of the specific job titles/classifications, their relationships are characterized by the assignment of a qualitative description of the academic supply.

Supply Descriptor

The terms “Sufficient” and “Deficient” are used to characterize the need/supply relationship. If the number of “Recent Graduates” and the “Need” are within 10 percent of each other on either side or if the “Recent Graduates” exceed the “Need” by more than 10 percent, the supply is considered “Sufficient.” If the “Need” exceeds the “Recent Graduates” by more than 10 percent, the supply is considered “Deficient.” The greater the deficit, obviously, the greater the need to consider how the region might structure an aviation education program that best serves both the state and the region.

These primary professions do not account for a significant number of jobs that are available at aviation-related employers which are not necessarily aviation-specific in terms of their function. These include a variety of engineering, environmental, business, administrative, and technical functions that are applied in an aviation setting. While an education or training from an aviation program may not be required, it may be seen as an asset from an employer perspective. A new employee that already has a background and familiarity in the industry in which they are working is a benefit to the employer who does not have to expend resources to train the employee.

Two of the included job titles/SOCs require additional explanation. These two are:

- 39-6031 Flight Attendants; and
- 17-3021 Aerospace Engineering and Operations Technicians.

As can be seen on the matrix, there is missing data and no subsequent supply descriptor because there are no academic programs in the state tied to these two job titles. A review of THECB data shows no current academic program linked to the job title 17-3021 Aerospace Engineering and Operations Technicians. It exists under CIP 15.0801 Aeronautical/Aerospace

Engineering Technology/Technician. The same is true for the flight attendant job title. Its job title/SOC is 39-6031 is linked to the CIP 49.0106 Airline Flight Attendant, and there is no academic program in the state. Again, these linkages are made via the crosswalk discussed earlier.

While it is likely that aeronautical technicians could be supplied through related academic programs (CIP codes 47.0607/47.0608/47.0609), the same cannot be said about flight attendants. While the academic program code exists, it is not likely such a program exists or would be developed. The primary reason for this is the lack of a requirement of a four-year degree for employment. While it would not be unusual for two years of college to be required, there exists no overarching need for the education to be in an aviation-related field.

D. MATRIX ANALYSIS: STATE AND REGIONAL AVIATION WORKFORCE NEED AND SUPPLY

The two matrices provide a picture of the aviation workforce needs and academic supply for both Texas and North Central Texas. As noted earlier, it includes employment levels for 2006 and 2016, the projected need over the time period, and a measure of academic supply for each of the aviation-specific job titles. Additionally, a descriptor for each of the included job titles is based on the need and supply relationship. Resulting conclusions are not necessarily the same for the state and region.

In Texas, there is sufficient supply of avionics technicians and aircraft structure, surfaces, rigging, and systems assemblers. There is a deficit, however, for four categories: aircraft mechanics and service technicians; airline pilots, copilots, and flight engineers; commercial pilots; and airfield operations specialists. The deficit among the airline pilots, copilots, and flight engineers category is the most dramatic as supply is only 19 percent of need. While approximately the same percentage held for airfield operations specialists, the overall numbers are significantly less. The supply of commercial pilots is also particularly low. The supply is 60 percent of need. The other job categories showing a deficit have more of a balanced picture but a need beyond 10 percent nonetheless.

Noteworthy among avionics technicians is the seemingly oversupply at more than 400 percent of need. This is on the state-level and not the regional level as need exists in the region. These avionics technicians may be succeeding in finding work in other industries as noted later in this report. The avionics education program appears to be serving as a successful training ground for other industries.



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Exhibit 4: Aviation Education Needs/Supply Matrix – North Central Texas

SOC/Title	Employment Levels		10-yr Change	Annual Need = Growth + Replacement (annual)	Recent Graduates Academic Year 2005	Future Outlook of Academic Supply
	2006	2016				
17-3021 Aerospace Engineering and Operations Technicians	426	508	82	10	n/a	n/a
39-6031 Flight Attendants	5,650	6,500	850	185	n/a	n/a
49-2091 Avionics Technicians	1,350*	1,600*	250	40	3	Deficient
49-3011 Aircraft Mechanics and Service Technicians	7,800*	9,650*	1,850	270	89	Deficient
51-2011 Aircraft Structure, Surfaces, Rigging, and Systems assemblers	2,496	2,972	476	92	89	Sufficient
53-2011 Airline Pilots, Copilots, and Flight Engineers	4,050	4,800	750	190	32	Deficient
53-2012 Commercial Pilots	650	800	150	30	32	Sufficient
53-2022 Airfield Operations Specialists	150	200	50	0	5	Sufficient

Source: Texas Workforce Commission. Note: Employment Data for 17-3021 and 51-2011 are for 2004/2014. n/a => No academic programs available/No determination made.

Notes for reviewing the matrix.

1. Standard Occupational Classification is abbreviated SOC.
2. *Employment data for 17-3021 (avionics technicians) and 51-2011 (aircraft mechanics, service technicians) is for 2004/2014.
3. No academic programs are available (na).
4. No determination is made (na).
5. If the "Supply" number is between the numbers of "Recent Graduates" and "Need", projected academic supply for the future is considered "Sufficient."
6. If the "Need" number exceeds the "Recent Graduates" by more than 10 percent, the projected academic supply for the future is considered "Deficient."



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In North Central Texas, there is sufficient academic supply of three job title categories: aircraft structure, surfaces, rigging, and systems assemblers; commercial pilots; and airfield operations specialists. All have a supply that is within 10 percent of the need. There are, however, deficits for three job title categories: avionics technicians; aircraft mechanics and service technicians; and airline pilots, copilots, and flight engineers.

There is a need for avionics technicians in the region that far outpaces its ability to produce them in the academic setting. The matrix shows only three being produced when 40 are needed annually (7.5 percent). Additionally, the imbalance in the airline pilot category is significant in that while only 17 percent of the need is met; however, this is not true of the commercial pilot category. (A commercial pilot is defined as the holder of a certificate that permits him/her to pilot an aircraft for hire.) This seems to indicate that the airline pilot category is likely to be filled with those holding four-year degrees, and the commercial pilot category includes professional flying jobs that do not have the same requirements as the airlines.

It should be noted that academic programs do not only supply one job title as defined by the SOC code. They may, in fact, supply several. The data appears to show that the job categories of aircraft mechanics and service technicians and aircraft structure, surfaces, rigging, and systems assemblers are supplied by the same academic programs. Additionally, the airline pilots, copilots, and flight engineers category and the commercial pilots category are served by the same academic programs. However, consolidating them may lead to incorrect assumptions because these two individual job titles may carry different requirements. When viewing the needs and supply, one should take into account that the supply for these is coming from the same source. This would appear to further underestimate the need as the supply that is used to meet the need of one category is not available to meet the need of the other. In short, the supply is being double counted when the need is not.

E. GAPS AT THE REGIONAL LEVEL

An examination of the employment data and the supply of aviation education program graduates in the region reveals several gaps. First, the lack of a four-year aviation degree program is clear for two primary reasons. There is no option for students to become professional pilots as part of their degree plan. This is an important pipeline for airline pilots and no such opportunity exists in the region. Secondly, there are no aviation-related options for those skilled/technical workers in the two-year programs to continue on in their education, thus placing themselves in a position to assume supervisory or management positions within their field/company. The combination of a technical skill set and a college degree is an asset to the employer as the employee has a greater familiarity with the workplace and all of its demands as opposed to a supervisor who may not have the technical background or another employee who may not have the management background. Additionally, the four-year program is capable of training a workforce for a myriad of positions within and outside of aviation and transportation fields.

The region also needs additional aircraft mechanics and service technicians. While academic resources do exist in the region, the area is home to a significant number of aviation/aerospace manufacturing jobs and airports that need them. The need for avionics technicians in the region exists, despite the adequate supply statewide. The need for these additional technical workers is apparent as is the need for a four-year aviation program with close ties and interaction between itself and the industries it serves.

Description of National Aviation Workforce Supply and Need

In summary, there appears to be a widening shortfall in the number of qualified personnel to meet the growing needs of the aviation industry. While objectively measured in terms of the number of skilled labor and professional flight personnel, the needs of the industry also include managerial and executive level aviation professionals which is difficult to quantify. The gap analysis reveals that as the nation emerges from the current economic distress, there should be a concern that the demand for entry level managerial and specialized knowledge workers will not be met by current sources and supply of graduates to fill the positions. As shortfalls materialize, there will be a commensurate impact on aviation employers in North Central Texas, who will be forced to compete for a dwindling pool of qualified personnel in the marketplace. One method for minimizing the effect on the region's aviation interests is to create and develop the resources and infrastructure to support the establishment of a "pipeline" for entry-level personnel within the industry.

F. OTHER RELEVANT EMPLOYMENT CATEGORIES/OPPORTUNITIES

While the matrices show the gaps for the primary professions in the state and in the region, they do not provide a comprehensive picture of all aviation employment needs. Other job opportunities and employment needs in the aviation industry exist and are worthy of discussion. It should be noted that there is significant employment in the aviation industry and not all of the jobs require an education in an aviation-related field or from an aviation education program. With that said, there are some obvious and inherent benefits to hiring employees who do have this familiarity and background.

Whether it is filling a need in marketing, software development, or customer service, among the many others, having such a background and understanding of the industry certainly can enhance job performance, customer/client satisfaction, and employee/company productivity. Aviation program graduates are likely to be considered as qualified candidates for a variety of jobs both in and out of the aviation industry and not simply those primary professions described in the matrices. In some sense, the matrix design understates the overall need and benefit of an enhanced and coordinated academic supply of aviation program graduates. Additionally, it is difficult for the data sources to fully capture the need for aviation management positions in the myriad of workforces whether in the airlines, aviation manufacturing, or airport/public agency environments. The aviation workforce in the state and region is a large one; the number of graduates coming out of academic programs in the region and state is small. The academic program data that reveals the number of graduates the state is producing, in itself, reveals a worrisome gap.

Following is a discussion of additional high profile jobs that are not represented in the matrices. These include air traffic controller and dispatchers. Each of these was not included for different reasons. The air traffic controllers, while small in number, are a different type of job. With a significant number of them being employed by the Federal Aviation Administration (FAA), the employment pipeline and selection is performed at the national level. While one could prepare for such a career at a particular program in one state, they may very well end up being assigned to a job in another state. The dispatcher jobs, although important in function, are quite small in number. Both are addressed separately below with employment levels and growth data provided.

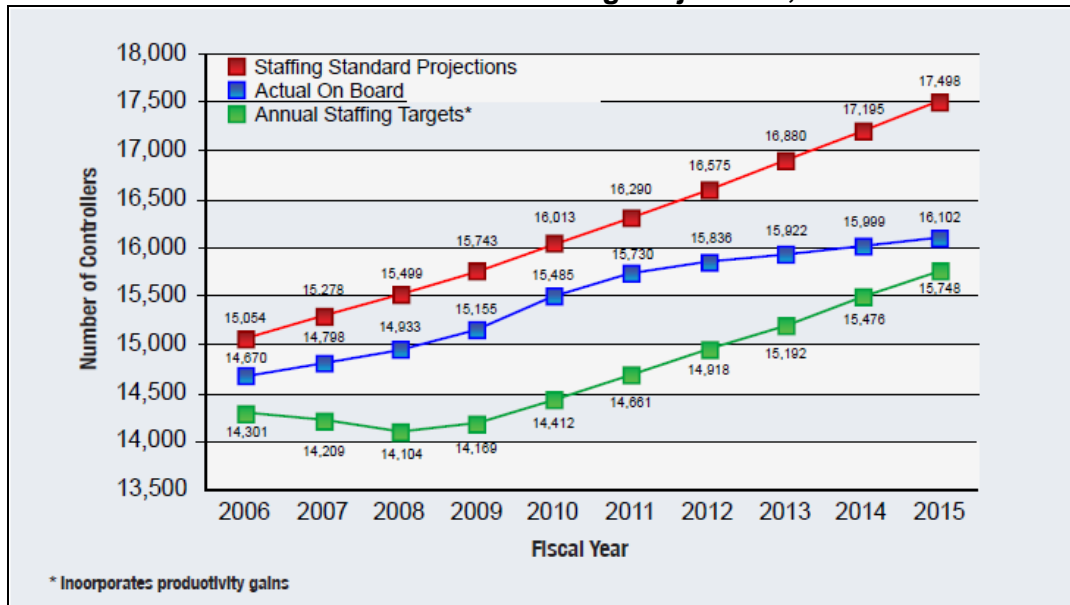
Air Traffic Controllers

As an occupational category, Air Traffic Controllers have significantly different characteristics over the other aviation-oriented occupations. The FAA as the primary employer of air traffic controllers throughout the country has concentrated its training and certification activities at its training academy in Oklahoma City, OK. Graduates of the academy are dispatched to locations where staffing replacements are required.

Currently, the FAA is confronted by the fact that a substantial number of controllers, who were hired immediately after striking controllers were fired in 1981, are approaching the mandatory retirement age of 58. One initiative the FAA has implemented to streamline and speed up the integration of new controllers into the Air Traffic Control (ATC) system is the Air Traffic Collegiate Training Initiative (AT-CTI) program. This program is a partnership with colleges and universities that offer two- and four-year non-engineering aviation degrees that include basic courses in ATC. While graduates of the AT-CTI program must still successfully complete their qualifications training at the FAA academy, the program allows these college graduates to bypass the FAA's Air Traffic Basics Course, which is conducted during the first five weeks of qualification training.

On a national level, the FAA has projected a continuous staffing shortfall of controllers through Fiscal Year (FY) 2015. Exhibit 5 illustrates national FAA staffing projections FY 2006 - 2015.

Exhibit 5: FAA Air Traffic Controller Staffing Projections, 2006-2015



Source: A Plan for the Future, The Federal Aviation Administration's 10-Year Strategy for the Air Traffic Control Workforce (2006-2015).

The growth of aviation activity in North Central Texas will contribute to the shortfall of controller staffing in future years. However, in terms of the adequacy of qualified controllers for staffing the region's ATC needs, the responsibility and authority for responding lies solely within the FAA.

Exhibit 6 shows the projected need for air traffic controllers in Texas and the 16-county North Central Texas Region through 2016.

Exhibit 6: Occupational Projections for Air Traffic Controllers in the North Central Texas Region and State, 2006-2016

Area/Location	Estimated Employment 2006	Projected Employment 2016	Change	Annual Growth	Annual Openings Due To Replacement	Total Annual Openings
North Central Texas	1,150	1,450	300	30	35	65
Texas	2,700	3,400	700	70	75	145

Source: Texas Workforce Commission

Dispatch Certificate Holders

A flight dispatcher is a FAA licensed person who plans flights taken by the airlines. The dispatcher is responsible for a variety of activities. These include determining the best route, the payload, weather, available diversion fields, and ATC procedures along the way. A dispatcher can plan and monitor as many as three to five flights at a time. Airlines are the principal employer of flight dispatchers, and opportunities exist at airlines of all sizes. Being the headquarters for three major airlines, Texas has a disproportional number of flight dispatcher jobs located in the state. The number of available jobs, and possibly the subsequent need, may be relatively small compared to other disciplines. Exhibit 7 shows the number of dispatcher certificate holders in Texas and in the United States. It is important to note that not all of those who hold such a certificate are employed—or even seeking employment—in such a capacity.

Exhibit 7: Number of FAA Dispatcher Certificate Holders in Texas and the Nation, 2004-2008

Year	Dispatcher Certificate	
	Texas	U.S.
2004	2,066	14,499
2005	2,130	14,960
2006	2,196	15,304
2007	2,264	15,570
2008	2,328	15,896

Source: U.S. Civil Airmen Statistics, Federal Aviation Administration

Although a four-year college degree is not necessary for employment as a dispatcher, a degree in air transportation or meteorology is useful and preferred. According to the BLS, dispatchers, in general, are employed in a variety of industries. Those employed in air transportation-specific settings are shown in Exhibit 8 which includes employment levels and growth projections. The national employment picture does not show a growing employment base, but the situation may vary by location. Certainly, those regions with airlines based nearby would see more job-related activity whether it is replacement of existing workers or growth to include additional workers.

Exhibit 8: National Dispatcher Employment Levels and Projections, 2006-2016

Industry	NAICS Code	2006 Employment	2016 Employment	Growth Rate 2006-2016
Scheduled Air Transportation	4811	1,096	1,089	-0.63%
Nonscheduled Air Transportation	4812	458	467	1.90%
Support Activities for Air Transportation	4881	596	648	8.72%
Total		2,150	2,204	2.51%

Source: Bureau of Labor Statistics, 2006-2016 Occupational Matrix

Airframe and Powerplant and Repairmen Certificate Holders

Additional data worth examining, because it provides an additional perspective, is the number of Airframe & Powerplant (A&P) certificate holders. As with the dispatcher certificates, some caveats exist regarding certificate holders and any desire to link them with employment levels and/or job seekers. Many people employed in a variety of technical, manufacturing, and professional jobs hold A&P certificates but have no interest or desire in seeking employment as an A&P mechanic. They earn their certification out of interest and a desire to enhance their skill set as well as their professional abilities and opportunities. This undoubtedly makes them more valued employees as they offer a wider skill set and increased capabilities to their employers.

An A&P mechanic is certificated to work on all aircraft components and does not have to be employed by an airline, certificated maintenance shop or other enterprise. A&P mechanics have substantial testing (written, oral, and practical exams) and experience requirements of 18-30 months. A repairman certificated to work on a specific aircraft type or component, must be employed by an airline, certificated repair shop or production manufacturer. A repairman works under the shop's certification, and privileges terminate after he leaves the employ of the enterprise. Repairmen undergo specific training requirements for their area of expertise and have an 18-month experience requirement. A&P certificate holders are also indentifying other uses of these skills. For example, A&P mechanics are being hired to work in the oil and gas industry.

In addition to the two-year programs that offer degrees in aviation maintenance-related fields in conjunction with FAA certification, a number of non-academic entities provide training for A&P classification. Exhibit 9 shows the number of airframe and/or powerplant certificate holders along with the number of repairman certificates held in the state of Texas and in the United States.

Exhibit 9: Number of FAA Airframe and/or Powerplant and Repairman Certificate Holders, 2004-2008

Year	FAA Airframe and/or Powerplant		FAA Repairman	
	Texas	U.S.	Texas	U.S.
2004	30,245	296,079	3,436	39,144
2005	30,523	298,799	3,532	39,937
2006	30,978	301,157	3,591	40,239
2007	31,007	300,484	3,633	40,198
2008	31,497	303,475	3,718	40,985

Source: U.S. Civil Airmen Statistics, Federal Aviation Administration

These numbers overstate the number of those actually working as mechanics/repairmen for the reasons mentioned above. The number of individuals working in Texas as aircraft mechanics and service technicians is on the order of half of those actually holding certificates. What is noteworthy, however, is the large number of certificate holders that appear not to be moving through academic programs. If this is, indeed, the case, there is the potential lack of A&P certificate holders capable of moving into management positions due to the lack of a college degree. Of course, this data does not readily indicate that that is the case as we have no way of knowing if the certificate holders also hold academic degrees that would make them qualified and eligible for management positions. Strengthening this connection going forward, however, through coordinated academic programs would alleviate the concern and generate graduates with both the technical and management skills to assume key roles in the air transportation sector. Today, the lack of comprehensive four-year programs in the state, both in terms of number, type, and location of program, precludes that option or opportunity for many A&P holders as well as those wishing to pursue such a combination.

Pilot Data by Certificate Type

Much like the A&P certificate data, certain pilot certificate data is provided here to give additional perspective on the numbers of certificate holders in Texas and the United States. This more-or-less “order of magnitude” perspective is useful because it provides an overview of the industry. The caveats that were given for the A&P certificate data are also relevant here. Some of these represented may be employed as professional pilots while many others are employed in other industries and/or professions. Holders of pilot certificates may make themselves more valuable to their employers or more marketable to prospective employers for non-flying jobs by having such background and capabilities.

Many of these certificates were achieved independent of an academic program setting. The observations made about the mechanics also hold for pilots. Not only does it make the individuals more valuable, attractive and marketable to employers, it offers individuals a track

leading to management positions in an industry that lacks a comprehensive and coordinated educational pipeline.

Exhibit 10 shows the number of holders of selected pilot certificates in both Texas and the United States. Commercial pilot, air transport pilot, and flight instructor certificate data was selected as it is possible that these holders could be considered as employable in a professional pilot capacity as opposed to a student or private pilot. While conceivable, data already provided in the matrix show the number of those employed in the state and region to be significantly lower than those provided here. Many of these represented in the table likely lack the experience/flight time minimums to be considered by employees for professional pilot employment.

Exhibit 10: Selected Pilot Certificates Held by State and Nation, 2004-2008

Year	Commercial Pilot		Air Transport Pilot		Flight Instructor	
	Texas	U.S.	Texas	U.S.	Texas	U.S.
2004	9,692	126,761	15,124	138,247	7,078	87,698
2005	9,535	125,437	14,910	138,139	7,135	88,723
2006	9,401	122,849	15,017	138,197	7,246	89,452
2007	9,451	120,068	15,267	139,903	7,496	90,218
2008	10,100	126,893	15,399	142,070	7,643	91,155

Source: U.S. Civil Airmen Statistics, Federal Aviation Administration.

While these numbers may seem to indicate a sufficient supply to accommodate future needs for pilots, one should not assume these numbers represent a fully qualified supply. As with the A&P registration data, a review of industry needs for airline pilots (SOC 53-2011) in Texas and the number of air transport pilot certificate holders shows the FAA pilot registration data overestimates the actual supply by a ratio of 2 to 1.

While providing an interesting comparison on a general level, the FAA registration data is not a proxy for industry supply for pilots or mechanics. The numbers are useful, however, in gauging an overall interest and ability of the aviation workforce.

Focus on Aviation “Knowledge Workers”

While much of the discussion on gaps in between qualified aviation industry employees and industry needs is based on national and regional occupational classifications, the underlying premise of this study is to determine the need for professional and managerial employees for the regional aviation industry. As such, there is limited data specifically addressing these categories of aviation “knowledge workers”, both in terms of how they can be quantified by standard industry classifications and how they are integrated into regional aviation interests. In many cases, personnel who fall within generic categories that describe basic managerial or executive-level employment are those who would fill job vacancies or new positions as opposed to classic skilled labor descriptors.

The data suggests that as the need for skilled and professional labor in the regional aviation industry increases, there will be a concurrent need for more executive level employment to

manage the growth. This assumption is supported by the relative strength of the regional aviation industry in the midst of a severe economic downturn. This effort to assess the needs for entry-level aviation industry knowledge workers to supply the need for the professional, managerial and other executive-level personnel is actually supported by the employment data for the standard occupation categories and the attendant gaps between supply and demand.

Employment Opportunities in other NAICS Codes

Earlier in this document, it was noted that a significant number of jobs exist in aviation businesses that are not classified in titles that are aviation-specific. Many of these jobs, whether it is in business, computer science, marketing, finance, engineering, information systems, administrative support, or others, are integral to their organizations. These areas could prove to be an important potential market for aviation education programs. The theory is that aviation businesses would benefit from having employees who have a certain background in, or familiarity with, aviation. The business and their customers could be better served by such employees despite the fact that they are not categorized in aviation-specific job titles. While it may not be a necessity for the job, it can certainly be of benefit to the employer while potentially providing advantages of upward mobility to the employee.

The other side of this issue is the employment opportunities that are available for aviation program graduates in areas outside of air transportation-specific industries. Much of the analysis thus far has centered on the air transportation industry as defined by the four aviation-specific NAICS codes. However, aviation program graduates are not limited in their options. Examining only those four NAICS codes tends to underestimate the employment opportunities and thus the need for such aviation programs.

Exhibit 11 shows the main aviation-specific jobs along with their 2006 employment levels and percentage of these jobs that are represented in the four aviation-specific NAICS codes as well as the percentage that fall outside of those codes. This data is more meaningful for some of the job titles as opposed to others.

For example, with dispatchers, those represented in air transportation are likely those trained specifically for aviation who hold the FAA certificate. These jobs are not likely to be easily transferable into other industries or have as much crossover appeal as the aviation component of the job is quite specific and requires specific training. Other jobs are dominated by aviation industries like flight attendants and air traffic controllers.

Of greater interest are those aviation specific jobs that have significant levels of employment outside of the four primary aviation industries. This is where the overall need can be underestimated and where further justification of higher educational programs in aviation can be found. Pilots, mechanics, and avionics technicians all have large percentages of employment outside of aviation-specific industries. While this data is national-level data, its applicability to our study region is still valid given the state's and region's diverse economy. The raw data for each of these job titles showing the industries where they are employed is in Appendix A.

Exhibit 11: Percent of Selected Aviation Professions Employed in Aviation-Related Industries in 2006

SOC/Job Title	SOC Code	Total Employment (National) 2006	Percent Employed in Air Transportation Related Industries	Percent Employed in Other Industries
Aerospace engineering and operations technicians	17-3021	8,512	49.07	50.93
Flight Attendants	39-6031	96,730	99.34	0.66
Dispatchers, except police, fire, and ambulance	43-5032	190,231	1.27	98.73
Avionics Technicians	49-2091	15,709	61.44	38.56
Aircraft mechanics and service technicians	49-3011	122,472	70.09	29.91
Aircraft structure, surfaces, rigging, and system assemblers	51-2011	28,083	87.14	12.86
Air cargo handling supervisors	53-1011	5,792	49.33	50.67
Airline pilots, copilots, and flight engineers	53-2011	79,444	88.42	11.58
Commercial pilots	53-2012	27,596	47.83	52.17
Air traffic controllers	53-2021	25,223	6.05*	93.95*
Airfield operations specialists	53-2022	4,891	54.18	45.82
Transportation Inspectors	53-6051	26,400	14.23	85.77

Source: U.S. Bureau of Labor Statistics, 2006-2016 Occupational Matrix.

Note: Air transportation related industries are considered to be the four primary ones used throughout this analysis: NAICS codes 3364, 4811, 4812, and 4881.

* 90 percent of air traffic controllers are employed by the government with 89 percent working for the federal government.

G. ADDITIONAL SUPPLY METRIC: DEGREES GRANTED FROM TEXAS AVIATION PROGRAMS

While the matrix design includes a measure of supply that coincides with employment data to give a picture of needs and supply, it is also useful to further examine the existing supply network of aviation graduates across the state. Using data from the THECB, Exhibits 12 through 14 show the number of degrees granted in aviation programs for both two- and four-year degrees.

Exhibit 12: Degrees Granted in Two-Year Aviation-Related Mechanic and Repair Technologies/Technicians (CIP 47) Programs in Texas, 2003-2008

Program Classification	CIP Code	Degrees Granted by School Year				
		2007-2008	2006-2007	2005-2006	2004-2005	2003-2004
Airframe Mechanics and Aircraft Maintenance Technology/Technician	47.0607	134	166	146	331	242
Aircraft Powerplant technology/Technician	47.0608	172	174	195	173	109
Avionics Maintenance Technology/Technician	47.0609	0	0	0	0	0

Source: Texas Higher Education Coordinating Board.

Exhibit 13: Degrees Granted in Two-Year Aviation-Related Transportation and Materials Moving: Air Transportation (CIP 49.01) Programs in Texas, 2003-2008

Program Classification	CIP Code	Degrees Granted by School Year				
		2007-2008	2006-2007	2005-2006	2004-2005	2003-2004
Aeronautics/Aviation/Aerospace Science and Technology, General	49.0101	0	0	0	0	0
Airline/Commercial/Professional Pilot and Flight Crew	49.0102	45	50	49	66	46
Aviation/Airway Management and Operations	49.0104	12	5	12	12	6
Air Traffic Controller	49.0105	0	0	2	10	4
Airline Flight Attendant	49.0106	0	0	0	0	0
Flight Instructor	49.0108	0	0	0	0	0
Air Transportation, Other	49.1099	0	0	0	0	0

Source: Texas Higher Education Coordinating Board.

Exhibit 14: Degrees Granted in Four-Year Aviation-Related Transportation and Materials Moving: Air Transportation (CIP 49.01) Programs in Texas, 2003-2008

Program Classification	CIP Code	Degrees Granted by School Year				
		2007-2008	2006-2007	2005-2006	2004-2005	2003-2004
Aeronautics/Aviation/Aerospace Science and Technology, General	49.0101	2	4	4	1	0
Airline/Commercial/Professional Pilot and Flight Crew	49.0102	22	22	19	26	23
Aviation/Airway Management and Operations	49.0104	4	5	5	9	5
Air Traffic Controller	49.0105	0	0	0	0	0
Airline Flight Attendant	49.0106	0	0	0	0	0
Flight Instructor	49.0108	0	0	0	0	0
Air Transportation, Other	49.1099	0	0	0	0	0

Source: Texas Higher Education Coordinating Board.

A zero in the cell indicates that either a program does not exist or that there are no graduates. This data is for a five-year period and provides some insight into the ongoing pipeline of aviation graduates. Available on an institutional level, it is reported here in the aggregate as a statewide supply metric.

One observation is the large number of graduates in the two-year programs compared to those in the four-year programs. There exists little ability or opportunity for these graduates to continue into four-year, aviation-specific programs in the state. The two programs that do exist are located outside of North Central Texas, leaving no opportunity for graduates to continue without relocating.

Not only are the educational opportunities nonexistent in the region at the four-year-level, they are entirely inadequate in the state in terms of providing educational opportunities for managers, supervisors, and other positions that would require a four-year degree. Individuals are undoubtedly pointed to other programs and forced into other disciplines, outside of aviation, in order to achieve a four-year degree.

In a region with a significant aviation industry where jobs are measured in the tens of thousands, aviation higher education programs are measured in the tens or hundreds, if at all. Given the documented need and interests of the aviation industry, the region should move forward to support its population and employment centers.

H. CONCLUSIONS AND RECOMMENDATIONS

General findings of this study's analytical research are:

- The aviation industry is a diverse and growing field with needs ranging from technical and trade level skills to executive level managerial/professional knowledge workers.
- Aviation employment requirements drive the supply/demand cycle of qualified entry-level personnel. Significant shortfalls exist in the ability of the region's workforce to meet the industry's needs.
- Certification programs are successfully training skilled workers, especially on community college campuses at various locations in the region.
- North Texas continues to lose the ability to recruit and retain talented aviation professionals because there is no four-year baccalaureate program that offers multiple degree plans and provides for a flight component.

The analysis of the gap existing between aviation workforce needs and supply for North Central Texas is the basis for the following recommendations.

- An integrated aviation education program serving the region and building on the strengths of existing ones should be created immediately. A four-year baccalaureate degree program should be established that offers multiple degree plans and also provides for a flight component.
- The aviation industry in North Central Texas should support the implementation of the Aviation Education Initiative because of its long-term value in developing and retaining an educated workforce.
- The overall education program should be structured to meet the needs of the students. The program must be accessible, affordable, and results oriented in that students should be able to quickly secure employment positions in the aviation industry in North Central Texas upon graduation.
- NCTCOG should be positioned as the repository of information related to aviation education.
- Clear pipelines should be established that (1) make men and women aware of aviation career opportunities; (2) assure program graduates can be assimilated into well-paying, rewarding jobs.