

**Regional Airline-University Airline Transport Pilot Bridge Programs:  
An Examination of Student Perceptions**

by

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## Abstract

Aviation has been described as the physical internet, connecting communities, regions, and nations around the globe. Living in the age of airplanes, we often take for granted the ability to jump on a plane and travel around the world, moving easily between countries, cultures, and economies. While globalization is increasing the demand for air travel, the labor supply of U.S. pilots is decreasing because of new pilot certification requirements and many pilots reaching the mandatory retirement age of 65.

To meet the demand for pilots, many airlines and collegiate flight programs are partnering to create employment bridges that span the flight hour gap between the collegiate flight program and professional airline cockpit. These partnerships take the form of a regional airline-university bridge agreement and offer students an opportunity to be on an airline's payroll while working for the university as a Certified Flight Instructor (CFI).

By anonymously surveying collegiate aviation flight students from Aviation Accreditation Board International (AABI) accredited collegiate aviation programs, this study identified characteristics of regional-airline university bridge agreements preferred by collegiate aviation flight students. Student orientation towards bridge agreements, and the perceived importance of flow-through from regional to major airlines, based on academic classification, Restricted Airline Transport Pilot (R-ATP) eligibility, total flight hours, and Certified Flight Instructor (CFI) status was examined. Results will help inform the discussion regarding regional airline-university bridge agreements and policies that promote a stable pilot production pipeline.

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## Table of Contents

Abstract.....	ii
Acknowledgments.....	iii
List of Tables .....	vii
List of Figures.....	ix
List of Abbreviations .....	x
Chapter 1 .....	1
Background .....	1
Significance .....	4
Important Terms .....	9
Purpose .....	10
Research Questions .....	10
Chapter 2 .....	11
Introduction .....	11
Air Transport Industry .....	11
Increasing Demand for Air Travel .....	16
Airline Classification .....	17
Regional Airlines .....	19
Pilot Workforce Development .....	27

Decreasing Pilot Supply.....	31
Quality vs. Quantity .....	37
Collegiate Aviation .....	43
Regional Airline-University Bridge Programs Develop .....	49
Chapter 3 .....	57
Overview.....	57
Sampling .....	58
Instrumentation .....	58
Instrument Testing .....	63
Validity .....	64
Reliability .....	65
Data Collection .....	66
Data Analysis .....	67
Chapter 4 .....	68
Introduction.....	68
Purpose .....	68
Research Questions .....	68
Data Collection and Analysis.....	69
Description of Sample .....	69
Preferred Characteristics of Regional Airline-University Bridge Agreements .....	74
Orientation Towards Regional Airline-University Bridge Agreements .....	82
Perceived Importance of Flow-Through Time from Regional to Major Airline .....	90

Chapter 5 .....	101
Introduction.....	101
Purpose.....	101
Research Questions .....	102
Limitations .....	102
Conclusion .....	103
Implications .....	105
Recommendations for Future Research .....	106
References .....	109
Appendix 1 – Survey Instrument: Assistance from Industry Professionals .....	127
Appendix 2 – Survey Instrument .....	128
Appendix 3 – IRB Approval .....	136
Appendix 4 – AABI Invitation to Participate in Survey .....	137

## List of Tables

Table 1 – Summary of Regional Airline Hiring Incentives .....	61
Table 2 – Survey Question Matrix .....	63
Table 3 – Distribution of Participants by Gender .....	70
Table 4 – Distribution of Participants by Academic Classification.....	71
Table 5 – Distribution of Participants by Highest Flight Certification Achieved .....	71
Table 6 – Distribution of Participants by Flight Ratings .....	72
Table 7 – Distribution of Participants by CFI Status .....	73
Table 8 – Distribution of Participants by R-ATP Eligibility .....	73
Table 9 – Distribution of Participants by Total Flight Time .....	74
Table 10 – Participant Perception of Compensation .....	75
Table 11 – Participants Perception of Benefits .....	76
Table 12 – Participant Perception of Employer Reputation .....	76
Table 13 – Participant Perception of Operating Environment .....	77
Table 14 – Participant Perception of Flow-Through .....	78
Table 15 – Participant Perception of Work-Life Balance.....	79
Table 16 – Participant Preferred Characteristics of Bridge Agreements .....	80
Table 17 – Participant Orientation Towards Bridge Agreements .....	82
Table 18 – Orientation Towards Bridge Agreements, by Academic Classification .....	84
Table 19 – Orientation Towards Bridge Agreements, by R-ATP Eligibility .....	86

Table 20 – Orientation Towards Bridge Agreements, by Total Flight Hours .....	88
Table 21- Orientation Towards Bridge Agreements, by CFI Status .....	90
Table 22 – Participant Perception of Importance of Flow-Through Time .....	91
Table 23 – Perceived Importance of Flow-Through Time, by Academic Classification .....	93
Table 24 – Perceived Importance of Flow-Through Time, by R-ATP Eligibility .....	95
Table 25 – Perceived Importance of Flow-Through Time, by Total Flight Hours .....	97
Table 26 – Perceived Importance of Flow-Through Time, by CFI Status .....	99



## List of Figures

Figure 1 – Research Survey Concept Map .....	62
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## List of Abbreviations

AABI	Aviation Accreditation Board International
ACE	Air Carrier Enhanced
ALPA	Air Line Pilots Association
AOPA	Aircraft Owners and Pilots Association
A4A	Airlines for America
ATP	Airline Transport Pilot
ATP-CTP	Airline Transport Pilot Certification Training Program
BTS	Bureau of Transportation Statistics
CAA	Civil Aeronautics Authority
CAA	Civil Aeronautics Administration
CAB	Civil Aeronautics Board
CAPA	Centre for Aviation
CEO	Chief Executive Officer
CFI	Certified Flight Instructor
CPTP	Civilian Pilot Training Program
DOT	Department of Transportation
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
FOQ	First Officer Qualification

GAO	Government Accountability Office
GDP	Gross Domestic Product
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
NIFA	National Intercollegiate Flying Associations
NTSB	National Transportation Safety Board
MPL	Multi-Crew Pilot License
MRO	Maintenance, Repair, and Overhaul
NAUAAE	National Association of University Administrators of Aviation Education
NTAS	National Training Aircraft Symposium
RAA	Regional Airline Association
R-ATP	Restricted Privileges Airline Transport Pilot
RJ	Regional Jet
ROTC	Reserve Officer Training Corps
SPSS	Statistical Package for the Social Science
UAA	University Aviation Association

## **Chapter 1**

### **Introduction**

#### **Background**

The U.S. air transport and national air transportation systems play a critical role in the development and growth of the U.S. economy, accounting for more than \$1.6 trillion in total economic activity, nearly 11 million jobs, and 5% of the nation's gross domestic product (GDP) (FAA, 2016a).

In 2015, approximately 897 million passengers transited U.S. airports, traveling via a complex air carrier network comprised of large commercial and regional airlines (Bureau of Transportation Statistics, n.d.). Large commercial airlines are frequently referred to as major carriers while regional airlines operate smaller aircraft, typically seating fewer than 60 passengers. Approximately 90 percent of regional airline passengers connect to major airlines, making regional airlines “a vital link between small communities and the national air transportation system” (Wensveen, 2011, p. 171).

To foster economic growth in the air transport industry, Congress passed the Airline Deregulation Act of 1978, which eliminated government oversight of airline route structures, pricing, and scheduling. As a result of the legislation, airlines compete in a highly competitive, volatile market that has seen consistent growth since 1978. Examining the growth of U.S. airlines since the Airline Deregulation Act of 1978, Vasigh, Fleming, and Tacker (2013) found large commercial airlines averaged an annual growth rate of 4.8 percent and regional airlines

grew at an annual growth rate of 14.3 percent.

Liberalization of air travel on an international scale, because of the globalization of economies, especially in countries with emerging middle classes, is driving significant growth in the air industry around the world and analysts predict steady, sustained growth over the next twenty years.

Airbus Chief Operating Officer John Leahy foresees demand for passenger travel increasing by 142 percent in the period 2015-2035, with the number of total commercial aircraft operating increasing by 109 percent in this same period (Airbus, 2016). Airbus projects annual growth for air transport at 5.6 percent in expanding regions such as China and India and a more conservative 3.7 percent in Western Europe and North America (Airbus, 2016). Airbus' rival Boeing, in their 2016 long-term market forecast, anticipates a 4.8 percent annual increase in the number of airline passengers over the next two decades which will in turn drive the need for 617,000 new commercial airline pilots during this same time (Boeing, 2016).

Ironically, in an era of unprecedented growth in the aviation industry, the labor supply of U.S. airline transport pilots is diminishing as a wave of Federal Aviation Administration (FAA) mandated pilot retirements and rigorous new pilot training requirements take effect.

In December 2007, The Fair Treatment of Experienced Pilots Act was signed into law by the President, immediately raising the mandatory retirement age of commercial pilots from 60 to 65 and essentially serving as a five-year freeze on new pilot hiring and development (FAA, 2012). Senior pilots who at age 60 could extend their flying career an additional five years, are now beginning to retire in large waves and as a result, 20,000 cockpit seats at U.S. airlines are expected to open over the next seven years (Aviation Week and Space Technology, 2015). This

exodus of experienced pilots, coupled with a decreased emphasis on new pilot hiring and development, is cause for concern as the demand for air travel increases.

Pilot experience was called into question following Colgan Air Flight 3407, which crashed on approach into Buffalo-Niagara International Airport on the night of February 12, 2009, killing all 45 passengers and four flight crew. The National Transportation Safety Board (NTSB) determined that the probable cause of the accident was:

The captain's inappropriate response to the activation of the stick shaker, which led to an aerodynamic stall from which the airplane did not recover. Contributing to the accident were (1) the flight crew's failure to monitor airspeed in relation to the rising position of the lowspeed cue, (2) the flight crew's failure to adhere to sterile cockpit procedures, (3) the captain's failure to effectively manage the flight, and (4) Colgan Air's inadequate procedures for airspeed selection and management during approaches in icing conditions (NTSB, 2010, p. x).

Following the accident, family members of the victims raised concern over the apparent lack of experience by the both the pilot and copilot and began pressing Congress for new legislation to prevent future accidents of this nature. Congress passed the Airline Safety and Federal Aviation Administration Extension Act of 2010 (Public Law 111-216), which substantially raised pilot training requirements and industry hiring minimums. Per the new legislation, both captains (pilots) and first officers (copilots) are required to hold an Airline Transport Pilot (ATP) certificate, which requires 1,500 hours total time as a pilot. Prior to this new legislation and during the timeframe of the mishap, first officers were only required to have a Commercial Pilot Certificate, which requires 250 hours of flight time (FAA, 2013). The net effect for first officers is that they must now gain an additional 1,250 hours before they are eligible for a starting job at the regional airlines, which typically have a starting salary of approximately \$23,000 (Carey, 2015).

## Significance

The six-fold increase in flight time required to be employed as a first officer created a financial barrier for many aspiring airline pilots and many industry experts are worried the U.S. will experience a severe pilot shortage in the next decade as a result.

Regional airlines, which are often seen as the minor league of the major airlines, are already having a hard time filling their cockpits as a result of the new ATP requirements. Some regional airlines have even been forced to limit service to select communities because of a reduced pilot workforce, prompting Congressional hearings on air service to small and rural communities in April 2014. In his testimony to the House Committee on Transportation and Infrastructure Subcommittee on Aviation, Pedro Fàbregas, (2014) President and Chief Executive Officer (CEO) of Envoy Air, Inc. (which operates American Eagle regional airline), explained the relationship between new legislation and regional carrier service shortages:

FAR 61's 1,500 hours requirement is adversely affecting untold numbers of aspiring airline pilots. Many of them have already graduated from accredited universities and colleges that specialize in the education and training of aviators – institutions such as Embry-Riddle Aeronautical University, Purdue University, University of North Dakota, Western Michigan University, as well as numerous others. But for FAR 61's 1,500 hours requirement, these pilots would be ready to enter into our own state-of-the-art-training program at Envoy, which we have worked so hard over the years to develop collaboratively with the FAA. Unfortunately, these aviators often find themselves needing to put the start of their airline career on hold – while they literally fly in circles accumulating hours in aircraft and operating conditions that are in no-way similar to those they would gain as a First Officer flying under the authority of an experienced airline captain. In addition, this building of hours comes at a heavy financial expense borne by the aviators personally.

This is not only slowing down the career development of these prospective professional pilots, but also is depriving the nation's air transportation system of skilled crew, especially in the regional airline industry. Combined with the additional staffing restrictions that result from FAR 117, FAR 61's requirements are creating a shortage of qualified and available pilots (Fàbregas, 2014, p. 2).

At Republic Airways, a Midwest-based regional airline, the pilot shortage became so acute in February 2016 that the company filed for bankruptcy protection. CEO Bryan Bedford explained the filing as “a result of our loss of revenue during the past several quarters associated with grounding aircraft due to a lack of pilot resources, combined with the reality that our negotiating effort with key stakeholders shows no apparent prospect of a near term resolution” (Bergqvist, 2016).

Airlines have traditionally enjoyed a selective hiring environment where the supply of eligible pilots exceeds demand, meaning they can select the best-qualified candidates from a large hiring pool. Aspiring pilots can follow one of many paths to their goal of becoming an airline pilot. These pathways are best described as military, traditional, bridge, *ab-initio*, and multi-crew pilot license (MPL) (Bovier, 2008).

Pilots who follow the traditional path earn their Private Pilot and Commercial Pilot Certificates, along with Instrument and Multi-engine ratings, and build their flight time and experience in increasingly complex aircraft, until reaching the prerequisites to join the airline ranks.

Bridge programs were first developed in the 1980s by the regional airlines, because of their rapid growth, to meet the high demand for pilots. Regional airline bridge programs filled the gap “between licensing – commercial instrument and multi-engine certificates – and the needs of the industry by introducing supplementary training” (Bovier, 2008, p. 25). During periods of hiring, large commercial carriers often look to the regional airlines for qualified, relatively experienced pilots to fill their ranks.

*Ab-initio*, which means “from the beginning” in Latin, was the first training method “to include airline practices and procedures from the earliest stages” as students earn their



commercial, instrument, and multi-engine pilot qualifications (Bovier, 2008, p. 25). In 2006, the International Civil Aviation Organization (ICAO) launched the multi-crew pilot license (MPL), a competency-based training program that leads to an aircraft type rating that satisfies regulatory license requirements, “to introduce an alternative pathway for *ab-initio* student pilots to achieve the necessary competencies to become highly effective, efficient, and safe operators of a modern commercial air transport category airplane” (ICAO, n.d., p. 1). Often thought of as outlier pathways to the airline cockpit in the U.S., *ab-initio* and MPL are beginning to gain traction in regions of the world where pilot labor supply is small, typically in regions with limited general aviation activity, such as Europe and Asia.

Historically, in the U.S., the military, bridge, and traditional career paths are the most common route to the airline cockpit. Many airlines favor military pilots because of the depth and breadth of their experience, however, because of military downsizing and the growth of unmanned aircraft systems, the supply of qualified airline transport pilots coming from the military is decreasing.

The Federal Aviation Administration Extension Act of 2010 prompted the FAA to implement the Pilot Certification and Qualification Requirements for Air Carrier Operations Rule in 2013, commonly referred to as the First Officer Qualification (FOQ) Rule, which provides for a new category of ATP, referred to as a restricted privileges ATP (R-ATP), that provides up to a 500-flight hour allowance for college graduates holding a bachelor’s degree with an aviation major and 1,000 hours total time as a pilot (FAA, 2013). The FAA’s 500-hour allowance shortens a collegiate aviation graduate’s path to the airline cockpit, and is creating a renewed interest in collegiate aviation. Regional airlines, which are in most desperate need for new pilots, are developing new bridge programs designed to provide a clear pathway from

college to the airline cockpit.

While the 500-hour allowance certainly aids collegiate aviation students, the lack of an allowance for young pilots taking the traditional path means potentially fewer students will travel that path in the future. According to Aircraft Owners and Pilots Association (AOPA) Vice President of Regulatory Affairs, Rob Hackman, the new legislation “will effectively prevent Part 61 training providers (independent flight instructors) from being a viable pathway to an airline carrier both by limitation on who can provide the required training and on how time is credited toward the restricted ATP certificate” (Wilson, 2013, p. 2).

Concerned about the health of the air transport industry, Congress commissioned the Government Accountability Office (GAO) to perform a study (2014) to examine whether the combination of FAA-mandated retirements, fewer pilots leaving the military, and new rules that increase the experience required to become an airline pilot will result in a shortage of qualified airline pilots. The GAO concluded:

Airlines are taking several actions to attract and retain qualified commercial airline pilots. For example, airlines that GAO interviewed have increased recruiting efforts, and developed partnerships with schools to provide incentives and clearer career paths for new pilots. Some regional airlines have offered new first officers signing bonuses or tuition reimbursement to attract more pilots. However, some airlines found these actions insufficient to attract more pilots, and some actions, such as raising wages, have associated costs that have implications for the industry. Airline representatives and pilot schools suggested FAA could do more to give credit for various kinds of flight experience in order to meet the higher flight-hour requirement, and could consider developing alternative pathways to becoming an airline pilot. Stakeholders were also concerned that available financial assistance may not be sufficient, given the high costs of pilot training and relatively low entry-level wages (GAO, 2014, cover).

The approximate lead-time to educate and train an airline pilot is eight years and the solution to future problems must be worked now. Not wanting to get caught in the downdraft of a potential pilot shortage, JetBlue Airways created their innovative University Gateway Program,

a partnership with multiple universities and two regional airlines, to provide a career pathway for young aviators enrolled in an accredited collegiate aviation program. The Gateway Bridge Program is an eight-year program consisting of four years of college, an internship, one year of flight instructing, and three years with a regional airline. Pilots who successfully complete the program can expect an interview and the opportunity to flow-through and join JetBlue's pilot ranks (JetBlue, n.d.).

Many other airlines (both majors and regionals) are following JetBlue's lead and developing their own bridge and flow-through programs that create well-defined career paths from the college classroom to the airline cockpit. With regional airline pilots in short supply, competition is heating up between regional airlines who are fighting to hire enough pilots.

To minimize the potential for a shortage of airline transport pilots in the U.S., new research is being conducted in the field of professional aviation education. In his dissertation, McGhee (2015) recommends a follow-on study to his own study of airline transport pilot supply and demand, to better understand the effects and limitations of bridge and flow-through agreements.

Additionally, a team of researchers from Embry-Riddle Aeronautical University, Arizona State University, Purdue University, Middle Tennessee State University, South Dakota State University, and the University of North Dakota performed a series of pilot source studies, beginning in 2010, focused on the performance of regional airline first officers (copilots) based on their educational backgrounds. Specifically, studies tried to determine whether first officers who were graduates from accredited university aviation degree programs outperformed peer first officers who were not graduates from an accredited university aviation program. In their most recent study, Bjerke et al. (2015) found that graduates of Aviation Accreditation Board

International (AABI) accredited flight programs are more likely to be successful in air carrier new-hire training programs and flight-line qualification than non-graduates. This study, as well as its two predecessors, has not shown that flight hours are a reliable predictor of pilot performance, suggesting that the quality of training may be a better variable for predicting new-hire pilot success rather than the quantity of flight hours. This finding supports industry leaders like Envoy CEO Pedro Fàbregas who believe quality (of training) outweighs quantity (of flight hours) in airline transport pilot production.

From the business point of view, regional airlines should focus recruiting efforts on AABI-accredited universities since their graduates have been shown to perform best in training and require very little, if any, retraining because of failing a flight evaluation. Not having to provide additional training saves regional airlines money and in the end, they have a more competent workforce.

As demand for airline transport pilots increases, regional airline-university bridge programs will become more important. Regional airlines will compete for the limited supply of pilots and need their bridge agreements to be successful. Pilot students will have to decide whether to enter a bridge agreement with a regional airline and if so, which airline is the best fit.

### **Important Terms**

- Flow-through – the vertical flow of pilots from a regional airline to major airline, based on an agreement between the two airlines
- Bridge agreement – an agreement between a regional airline and collegiate aviation program to offer a defined path of employment to the regional airline

## **Purpose**

The purpose of this study is to identify the characteristics of successful bridge agreements, explore the influence of bridge agreements toward regional airline employment, and examine the perception of regional airline-university bridge agreements among collegiate aviation students.

## **Research Questions**

This research examines the following questions:

1. What are the characteristics of regional airline-university bridge agreements preferred by collegiate aviation flight students?
2. What are the differences in collegiate aviation flight students' orientation towards regional airline-university bridge agreements based on academic classification, R-ATP eligibility, total flight hours, and Certified Flight Instructor (CFI) status?
3. What are the differences in collegiate aviation flight students' perception of the importance of flow-through time, from the regional to major airlines, based on academic classification, R-ATP eligibility, total flight hours, and Certified Flight Instructor (CFI) status?

## **Chapter 2**

### **Literature Review**

#### **Introduction**

The purpose of this literature review is to provide an overview and discussion of the literature related to this project. This review includes discussion of the air transport industry, increasing demand for air travel, decreasing pilot labor supply, pathways to the airline cockpit, collegiate aviation, and development of bridge programs.

#### **Air Transport Industry**

The air transport industry can trace its roots to December 17, 1903, when the Wright Brothers made the first successful controlled-power airplane flight at Kitty Hawk, North Carolina. Octave Chanute, a close friend of the Wrights and a pioneer aeronautical engineer, immediately recognized the significance of what the Wright Brothers had accomplished and predicted that the airplane's first "application will probably be military... The machine will eventually be fast; they [aircraft] will be used in sport; but they are not thought of as commercial carriers" (Mehrens, 1954, p. 1). Chanute was correct on all his predictions except that he and many of his aviation peers could not have foreseen the scale of economic and social impact that commercial airplanes would have in the future.

The first two decades of powered flight were characterized by innovation and limited government oversight. Aircraft designers and builders were quick to capitalize on the advent of powered flight, hoping to make a name for themselves and stake their claim in a new industry.

Pilots could fly without government oversight since there was no government entity charged to create, regulate, or enforce flight safety standards.

The first scheduled airline flight was conducted on January 1, 1914, in a Benoist Aircraft Company airboat, which flew the former mayor of St. Petersburg, Florida, 21 miles (in 23 minutes), across the bay from St. Petersburg to Tampa, Florida. Scheduled service on this route continued for the next four months until the winter tourist season ended as summer approached. Considered a novelty at the time, the seeds for a viable commercial airline industry had been planted.

True to Chanute's early prediction, aircraft found many uses during World War I that included reconnaissance, bomber, and fighter – roles that are still performed by military aircraft today. Coming out of World War I, the U.S. had a surplus of aircraft and the U.S. Postal Service began transporting mail by air, using pilots and aircraft acquired from the Army following the war. A coast-to-coast network of day, and then night, air mail routes was established using ground-based reference points for navigation. A series of arrows directed pilots during the day and lighted beacons spaced every ten miles were used at night. As air mail became a regular fixture of American life, the air transport industry grew with pioneering leaders envisioning air transport as a key enabler to economic commerce.

In 1926, Congress passed the Air Commerce Act which established government oversight of the aviation industry. The Act directed the Secretary of Commerce to foster air commerce by: encouraging the establishment of airports, civil airways, and other navigation facilities; researching the development of air commerce and trade in the aeronautical industry; investigating, recording, and reporting the causes of aviation accidents; establishing and enforcing air traffic rules, licensing pilots, and certifying aircraft (U.S. Government, 1926).

To lead the development of air commerce, the Department of Commerce established the Aeronautics Branch shortly after the Act was passed. The Aeronautics Branch was renamed the Bureau of Air Commerce in 1934 to reflect the organization's growing importance; and in 1938 Congress passed the Civil Aeronautics Act, which established the new Civil Aeronautics Authority (CAA) within the Department of Commerce. Responsibilities of the Interstate Commerce Commission's Bureau of Air Mail (which included fare regulation) and the Bureau of Air Commerce, were transferred and consolidated within the Civil Aeronautics Authority (Schmeckebeier, 1938). In 1940, the Civil Aeronautics Authority was reorganized by President Franklin Roosevelt into two new entities, the Civil Aeronautics Administration (CAA) and the Civil Aeronautics Board (CAB). The Civil Aeronautics Administration facilitated "air traffic control, certification of airmen and aircraft, rule enforcement, and the development of new airways" while the Civil Aeronautics Board led "rulemaking to enhance safety, accident investigation, and the economic regulation of the airlines" (FAA, 2008, p. 1-5).

Air traffic continued to increase through the 1940s and the nation's aviation industry expanded rapidly in part because of World War II. Technologies born during the war yielded results in commercial aviation and jet aircraft began filling the skies in the 1950s, flying passengers faster and further than anyone had ever dreamed. Midair collisions over the Grand Canyon and New York City prompted calls for improved air safety systems and the federal government reorganized its aviation agencies once again. The Federal Aviation Act of 1958 established the Federal Aviation Agency, which assumed the rule making authority of the Civil Aeronautics Board, as well as the role of the Civil Aeronautics Administration.

In 1967, Congress established the Department of Transportation (DOT) to ensure a fast, safe, efficient, accessible, and convenient transportation system to meet vital national interests



and enhance the quality of life of the American people, then, now, and into the future (DOT, n.d.a). That same year, the Federal Aviation Agency was renamed the Federal Aviation Administration and moved to the Department of Transportation and the accident investigation role of the Civil Aeronautics Board was transferred to the newly created National Transportation Safety Board, leaving the Civil Aeronautics Board with the sole responsibility of airline economic regulation (NTSB, n.d.).

On October 24, 1978, President Carter signed the Airline Deregulation Act of 1978 which began the process of removing the Civil Aeronautics Board's authority over fares and routes and ending the government's 50-plus years of economic regulation of the air transport industry. The lasting result was that the FAA remained responsible for the safety and efficiency of the air transport industry while airlines controlled their own economic fate.

Operating in a highly competitive economic market, airlines were forced to adopt new revenue growth and cost-cutting strategies to survive and prosper. Airlines offer varying levels of service quality, price points, and route networks to leverage advantages in the marketplace. Travelers have benefitted from lower prices and increased capacity in a deregulated market, but most airlines, until recently, have struggled to reach a stable plateau of prosperity. High fuel, labor, maintenance, and capital costs limit an airline's flexibility to change cost strategies. Airlines with right-sized economies of scale are positioned to be more competitive but are still subject to economic market forces beyond their control such as down economic cycles, disruptive weather, terrorism, and disease outbreaks.

Since 1978, the U.S. airline industry can best be described as volatile. Airlines for America (A4A), a trade organization representing principle U.S. airlines, reports that since deregulation, U.S. airlines have collectively recorded net losses of \$5.9 billion, with the worst

loss period (\$65 billion) occurring between 2001-2009 and best earning period occurring between 2010-2015 (\$48.1 billion) (A4A, 2016).

A series of mergers in the past decade have right-sized economies of scale for major airlines who seem to be capable of stabilizing the industry. Industry analysts such as Clifford Winston, Senior Fellow, Brookings Institution, believe that consolidation in the airlines will produce benefits seen in the railroad and trucking industries in that “you’ll have fewer crises, fewer bankruptcies, more predictability, more stability” (Haq, 2013, para. 16). In 2015, the DOT’s Bureau of Transportation Statistics (BTS) reported that well over half of all U.S. domestic airline seats were controlled by four U.S. major airlines: Southwest Airlines, Delta Air Lines, American Airlines, and United Airlines (BTS, n.d.).

In the first quarter of 2016, U.S. airlines reported an after-tax net profit of \$3.1 billion – their 10th consecutive profitable quarter as a group (BTS, 2016). Increased profits are due in part because of lower oil and jet-fuel prices the last 30 months. Profit margins close to 15 percent are allowing U.S. airlines to reinvest in their product by purchasing new (and larger) aircraft, improving employee pay and benefits, reducing debt, and sharing profits with investors (A4A, 2016).

A stable commercial aviation industry supports a healthy economy. In 2014, nearly 11 million jobs and over 5% of the U.S. gross domestic product (GDP) was driven by commercial aviation, and visitors to the U.S. enabled by commercial airlines, added \$310 billion to the U.S. economy (FAA, 2016a). Aviation has a direct, indirect, and induced economic impact on local, regional, and national economies and has contributed to the globalization of the world’s economy. Buyers and sellers can easily connect around the globe to build new supply chain

networks and the continual flow of capital, goods, technology, and ideas is connecting countries and cultures at an unprecedented pace.

### **Increasing Demand for Air Travel**

In the U.S., adjusted for inflation, domestic air fares for passengers have decreased by 50% over the past 30 years, making it one of the most inexpensive forms of transportation, in terms of cost per mile (Thompson, 2013). During this same timeframe, the U.S. population grew from an estimated 233 million to 316 million people (U.S. Census Bureau, n.d.). The reduced real cost of flying, combined with exponential population growth, have led to recent record numbers of passenger travelers in the U.S. and around the globe.

In 2015, U.S. airlines transported a total of 796,922,891 passengers on domestic and international flights combined (BTS, n.d.). Looking forward, air travel in the U.S. is forecast to trend upward for the foreseeable future. The FAA's 2015 Aerospace Forecast indicates that airline passenger enplanements are expected to increase to more than 800 million by 2017 and that by 2029, passenger enplanements will eclipse the one billion mark (Hauptli, 2015).

On a global level, in 2015, demand for air travel increased at a rate of 7.4% (IATA, 2016b). In areas with emerging economies, air travel is accelerating at a much faster rate as emerging middle class consumers can afford to fly for both the purpose of business and pleasure. India, which has a population of 1.4 billion, saw demand for domestic air travel increase by 25% in 2015 (IATA, 2016a). Industry experts forecast continued steady growth over the next two decades and the International Air Transport Association (IATA) projects that global passenger enplanements will reach 7 billion by 2034 (IATA, 2015).

To meet the growing demand for air travel, aircraft manufacturers are producing new aircraft in record numbers and in 2016 will deliver more than 1,900 new aircraft worth more than

\$180 billion (IATA, 2016b). Boeing (2016) and Airbus (2016), the world's leading commercial aircraft manufacturers, in their 20-year forecasts, predict respectively that 39,620 and 32,425 new aircraft will need to be delivered to meet passenger demand for air travel around the globe, over the next 20 years. Oliver Wyman's 2016-2026 Global Fleet & MRO (Maintenance, Repair, and Overhaul) Market Forecast confirms Boeing and Airbus' optimistic growth outlook and predicts that the global aircraft fleet size will increase 40 percent to 34,437 aircraft during the next 20 years (Anderson, Prentice, and Gouel, 2016).

A new generation of light-weight, fuel efficient commercial composite aircraft, such as the Boeing 787 and Airbus A350, offer unprecedented service range and the ability to connect new city pairs. As a result, airlines are quickly adding new products in the market place for air travelers by introducing new nonstop city pairings. The International Air Transport Association reports that "the number of unique city-pair connections is expected to reach more than 17,000 in 2016, double the connectivity by air twenty years ago" (IATA, 2016). Non-stop city pairings on routes more than 6,000 miles are becoming routine and travel is becoming more efficient, increasing connectivity between cities, nations, and cultures, while creating new business opportunities for airlines.

### **Airline Classification**

To provide air transportation service in the U.S., air carriers must earn two separate authorizations from the Department of Transportation. The first is safety authority in the form of an Air Carrier Certificate and Operations Specifications from the FAA that may authorize either scheduled service, known as the Federal Aviation Regulation (FAR) Part 121 operations, or charter-only operations, called FAR Part 135 operations (DOT, n.d.b). FAA-issued Part 121 and Part 135 operating certificates define the many requirements for operating aircraft to include

flight crew training and maintenance programs. The second authority is economic in nature, issued by the Office of the Secretary of Transportation in the form of a certificate for interstate or foreign passenger and/or cargo authority that declares an applicant is “fit, willing, and able” to perform the proposed service (DOT, n.d.b).

U.S. scheduled (Part 121) airlines are categorized by the Department of Transportation as major, national, or regional, based on operating revenue. Major airlines are air carriers with annual operating revenue exceeding \$1 billion and national airlines are carriers that generate operating revenue between \$100 million and \$1 billion annually. Regional airlines, which typically serve a specific geographic region, are divided into two subsets – large and medium. Large regionals generate \$20 million to \$100 million annually while medium regionals generate less than \$20 million annually.

Terms used to define a regional airline are often confusing, given that many regional airlines such as SkyWest, Envoy, and ExpressJet are technically majors, based on their annual revenue, not the size of aircraft flown.

The smallest airline category is commuter airline which is defined by the DOT as an air carrier which operates small aircraft, i.e., those with an original design capacity of 60 or fewer seats, and carries passengers on at least five round-trip flights per week on at least one route between two or more points per published flight schedules which specify the times, days of the week, and places between which they are performed” (DOT, n.d.c). Historically, commuter and regional airlines have served as the starting point for careers in civil aviation.

## **Regional Airlines**

When the CAB was formed to regulate the economics of the air transport industry, 16 air carriers were already in existence. These airlines were granted a certificate to continue their operation and became known as the trunk carriers. Following World War II, increased demand for air travel, in more markets, prompted the CAB to establish feeder airlines that offered air service to small communities, connecting passengers to larger airports where trunk carriers operated. The CAB designated feeder airlines as local service airlines in the mid-1950s, allowing them to operate on low-density routes not in direct competition with trunk carriers. To aid the trunk carriers and their networks, the government often subsidized local service airlines.

A third category of commercial air service known as air taxis emerged after World War II. Air taxis operated on-demand commercial operations and in 1952, the CAB recognized this group of airlines as commuter airlines and did not require them to have an operating certificate, given the irregular nature of their routes and schedules. To avoid competition with the trunk and local service airlines, the CAB prohibited commuter airlines from offering scheduled service between airports and limited commuters to operating aircraft that weigh less than 12,500 pounds.

As air travel continued to grow in the 1960s, so did the cost of subsidizing local service airlines. To help offset rising government subsidies, the CAB allowed local service airlines to reorganize their networks, allowing them to eliminate service to airports that generated less than five passengers per day, on average. Over 100 hundred small communities lost their access to air service because of the reorganization, creating a new market opportunity for commuter carriers.

In 1965, the CAB began to allow commuters to provide service between airports, often replacing trunk carriers and local service airlines. Some trunk airlines began to contract commuter airlines to replace service in select markets and in 1964, American Airlines contracted

with Apache Airlines to replace its service in Douglas, Arizona. Many larger airlines followed suit and began contracting their less profitable routes to smaller commuter airlines, a business practice that still exists today and influences relationships and behavior amongst major and regional airlines.

As a result of regulatory and economic changes, commuter airlines experienced significant growth and in the 1970s, commuter carriers' enplanements grew at a rate of 13% while mainline (trunk) and local service carriers grew at a rate of about 7% (Wensveen, 2011).

Market competition invoked by the Airline Deregulation Act of 1978 forced airlines to improve the economic quality of their route networks. Mainline carriers developed highly efficient hub and spoke networks to improve airline efficiencies and often withdrew service from less profitable markets. As was the case before, cities that lost service because of mainline restructuring presented, presented a new market of opportunity for the commuter airlines who could step in and backfill the service left behind larger airlines.

The Airline Deregulation Act of 1978 established the requirement for commuter airlines to hold an FAA operating (safety) certificate and raised the seat allowance, enabling commuters to carry more passengers for flight. The ability to carry more passengers, paired with the design of a hub and spoke network, provided an environment where the commuter and regional airlines flourished.

As the regional airline industry grew in the 1990s, many regional airlines began adding jet aircraft, which became known as regional jets (RJs), to their fleets. Regional jets are larger and faster than the turbo-prop aircraft traditionally used by commuter airlines. For a given flight time, regional jets fly further than turbo-props, lending to the increase in average regional airline trip length. Continental Express was one of the first regional airlines to operate regional jets; and

in 1996, to market the aircraft upgrade and distinguish itself from competitors, renamed itself ExpressJet Airlines (ExpressJet, n.d.). The regional jet boom of the 1990s transformed the regional airline industry, which in 2014 flew 46.85% of U.S. passenger enplanements and served a total of 607 airports, including major hubs where in some cases they accounted for more than half of all airport traffic, such as in O'Hare International Airport in Chicago, Illinois (56.4%) and Douglas International Airport in Charlotte, North Carolina (55.3%) (RAA, 2015).

Since deregulation, regional airlines have been one of the fastest growing and most profitable segments of the airline industry. The Regional Airline Association (RAA) (2015) reports that on regional airlines, between 1980 and 2014: passengers enplaned rose from 14.69 million to 158.36 million; departures grew from 2.26 million to 4.38 million; average passenger trip length grew from 129 to 480 miles; and average aircraft seating capacity grew from 16 to 58 seats.

The importance of a regional airline is often reflected in its relationship with major airlines. Regional airlines can be a wholly-owned subsidiary of a major airline, or may be owned by an organization that is independent of a major airline. Forbes and Lederman (2007) note that almost all regional airlines operate under codeshare agreements with one or more major carriers that allow the regional airline to operate flights on behalf of the major carrier who is responsible for marketing and ticketing the flight. In this relationship, majors have a cost advantage over their own operations, due to lower cost structures, in part due to lower labor costs that can be traced to the lack of non-unionized work forces in the early years of commuter airlines, when compared to their major (trunk) airline counterparts. Regional airline ownership drives codeshare agreements and operational control of the airline, to include employee management.



In their analysis of contracts between major (mainline) and regional airlines, Forbes and Lederman (2007) found that in the case of independent regional airlines, the contract between the regional and major will take will typically take one of two forms:

Historically, most contracts have been revenue-sharing agreements (also known in the industry as pro-rate agreements). Under these agreements, the regional agrees to serve a set of routes on behalf of the major and to coordinate its schedule on (and allocation of aircraft to) those routes with the major's own schedule. In exchange, the major permits the regional to use its service marks and logos and lists the regional's flights in computer reservation systems under its two-letter designator code. The regional receives an allocated portion of the revenue from each passenger that flies the regional as part of an itinerary that connects with one of the major's flights. Fares are set by the major and marketing and ticketing are carried out by the major.

More recently, the industry has shifted towards fixed-fee or capacity-purchase agreements. Under these types of contracts, the regional receives a fixed payment (usually based on block hours flown) for each departure that it operates on behalf of the major. This fixed payment is calculated to cover the regional's operating costs and to guarantee a reasonable rate of profit. In addition, the regional may receive incentive payments based on operational performance, such as on-time performance and baggage handling. Under a capacity purchase-agreement, the major retains all revenue from flights operated by its regional. Our conversations with industry participants and examination of the trade presses suggest that the switch to fixed-fee contracts was motivated by two factors. First, these contracts eliminate almost all of the risk faced by the regional. The fixed fee payment with a guaranteed profit margin insulates the regional from both demand risk (since its revenue is independent of the number of passengers onboard) and cost risk (since most costs, including fuel, are passed on to the major). Second, fixed fee contracts provide the major with a greater level of control over the regional, in particular over its schedule. The switch to fixed fee contracts began in the late 1990s and, interestingly, largely coincides with regionals' adoption of RJs (Forbes & Lederman, 2007, pp 8-9).

Consolidation of major airlines over the last decade has left an industry with more regional airlines than major airlines. As a result, the major airlines can leverage the regional airlines against one another as they compete for capacity purchase agreements. "The large carriers are playing the small ones off by putting segments of the business out for bid, and pretty much accepting the lowest bidder that can do the job," says George Hamlin, president of Hamlin

Transportation Consulting. “It’s becoming a commodity business with multiple bidders. And the cost pressure on regionals is extreme” (Knibb, 2012, para. 5). In his testimony to the U.S. Senate Committee on Commerce, Science, and Transportation, Captain Sullenberger (2015) explains what it means to you as a passenger on a regional airline: “It means you are flying on the lowest bidder” (para. 41).

Cost-fixed contracts between the regional and major airlines, coupled with pilots’ collective bargaining agreements, allow little maneuvering room for regional pilot salary negotiation (Aviation Week and Space Technology, 2015). If a regional airline is able to raise its employee salaries, it typically won’t be able to get lowest-bidder contracts from the majors. Industry analysts believe this created a race to the bottom that helped create the environment where regional pilot salaries were kept so low, helping “regional pilots effectively to cross subsidize their major carrier counterparts” (CAPA, 2015, p. 3).

Regional jets can travel at speeds comparable to major airlines and when first introduced, provided a new level of comfort and speed not seen previously in the regional fleet. The new travel capabilities afforded by regional jets meant they could be used on more than just short feeder routes between small regional and major hub airports. Having the ability to operate on the same routes as major airlines, but at a lower cost structure due to lower labor costs, meant major airlines could schedule their regional partners to fly routes that were previously operated by the mainline carrier itself, but at a lower cost. In essence, major airlines could subcontract their regional partners to fly a portion of their routes.

Forbes and Lederman (2007) point out that the emergence of the regional jet has “exacerbated existing tensions between management and pilot unions at the major carriers” (p. 15) due to management’s ability to replace mainline missions with regional jets, at a lower cost.

As regional airline affiliates picked up more flights from their mainline carrier, new major airline pilot scope clauses spelled the scope of the contract in terms of size of aircraft operated. Today, most U.S. major airline pilot contracts have scope clauses that limit outsourcing of flying on aircraft exceeding 76 seats (Unnikrishnan, 2016).

Many industry experts believe that the regional airline business model is reaching a breaking point. Due to changing industry economics and a rapidly increasing shortage of pilots, regional airlines (especially independent) will not be able to commit to long-term capacity service agreements with major carriers and majors are reconsidering how to meet increasing passenger demand with fewer pilots. In its 2016 aerospace forecast, the FAA (2016) notes an increase in passenger demand for travel, but a decrease in capacity, led by a reduction in capacity of the regional airlines, which has decreased capacity by 3% (and passengers carried down 2.1%) since 2007.

To meet the growing demand for air travel, U.S. airlines are utilizing larger aircraft, replacing many smaller 50-seat regional jets with larger, more fuel-efficient regional jets with 70-90 seats (A4A, 2016). From an economic standpoint, smaller RJs have higher costs per unit of capacity. For example, on a two-engine jet, for a two-pilot crew, the more seats available for revenue paying passengers, the lower the unit cost per seat, with the added potential of increased revenue. Former Delta CEO Richard Anderson noted the inefficient nature of 50-seat RJs stating that with oil at \$110 per barrel, the aircraft would have to fly with a 150% load factor (occupancy factor) to make money (CAPA, 2015). Confirming the trend of eliminating smaller RJs, the FAA (2016) forecasts that only a handful of the 50-seat regional jets will be in service by 2023.

The Regional Airline Association (2015) reports that regional airlines are employing increasingly larger regional jets and new offerings from Embraer and Bombardier, the two leading manufacturers of RJs, are introducing aircraft that can seat about 100 passengers, depending on airline configuration. Several major airlines are purchasing these new narrow-body aircraft to eliminate the need for outsourcing to regional airlines.

Both Delta Air Lines and United Airlines are recapitalizing and up-gauging their fleets to larger aircraft to provide better customer service and improve operating economics. Delta Air Lines announced recently that they have “been replacing inefficient, older technology airplanes generating substantial cost improvement and increased customer satisfaction. Since 2009, Delta has retired 280 50-seat regional jets and more than 130 older, narrow body aircraft, while refreshing its fleet with over 300 aircraft” (Delta, 2016, para. 9). In April 2016, Delta announced the purchase of 75 new Bombardier CS100 small narrow body aircraft. Delta is the U.S. launch customer for the CS100 which was designed to bridge the gap between the regional jet and larger mainline jet markets. Delta CEO Ed Bastian said, “these new aircraft are a solid investment, allowing us to take advantage of superior operating economics, network flexibility and best-in-class fuel performance” (Delta, 2016, para. 3). Industry experts believe Delta’s purchase of the CS100 confirms a trend among major carriers – the use of outsourced regional airline operations is being replaced by the purchase of small narrow body aircraft operated by the major carrier. Delta started this trend in 2013 when it purchased 88 Boeing 717 aircraft from Southwest Airlines (following the Southwest – AirTran merger) to replace regional jets with larger airplanes, a move supported by its pilot union (Bachman, 2014).

In March 2016, United Airlines announced an order to purchase an additional 25 new Boeing 737-700 aircraft (adding to a previous order of 40 Boeing 737-700 aircraft), bringing the

total number of new Boeing 737-700s to be delivered to United in 2017, to 65 aircraft. United (2016) says “the new 737-700 aircraft will enable United to continue utilizing larger, more efficient aircraft as the airline reduces the size of its 50-seat regional fleet. United expects to have fewer than 100 aircraft in its 50-seat fleet by the end of 2019” (United, 2016, para. 2). Gerry Laderman, United’s senior vice president of finance and acting chief financial officer says, “the new 737-700 aircraft are ideal for our fleet as we continue to reduce our reliance on 50-seat aircraft” (United, 2016, para. 5).

United and Delta’s fleet recapitalization improves their bottom-line economics, but they are also planning for an industry pilot shortage and working to reduce the size of their regional fleets on a permanent basis. Jeff Smisnek, former CEO of United Airlines, in discussing United’s draw down of 50-seat aircraft because of its partners’ difficulty staffing jets, noted that “the reduction in availability of pilots for smaller airplanes is clearly affecting us, as it’s affecting all of our competitors” (Sumers, 2015, para 3). Levine-Weinberg (2016) notes that Delta and United will have to increase their mainline (non-regional) hiring to staff these new jets, but since they offer much better pay than the regional airlines, they will be better suited to handle any worsening of the pilot shortage.

Seismic shifts are occurring in the regional airline industry. In 2009, there were five publicly held regional airlines, but because of a series of bankruptcies and mergers that occurred over the next six years, there were only two remaining by 2015 (CAPA, 2015). Murphy writes “citing the pilot shortage, two regional operators, Republic Airways and SeaPort Airlines, filed for Chapter 11 bankruptcy in February. Other regional carriers have been unable to fulfill their obligations to their mainline partners, resulting in shake-ups; United Airlines, for example

recently transferred 40 jets from ExpressJet to CommutAir in the hopes the latter could better meet its needs” (Murphy, 2016).

Much of the success of the regional airlines was due to the low-cost structure, due in part to low pay. The regional airlines are facing headwinds today. Like the consolidation and subsequent stability seen among the majors over the last decade, the regionals are going through a similar period of upheaval and turmoil. George Hamlin, president of Hamlin Transportation Consulting says, “with consolidation, we can expect musical chairs with fewer and fewer players” (Knibb, 2012, para. 10). Centre for Aviation (CAPA) analysts (2015) predict following this turmoil, we will see a much smaller, more stable regional airline industry.

### **Pilot Workforce Development**

Duggar, Smith, and Harrison (2011) note that the demand for commercial airline pilots is a derived demand, based on the size and utilization of the commercial aviation fleet. As one could imagine, the cyclical and volatile nature of the air transport industry make workforce planning a challenge.

Developing the airline transport pilot workforce presents a series of technical and economic challenges to those who seek careers as professional airline pilots. Airline pilots typically have a bachelor’s degree and must hold an Airline Transport Pilot (ATP) certificate (which requires a minimum of 1,500 flight hours) and possess extensive flight experience before being hired at a regional, then major airline. The journey to becoming a professional airline transport pilot may take seven to 10 years depending on the path selected and economic environment.

There are two types of civilian flight schools, each named after the Federal Aviation Regulation (FAR) under which they are authorized to operate: Part 141 and Part 61. The two

types of schools differ in their structure and program flexibility. Part 141 schools, which are structured and more geared towards full-time, career oriented students, are subject to audits by the FAA and must have detailed, FAA-approved course outlines and meet minimum pilot pass rates on practical exams (AOPA, n.d.). Part 61 schools provide a more flexible training environment, better suited for part-time students (Wallace, 2010). Each school type has its own unique advantages (and disadvantages) that allow for differing pathways to pilot certification, depending on student needs. Student pilots decide which type of school to attend and are held to the same certification standards, regardless of whether they attend a Part 141 or Part 61 school.

Becoming a professional airline transport pilot is a significant investment in terms of both time and money. Pilots must earn a Student Pilot certificate, Private Pilot certificate, Instrument rating, Commercial Pilot certificate, Multi-engine rating, and Airline Transport Pilot certificate. Each of these certificates and ratings require ground and flight training, as well as ground and flight evaluations. Most collegiate aviation program pilots graduate with a Commercial Pilot certificate with Multi-engine and Instrument ratings. Some also graduate as Certified Flight Instructors (CFIs). Together, these certificates and ratings can cost \$60,000-75,000 depending on flight school and instructor fees. Factor in the cost of college and prospective airline candidates may face excessive debt, having spent “\$150,000 to \$200,000 for a university degree and flight training” (Carey, 2015, para. 3).

Prior to the 2009 Colgan Air accident in Buffalo, pilots graduating from collegiate aviation programs who held Private, Commercial, Instrument, and Multi-engine certificates and ratings, and had accumulated 250 to 350 flight hours, met the standards for entry into the first officer position at many regional airlines (Brady, 2014). At that time, the Commercial Pilot certificate was the minimum legal requirement, but actual flight hour hiring requirements would

depend on economic conditions and the resulting demand for pilots. As demand for pilots went up, flight-hour hiring minimums went down, and when demand for pilots was down, flight-hour hiring minimums would go up. Following the Colgan Air accident, Congress passed legislation that raised the minimum hiring standards for first officers.

The Airline Safety and Federal Administration Extension Act of 2010 prompted the FAA to increase the qualification requirements for first officers through the 2013 Pilot Certification and Qualification Requirements for Air Carrier Operations rule, which is commonly referred to as the First Officer Qualification (FOQ) rule. The new FOQ rule requires first officers to hold an ATP certificate, but provides new allowances for pilots with less than 1,500 flight hours and an approved aviation college degree. College graduates with a bachelor's degree (with 60 hours of FAA-approved aviation curriculum) receive a 500-flight hour credit and graduates with an associate's degree (with 30 hours of FAA-approved aviation curriculum) earn a 250-flight hour credit (FAA, 2013).

In 2014, the also FAA revised the training required for the ATP certificate and now multi-engine pilots must also complete the new Airline Transport Pilot Certification Training Program (ATP-CTP) which requires 30 hours of ground instruction and 10 hours of simulator time, six of which must be conducted in a Level C full-motion simulator (Bergqvist, 2015). The ATP-CTP course is meant to bridge the knowledge gap between a commercial pilot and a first officer operating in an air carrier environment (Adams, 2016). The financial burden for the ATP-CTP course falls upon the student who will pay from \$5,000 to \$10,000 for the training, in addition to previous flight training and education expenses (Brady, 2014).

The high cost of flight education and training required to meet the minimum hiring standards are problematic because students cannot afford to take on excessive student loan debt



based on the low starting pilot salaries. The monthly payment for a student loan of \$150,000, financed over 20 years at an interest rate of 4.5 percent, would be approximately \$949, an amount seen as unsustainable given the low starting salaries of professional pilots (Bankrate.com, n.d).

Aviation consultant Kit Darby believes regional airline co-pilots and pilots, at least in the lower ranks, don't make a living wage (Schaal, 2013). According to the Air Line Pilots Association (ALPA), the largest pilot union in the world, the average starting pay for a first officer at a regional airline is \$23,000 (Carey, 2015). The five airlines with the lowest estimated annual salary, according to ALPA (2015) are SkyWest Airlines (\$20,064), Mesa Airlines (\$20,183), Republic/Shuttle/Chautauqua (\$20,655), ExpressJet Airlines (\$20,745) and GoJet Airlines (\$20,815). The first officer of the ill-fated Colgan Air Flight 3407 earned only \$16,400 annually before taxes (Sullenberger, 2015).

ALPA also reports in addition to low pay, "pilots are typically away from their base, and from their families, about 240 to 300 hours per month," negatively impacting quality of life (Schaal, 2013, para. 13). With low pay and poor work conditions, regional airline pilots have historically seen their role in the workplace as a type of apprenticeship, knowing there may be opportunity to "graduate to a much higher paying job at a major carrier" once they meet major airline hiring requirements (Trageser, 2016, para. 12). Unfortunately, the volatile and cyclical nature of the air transport industry does not allow the guarantee of easily reaching a higher paying job at a major carrier and the potential to be stuck in a low-paying regional airline job is very real, given the cyclical nature of the U.S. economy.

The U.S. economy is prone to economic cycles that occur every five to six years, meaning the economy is either at its peak, contracting, recessed, or expanding. Airline pilot

hiring is directly related to the economy. Typically, during periods of economic expansion, airlines hire and during periods of economic contraction, pilots are not hired, and in some cases, may be furloughed without pay. “When the economy catches cold,” economists joke, “the airlines catch pneumonia” (Hopkins, 2001, para. 21).

Given the seven to 10-year lead time required to earn the Airline Transport Pilot certificate, coupled with a cyclical and volatile air transport industry, prospective pilots rarely have a clear path to the professional cockpit when beginning their flight training. The high cost of education and flight training, coupled with a volatile and cyclical job outlook, have in part led to a shortage of airline transport pilots in the U.S.

### **Decreasing Pilot Supply**

The demand for commercial pilots in the future as the industry grows, coupled with fewer pilots in the professional pilot pipeline, are leading industry experts to the conclusion that a pilot shortage is occurring. The labor supply of U.S. airline transport pilots is diminishing and a study by the University of North Dakota forecasts a pilot deficit of 14,439 pilots by 2026 (Bjerke, 2016).

In his testimony to the House Committee on Transportation and Infrastructure Subcommittee on Aviation, Bryan Bedford, (2014) Chairman, President, and Chief Executive Officer of Republic Airways, stated:

Over the next eight years, the largest network carriers are expected to retire approximately half their global pilot workforce. An estimated 54,000 pilots will “age out” of the part 121 commercial airline profession over the next decade and the overall demand for commercial airline pilots over the next 20 years is expected to equal 498,000 new pilots. In the meantime, the FAA’s new pilot rest rule, which our industry has embraced, has increased pilot staffing needs further by 3,000 – 6,000 pilots in the U.S. alone.

At the same time, our country’s mainline carriers, looking to replenish their pilot contingent, will continue to find the most qualified, professional aviators at the regional

airlines. In fact, the four largest U.S. airlines alone are expected to retire 18,000 pilots in the next eight years; yet, there are fewer than 18,000 pilots in the entire regional airline workforce today.

Unfortunately, compared with the 1990's, the U.S. is producing 60 percent fewer pilots yearly and experts predict that only about half of those pilots intend to fly for a U.S. commercial airline (Bedford, 2014, p. 4).

Greg Muccio, a senior manager at Southwest Airlines says, “the biggest problem is a general lack of interest in folks pursuing this as a career anymore” (Schlangenstein & Sasso, 2016, para. 4). Aviation Week and Space Technology magazine reports “too few bright-eyed students are opting for careers in the cockpit, despite the promise of readily available jobs” (Aviation Week and Space Technology, 2015). Their editors write:

The apparent lack of interest on the front side of the pipeline could simply be the long lag between low starting salaries and a comfortable lifestyle later. But it is more likely more complicated than the peculiar pay path. Some aviation college officials say the students are no longer enamored by the lifestyle of a pilot that can be affected by the heavy travel schedule and the quickness with which the industry can be turned upside down by major blows like 9/11, Chapter 11 bankruptcy reorganizations or recessions. Thrown in the mix are resulting furloughs and pension cuts (Aviation Week and Space Technology, 2015, para. 5).

Louis Smith, president of pilot career and financial planning company FAPA.aero, says few pilots have been willing to recommend the career even to their own children until recently, but says now “that mood is changing” as larger airlines have become profitable and picked up hiring. He cautions though, “the cost of learning to fly and the risk and impact of failure is a major impediment to building the pool of pilots” (Schlangenstein & Sasso, 2016, para. 9).

In their analysis of international supply and demand for U.S. pilots, Duggar, Smith and Harrison (2011) write:

The concern over commercial pilot availability stems largely from a review of past U.S. airline industry hiring practices and their ultimate adverse effect on pilot production. In the past, major airlines, both domestic and international, routinely target senior regional pilots to meet their flight deck needs. This practice resulted in some regional airlines

having annual cockpit turnover rates in excess of 50 percent. In turn, regional airlines targeted Certified Flight Instructors (CFIs) from Federal Air Regulations (FARs) Part 61 and 141 training organizations (especially those qualified to conduct both instrument and multi-engine training) to meet their flight deck needs. The unintended consequence of this “trickle-down” pattern of pilot hiring is the adverse effect it has on the aviation industry’s ability to meet future pilot requirements. By hiring CFIs away from “*Ab-initio*” (Latin for “from the beginning”) training providers, pilot production capabilities are significantly reduced throughout the United States (Duggar, Smith, & Harrison, 2011, p. 2).

Hiring practices in the airline industry are typically reactive and not proactive. Murphy (2016) writes that Congress kicked the pilot shortage created by heavy retirements down the road in 2007 when “it raised the mandatory retirement age to 65 from 60 to delay the exit of all the military pilots who moved to the airlines after the Vietnam War” (Murphy, 2016, para. 5). According to data compiled by aviation consultant Kit Darby, “more than 30,000 pilots – or half the current total of 60,222 at 10 large U.S. airlines, United Parcel Service Inc. and FedEx Corp. – will reach age 65 by 2026” (Schlangenstein and Sasso, 2015, para. 14).

Increased demand overseas for U.S. certificated pilots, particularly in China, India, and the Middle East, is placing additional strain on the U.S. pilot supply (Duggar, Smith & Harrison, 2011). Whitley (2016) found that Chinese airlines need to hire almost 100 pilots a week for the next 20 years to meet travel demand, and that some Chinese air carriers are offering annual salaries as much as \$318,000 to attract U.S. pilots. Emirates, a Middle East airline, routinely recruits pilots at pilot recruiting events in the U.S., often competing with U.S. carriers. Captain Carl Davis of Boeing, at the 2016 National Training Aircraft Symposium (NTAS), stated that the ability to earn an aviation education from accredited aviation institutions will be the global standard and that the U.S. industry should start to see more countries (who do not have 750, 1,000, 1,250, and 1,500 hour requirements) hire U.S. qualified and trained pilots (Greubel et al., 2016).

Historically, a large percentage of the U.S. airline pilot labor supply has come from the military. Duggar, Smith, and Harrison (2011) found that until the 1990s, approximately 90 percent of the pilots hired by major U.S. air carriers came from the U.S. military with the remaining 10 percent coming through civilian aviation tracks. In 2014, the GAO reported that only 30 percent of pilots hired by major carriers now come from the military (GAO, 2014). According to CAPA analysts, the “military-to-airline path lost its luster amidst the volatility of the industry since 2000 with bankruptcies, changing pilot contracts, and lost pensions” (CAPA, 2015, para. 33). The supply of military pilots is expected to shrink over the next decade as the military produces fewer pilots and works to retain its current pilot force through financial incentives, to include retention bonuses as much as \$225,000 (Bachman, 2014).

The U.S. military routinely produces large numbers of high quality pilots through 12-month *ab-initio* undergraduate pilot training programs which are designed to train pilots with no flight experience. Historically, U.S. airlines have not had a problem attracting qualified pilots, so there has been little interest in *ab-initio* training within the airline industry. Pettitt and Dunlap (1994) describe an industry environment that is resistant to *ab-initio* programs because airlines, unions, and the government regard flight hours as the predominant factor in assessing experience, not proficiency based programs. Unless the industry is faced with a pilot shortage, *ab-initio* training is seldom discussed in the U.S. air transport industry.

Many foreign airlines who train their pilots in the U.S. use *ab-initio* training. Pettitt and Dunlap (1994) found common characteristics of successful *ab-initio* programs include a rigorous and comprehensive process to select pilot candidates before program entry; employer sponsorship at some level; extensive ground school and technical training well beyond regulatory

requirements; basic and advanced flight training; phase checks; and highly-qualified, full-time instructors.

In studying the role of the Certified Flight Instructor (CFI), Bjerke (2012) identified today's millennial flight instructors as technologically savvy and imaginative. Their high ability to employ technology in the aircraft and enhanced training systems, combined with a severe pilot shortage, may lead to more industry leaders following Pettitt and Dunlap's (1994) conclusion that "the 30-year success of the *ab-initio* approach used by foreign airlines and the U.S. military deserves serious consideration" (Pettit & Dunlap, 1994, p. 26).

In 2015, realizing it must be proactive to lead-turn its pilot training pipeline, JetBlue Airways announced the development of a progressive new *ab-initio* program called Gateway Select, one of seven different pathways the airline lays out for prospective pilots. Gateway Select student pilots pay JetBlue \$125,000 to join the program which is comprised of a foundation course, basic and advanced flight training, threat and error management, extensive simulator training, CFI instruction and attainment, and sim instructor qualification (Morton et al, 2016). While an innovative approach to civilian pilot training, the Gateway Select program still presents a financial barrier to aspiring airline transport pilots since flight training is not considered education and is not covered by student loans like collegiate aviation programs.

With fewer students entering the airline transport pilot career pipeline, rapidly increasing demand for pilots, and no quick-fixes on the horizon, the U.S. air transportation system is starting to reveal system shortcomings. The shortage of pilots is causing some airlines to cancel or reduce air service. The Regional Airline Association has been warning legislators about declining service because of a shrinking pilot pool. Scott Foose, RAA Senior Vice President of Operations and Safety, says people in places such as his hometown of Harrisburg, Pennsylvania

often don't fully appreciate the extent to which their communities need regional air service until they lose it. He describes how "the economic impact hasn't really resonated yet. I think we have an obligation to make sure that everyone around the country, including the policy makers in Washington, understands how this is going to cause a significant loss of jobs on top of the service losses that will continue" (Polek, 2014, para. 2). Since 2013, at least 29 communities from Modesto, California, to Macon, Georgia, have lost air service and many growing communities complain they can't get enough air service to support growing economic development. Mike Hainsey, executive director of the Golden Triangle Regional Airport, which serves Columbus, Starkville, and West Point, Mississippi, says "we've had \$5 billion of new industry come to our area, and the airlines say they can't grow us because there aren't enough pilots" (Murphy, 2016, para. 3).

The negative impact of reduced air service and its impact on the economy was presented to Congress by Chairman, President, and Chief Executive Officer of Republic Airways, Brian Bedford (2014):

In addition to the economic consequences at small communities, where air service has already been cut, the pilot shortage facing America's airlines threatens our nation's economic vitality more broadly. Analysts have identified 239 airports considered "at risk" for losing or seeing sharply reduced air service across the country. Collectively, these at-risk airports account for \$2.1 billion in domestic airline revenues, and are located in communities comprising over 10 percent of the U.S. population and 7 percent of the U.S. GDP.

When air service is cut, or reduced, businesses large and small, which rely on that air service for connectivity, relocate or close. This translates to job losses and reduced tax revenue in state and local communities across the nation. As one example: in 2008, AT&T moved its headquarters to Dallas from San Antonio, citing air service as a factor in its decision. Of course, communities with diminished air service will likewise face difficulty in attracting new businesses, making recovery even more difficult.

Within the next few years, U.S. airlines are projected to suffer a shortfall of between 4,000 and 10,000 pilots, or 5 to 13 percent of their pilot workforce. This translates to industry-wide annual revenue losses approaching \$10 to \$26 billion, and

eliminates as much as \$50 to \$130 billion in economic activity (Bedford, 2014, pp. 12-13).

Pilot shortages are not new to the airline industry. Aviation historian Hopkins (2001) noted previous pilot shortages: during the late 1920s as Air Mail Service began to increase and many World War I pilots were no longer proficient to fly as professional pilots; before World War II as the U.S. built up its pilot workforce through the Civilian Pilot Training Program (CPTP); the jet boom of the late 1960s as demand for air travel increased and World War II pilots who entered civil service were retiring; and the millennium pilot shortage of the late 1990s which abruptly ended with the tragic events of 9/11. In studying these pilot shortages, Hopkins noted that “the FAA can, of course, end any pilot shortage with the stroke of a pen. It could determine that technology makes 100-hour pilots as safe as 5,000 hour pilots” (Hopkins, 2001, para. 26).

### **Quality vs. Quantity**

In flying, as is the case in many endeavors, experience is often considered the best teacher, giving the test first and then the lesson. The lessons gained in 1,500 hours of flight time by a new pilot not associated with a structured training program will vary as widely as the environments the new pilots operate in. Some will fly in adverse weather conditions, some will not. Flight hours are easily quantifiable; flight experience is not.

In the 2010 Pilot Source Study, commissioned by AABI and the University Aviation Association (UAA) to research the success of pilots in initial training for Part 121 airline operations, Smith, NewMyer, Bjerke, Niemczyk, and Hamilton (2010) found that:

Statistically, the best performing pilots were those who had flight instructor certificates, graduated from collegiate accredited flight programs, received advanced (post-Private) pilot training in college, graduated with collegiate aviation degrees (any aviation



discipline), and had between 500 and 1,000 pre-employment flight hours. (Smith et al, 2010, p. 73)

In 2012, a second pilot source study was completed, using the same research design as the 2010 study, but with a new data set from an increased number of regional airlines participating in the study. Smith et al (2013) found similar results in the 2012 study as the 2010 study:

Pilots entering the industry with an aviation-specific college degree, particularly a degree from an AABI-accredited flight program, performed better in initial training than those with no degree or a non-aviation degree. The results also indicated that a pilot's background, such as having a CFI certificate and obtaining advance training from a collegiate aviation program, is an indicator of success in training. (Smith et al, 2013, p. 13)

The FAA acknowledges that quantity does not necessarily equal quality, since all flight time does not impart the same level of aeronautical experience (Adams, 2016). The pilot shortage and need for clear pathways to the cockpit has prompted industry debate on what is the right balance of quality (of flight training) versus quantity (of flight hours). In his 2012 statement to the House Committee on Transportation and Infrastructure, Scott Foose, RAA Senior Vice President stated:

The Airline Safety Act of 2010 raises the certification standard, but without additional action, there may be unintended consequences. Pilots not reaching age 23 will lose their jobs, students graduating from well-respected aviation programs will be disadvantaged and may find non-airline jobs or airline jobs in foreign countries more appealing, and students frustrated by the lack of financial support may find the less-rigorous route of flying pipeline patrol to be easier and more feasible than attending training from our best instructors in our best simulators.

If safety is the goal, then experience is part of the solution. It is my opinion and the opinion of many other industry veterans that "flight time" does not equal "experience."

We acknowledge the need for prescriptive standards but the FAA and NTSB have each recognized that flight time is not a good indication of experience or safety. Let me put it simply: four hours of fair weather sightseeing in a Skyhawk has minimal benefit as

compared to four hours in a modern simulator with a highly trained, professional instructor (Foose, 2012, pp. 5-6).

Discussing the impact of recent legislative changes to improve airline safety and the impact on pilot supply, Bryan Bedford, Chairman, President, and Chief Executive Officer of Republic Airways, in his testimony to the House Committee on Transportation and Infrastructure Subcommittee stated:

There was nothing in the NTSB's investigation of flight 3407 – and indeed there is no evidence anywhere – indicating that flight-hour experience contributes to accidents generally or contributed to that accident, specifically. In fact, both the pilot-in-command and first officer of that flight possessed substantially more than 1,500 hours of flight time. Unfortunately, a requirement for first officers to amass 1,500 flight hours before hiring eligibility would not have prevented the accident that spurred its implementation.

In fact, when questioned about flight time and related impact on accidents during a Senate Commerce Committee hearing on February 25, 2010, NTSB Chair Deborah Hersman rejected any connection, stating: *“We've investigated accidents where we've seen very high-time pilots, and we've also investigated accidents where we've seen low-time pilots... We don't have any recommendations about the appropriate number of hours for different categories...we don't have any data supporting the number of hours for a certificate, or its correlation with being involved in an accident.”*

You see, while hiring a pilot with 1,500 hours of flight time may *seem* safer than hiring a pilot with only 500 hours of flight time, in fact this merely forces future aviators into a lengthy holding pattern. They are well-trained and ready to fly, but are forced to shelve their skills in favor of accumulating arbitrary flight-hours in environments that offer little professional enrichment.

Because of the new 1,500-hour rule, pilots who are pursuing commercial aviation careers and have graduated from academic and other well-regarded, structured training programs must now spend an additional 12-18 months building extra flight hours in predominantly unstructured environments before airlines are permitted to hire and place them into their own structured training programs. As a result, aspiring pilots face even higher education costs, which discourages potential pilots from pursuing pilot careers altogether, and reduces incentive to pursue structured flight training programs over other paths to build flight hours. Companies like Republic are considering avenues that bridge this gap for inspiring pilots, but these solutions are limited, costly, and do not address the real pilot shortage facing the nation. (Bedford, 2014, pp. 6-7)

In their study of commercial airline operations, Todd and Thomas (2012) worked to answer the question of whether low-hour pilots (less than 1,500 hours) have sufficient skills to perform on the flight deck of modern aircraft and whether flight hours serve as a surrogate for competence. After observing 302 operations during commercial airline flying, they concluded “there was no statistically significant difference between the performance of Captains and First Officers against the stabilized approach criteria used during the observations” (Todd & Thomas, 2012, p 780). They conclude:

The findings of this research provide concrete evidence to inform legislators, regulators, safety groups, pilots, and the industry in the on-going debate surrounding pilot hours and inferred performance. Given our current flight training and checking regimes, this research suggests that the performance of a pilot certainly does not differ dramatically at 1,500 hours when compared to 1,499 hours or less. There is a continued need for scientific rigor, rather than political commentary, to inform the debate on commercial pilot training and licensing, in particular the individual differences that make up the competence of a pilot instead of adherence to an arbitrary threshold that might somehow ensure performance and, therefore, safety. (Todd & Thomas, 2012, p 781).

In the first study following the implementation of the new ATP FOQ ruling to compare pilots hired before the ruling to those hired after the ruling, Shane (2015) found that “while pilots hired after the FOQ ruling had a significantly higher number of total flight hours, that group was more likely to need additional training and less likely to successfully complete training than those who were hired prior to FOQ” (Shane, 2015, p 1). The Regional Airline Association says many proficient pilots were made ineligible by the FOQ rule and that the longer pilots fly outside of a structured training environment to build their hours, the worse their training performance becomes (RAA, 2016a).

A third pilot source study was completed in 2015, this time using initial flight training data from all U.S. regional airlines, and Bjerke et al (2016) found that post-FOQ rule pilots had less aviation-related academic experience and a significant reduction in multi-engine time among

less-experienced pilots. In discussing the results of the study at the 2016 National Training Aircraft Symposium, Smith et al. (2016) addressed specific findings from the study:

- AABI flight degree pilots needed less extra training, less Initial Operating Experience (IOE) time, less extra recurrent training, and had fewer non-completions.
- Aviation degree pilots needed less extra training, less extra recurrent, and fewer non-completions.
- CFI pilots had fewer non-completions.
- Non-CFI pilots had more non-completions and more extra training.
- R-ATP pilots had fewer non-completions, less extra training.
- Pilots with less than 1,500 flight hours had less extra training, fewer non-completions and less extra recurrent.
- Estimated grand total cost to regional airlines for non-completions and extra training: \$24,885,263.

Working to find solutions for member airlines who were only able to hire just 63% of the approximate 6,000 pilots needed last year, the Regional Airline Association is making a case based on the findings of the Pilot Source Studies that another restricted ATP category named the Air Carrier Enhanced (ACE) ATP, be added (Hemmerdinger, 2016). The ACE program is designed as “an alternative means to identify, train, qualify, and monitor new airline pilots” and keep pilots in a structured pipeline program, where flight experience levels and performance are monitored (RAA ACE, n.d.). Proponents of the ACE R-ATP believe the program would increase the quality of training for aspiring airline pilots, making them better first officers, and better prepared to perform their duties. Not all industry stakeholders agree that that a new training pathway will correct the pilot shortage.

ALPA has long insisted that “the most immediate concern is simply a shortage of qualified pilots who are willing to work for the paltry wages and benefits offered by some regional airlines to first officer candidates and recommends that the “U.S. Congress should rebuff any efforts by aviation stakeholders to undo or roll back safety gains that have been

realized for first officer qualifications and training requirements” (ALPA, 2015, p. 6).

Countering ALPA’s concerns, RAA Senior Vice President Scott Foose dismisses claims that the shortage of pilots has resulted from the regional airline’s low starting pay, and contends that a pilot’s lifetime career earnings compare favorably with professions requiring comparable levels of education (Polek, 2014).

CAPA (2015) reports that although a “movement is afoot to lower the 1,500-hour requirement, with heavy lobbying from regionals,” it is unlikely to happen since families of the Colgan Air disaster, who helped bring about the new regulations, are extremely active in the legislative branches of government (CAPA, 2015, para. 34). Good politics requires legislators to err on the side of safety; and Sullenberger (2015) states since the regional airline industry has insisted on using a broken economic model, they have created their own problem. He testified before a Senate Committee, with family members of Colgan Air Flight 3407, that “it is not in anyone’s best interest – not regional airlines, not major airlines, and certainly not the traveling public – to have the aviation industry lower commonsense safety requirements to meet an unsupportable business model” (Sullenberger, 2015, para. 40). He says those working to reduce the flight hours required of newly hired pilots believe first officers don’t need to have the same level of competence as the captain and that highly scripted, highly supervised training experiences offered in a sterile environment are better than real flight experiences (Sullenberger, 2015). Like ALPA, he believes the real problem with the regionals is not a pilot shortage, but rather a shortage of pilots willing to work in the airline industry under the current economic model – adding that currently the rewards of an airline career don’t match the investment required.

## **Collegiate Aviation**

Since the establishment of Harvard University in 1636, the first institution of higher education in the U.S., our nation's system of colleges and universities has continued to expand with the advent of new technologies and resulting educational needs. Over the past century, the growth and emergence of aviation and the air transport industry has fueled the development of collegiate aviation programs throughout the U.S.

Cohen identifies a trend throughout the history of U.S. higher education towards a "varied, vocationalized curriculum" (Cohen, 2010, p. 81). Professional schools that combined theory and application began to gain traction in the U.S. following the Civil War when Harvard's President Charles Eliot successfully persuaded professional schools to require a professional degree. Since the late 1800s, professional curriculum has evolved to become more specialized to support new industries and vocations such as engineering, agriculture, and manufacturing (Cohen, 2010). The onset of the powered flight era brought the need to develop professional education programs specializing in aviation.

The Wright Brothers were well respected for their engineering acumen, but were not necessarily known as great businessmen. Other men would see the value of airplanes as part of a larger air transport industry that could reduce the globe "to a series of interconnected neighborhoods through the medium of flight" (Faherty, 1990, p. vii). In 1925, Oliver Parks, a Chevrolet salesman in St. Louis, Missouri, began taking flying lessons from the Robertson Aircraft Corporation. Parks witnessed firsthand the strategic potential of aviation when one of Robertson's pilots, Charles Lindbergh, became the first pilot to fly solo across the Atlantic Ocean in 1927. The international attention given to Lindbergh helped Parks envision the future commercial possibilities of the air transport industry. Realizing the significant number of people

who would need to learn to design, fly, and maintain aircraft, Parks founded the Parks Air College in 1927 which “owns the distinction of being the first federally-certificated flight school in the United States” (Saint Louis University, 2015). Like many preceding professional schools with specialized curriculum, Parks Air College became part of a larger university when Oliver Parks realized that “future aviation leaders would need a broader, more academic education” and gifted his college to St. Louis University in 1946 where it became known as the Parks College of Engineering, Aviation, and Technology (Saint Louis University, n.d.).

While Parks Air College is recognized as the first collegiate aviation program, Embry-Riddle Aeronautical University is considered the largest. Barnstormer John P. Riddle and entrepreneur T. Higbee Embry founded the Embry-Riddle School of Aviation in 1926 in Cincinnati, Ohio, to train airplane pilots (Embry-Riddle Aeronautical University, n.d.). From humble beginnings, the school grew to become a “a global leader in aviation and aerospace higher education” and today Embry-Riddle Aeronautical University is an independent, not-for-profit university with campuses in Florida and Arizona, and satellite campuses in 150 locations around the U.S., Europe, Asia, and the Middle East (Embry-Riddle Aeronautical University, n.d., p. 1).

As aviation education was taking shape on college campuses in the 1920s, two important student organizations emerged and continue to be a part of collegiate aviation programs today: The National Intercollegiate Flying Association (NIFA) and Alpha Eta Rho International Aviation Fraternity. NIFA traces its roots to May 1920 when collegiate aviators (primarily ex-army and ex-navy aviators) from nine schools first met to compete in four flying events. Yale University won first place (NIFA, n.d.). Today NIFA serves as a forum for collegiate aviators to expand their education through competitive and non-competitive events with other universities,

as well as network with industry (NIFA, n.d.). Alpha Eta Rho is a professional collegiate fraternity founded in 1929 at the University of Southern California to “bring together those students having a common interest in the field of commercial aviation” (Alph Eta Rho, n.d., p. 1). Eighty-plus years later the fraternity, whose motto is “Collegiate Aviation Leaders of Today ... Aviation Industry Leaders of Tomorrow” is going strong with 60 active chapters around the globe (Alph Eta Rho, n.d., p. 1).

The 1930s saw a large plus up in aviation student enrollment because of the Civilian Pilot Training Program (CPTP), which fueled the growth of many future collegiate aviation programs by using the classrooms of American colleges and universities to train pilots, using government funds. The CPTP was developed by President Franklin Delano Roosevelt and lasted from 1939 to 1946. Pisano (1993) describes the CPTP as a:

Dual-purpose governmental program conceived by the Civil Aeronautics Authority to serve as a New Deal economic panacea for a neglected segment of the aviation industry and as a bulwark in the national defense by providing trained pilots in the event of war. (Pisano, 1993, p. ix).

Thousands of military pilots trained on college campuses during the CPTP, which became the foundation for U.S. collegiate aviation programs across the country. Following the war, many of the collegiate aviation programs “continued, in part, because Reserve Officer Training Corps (ROTC) programs included flight orientation for students enrolled in them” and the increasing need for improved aircraft design, operations, and maintenance as the U.S. entered the atomic age (Kiteley, n.d., p. 1).

The pace of technology development advanced rapidly in the 1940s with many of the new technologies developed in World War II, to include the jet engine, quickly finding their way into the commercial market. Leaps in technology required U.S. education systems to quickly adapt to stay relevant. In 1945, the Civil Aeronautics Administration partnered with Stanford



University's School of Education to help American schools adjust themselves dynamically to the technological and cultural needs of the Air Age by publishing the Aviation Education Source Book, that helped teachers introduce aviation materials in the K-12 classroom (Hanna, 1946). Parallel efforts occurred in higher education as colleges and universities across the country also increased their emphasis on science and engineering, in both teaching and research.

In 1947, faculty and staff from collegiate aviation programs around the country met in Denver, Colorado, and formed the National Association of University Administrators of Aviation Education (NAUAAE) to expand the growth of existing aviation education programs nationwide. In their first year, NAUAAE reported membership of 41 personnel and developed their first mission statement:

It is believed that the work of the Association, conducted as it will be by leading educators of the United States, will be of basic and permanent benefit to aviation. A new generation of youth, graduating from the high schools and colleges each year, with a thorough grounding in and understanding of the airplane and its social, scientific, political, and economic influences upon living will, through the years, establish an informed public opinion on aviation which will go far toward eliminating many of the present-day problems which beset the aviation industry and the national defense. (UAA History, n.d., p. 1)

NAUAAE changed its name to the University Aviation Association (UAA) in 1948 and today works to “promote and foster excellence in collegiate aviation education by providing a forum for students, faculty, staff and practitioners to share ideas, to enhance the quality of education, and to develop stronger programs and curricula” (UAA Mission, n.d., p. 1).

Leadership for Alpha Eta Rho passed from the University of Southern California to Parks College at St. Louis University in 1950. Professor Wood, Chair of Park's Aeronautics Department, managed the national office of Alpha Eta Rho for the next 36 years (until he retired

in 1986) and was extremely active in all aspects of U.S. collegiate aviation, expanding and modernizing Alpha Eta Rho, NIFA, and UAA well into the jet age (Saint Louis University, n.d.).

America's jet age was brought about by the Boeing 707, the first commercial jet airplane to be built in America, which entered commercial service in 1958. The Boeing 707 revolutionized air travel and "kicked the jet age into top gear" by allowing passengers to travel the world more easily than ever before (Glancey, 2014, p. 1). The increased demand for passenger air travel required more aviation professionals to support the growing industry.

Collegiate aviation programs in the 1960s reflected the needs of the flourishing air transport industry and included flight, maintenance, avionics, and management (Kiteley, n.d.). Courses were offered in 2-year and 4-year programs: 2-year programs focused on technical skills and 4-year programs offered a well-rounded, more in-depth education. As new aviation technologies were developed, the trend towards a more technically diverse, vocationalized curriculum continued with the emergence of new specialized air traffic control, electronics, and avionics programs.

Standards for aviation curricula, courses, and credits were first published by UAA in 1976 to assist prospective students in selecting a collegiate aviation program (Kiteley, n.d.). UAA's accrediting body later became the Aviation Accreditation Board International (AABI) and is closely tied to industry leaders and other professional aviation associations. AABI serves to ensure the quality of flight institutions and programs; assist in the improvement of flight programs; and maintain relevance of education with the industry it serves (AABI, n.d.). Partnerships between industry, government, and higher education institutions are facilitated by AABI and the result is informed research, policy, and practices that advance flight education and

safety, while meeting industry needs. Over sixty collegiate aviation programs are currently accredited by AABI.

Research regarding the learning styles of aviation students began to surface in 2001 when Brady, Stolzer, Muller, and Schaum (2001) worked to relate the learning characteristics of aviation students to the concepts of andragogy and pedagogy. The term andragogy was first coined and published in 1833 by Alexander Kapp of Germany. It is used to describe the art and science of helping adults learn. In contrast to pedagogy, which is the art and science of teaching children, andragogy is helping adults learn, not teaching adults.

Malcolm Knowles popularized the term andragogy, and in his research, made a comparison of pedagogy and andragogy. Looking at andragogy, Knowles (1980) concluded: regarding the concept of the learner, adults are expected to have more self-directedness; regarding the role of the learner's experience, adults have a larger reservoir of experience to draw on while learning; regarding readiness to learn, adults are ready to learn when they experience a need to learn; and regarding orientation to learning, adult learners see education as the vehicle to achieve their full potential.

Academia has worked hard the past 90 years to define an adult and paint an accurate picture of what adult education really is. Merriam and Brockett (1997) write that the field of adult education cannot agree on the definition of adult because adulthood is a sociocultural construction and the answer depends on the culture and society being asked to define adulthood. In describing adults educationally, Knowles (1980) wrote that an adult performs roles that are accepted and expected by society and that a person is an adult to the extent they perceive themselves taking responsibility for their own life.

Brady et al. (2001) found that when comparing the learning styles of aviation and non-aviation students, collegiate aviation students behave as adult learners in all four constructs of Knowles' learning model. Collegiate aviation students differ from traditional college students in that they:

Are not searching for a career; they have found one and are taking steps to realize their dreams. They approach learning as an adult. They are motivated from within, see education as a means of solving problems that occur in the course of life, and learn better in discussion groups than in lectures. They see learning as a utility from which an application can be made (Brady et al, 2001, p. 40).

Motivated from within and seeing standardized, high quality collegiate aviation programs as a structured onramp to a career as an airline transport pilot, collegiate aviation students will help minimize the potential shortage of airline transport pilots in the U.S.

### **Regional Airline-University Bridge Programs Develop**

While there is disagreement among various air transport industry stakeholders as to the cause of the pilot shortage, there is consensus that a structured training environment is beneficial to students, the traveling public, and the air transport industry at large. To ensure a viable industry, airlines must find and work with industry partners to cultivate a sustainable pilot pipeline. According to Anderson, Prentice, and Gouel (2016), failure to do so could lead to “difficult, even volatile, competition for experienced pilots because the current regulatory and industry situation can only yield about two-thirds of the pilots the U.S. will need in the next 20 years” (para. 2). “Smart airlines are exploring stronger, scalable relationships within the pipeline, namely with pilot training organizations. These types of relationships could be the differentiator for airline success” (Anderson et al., 2016, para. 13).

Karp (2004) suggested a university to regional airlines bridge model that included flight training focused on airline-type crew procedures and checklists, motion-based simulators, and

student employment interview agreements between regional airlines and universities. His model provided a clear career pathway for collegiate aviation students while assuring the required quantity and quality of pilots in the regional airlines. Airline pilot hiring slowed to a trickle in the late 2000's and few airlines developed bridge models. One exception is JetBlue Airways, an early pioneer in bridge programs.

In 2007, JetBlue founded the University Gateway Program with the help of select regional/commuter airline and higher education partners. The University Gateway allows students with an aviation major from one of six AABI-accredited universities a defined pathway that leads to a guaranteed interview as a first officer at JetBlue (JetBlue, n.d.). The program provides select students the opportunity to develop their flying skills and professionalism in a structured, supervised setting where students gain high quality training and flight experience, as well as learn JetBlue's company culture. JetBlue (n.d.) describes how the University Gateway Program works:

1. Apply and be accepted as a University Gateway Program participant.
2. Complete an internship within the industry (JetBlue or Cape Air encouraged).
3. Graduate from your AABI-accredited aeronautical university.
4. Serve as a certified flight instructor (CFI) for at least one year.
5. Fly for Cape Air and/or ExpressJet for 2-3 years (2,500+ hours of flight experience).
6. Attend a jet transition course.
7. Complete a first officer interview.

JetBlue's progressive program, which began before the 2009 Colgan Air mishap and subsequent pilot certification legislative changes, fostered relationships between academia and industry and has provided the airline with a steady flow of qualified and experienced pilots to meet pilot hiring needs.

JetBlue's University Gateway Program is an industry best-practice and has become a model for other airlines and industry experts to embrace. In their analysis of the airline transport

pilot shortage, Anderson et al. (2016) recommend developing programs with vocational and collegiate education partners that lead to more “formalized feeder programs with regional partners” (Anderson et al., 2016, para. 10).

The terms bridge and gateway are sometimes used interchangeably in collegiate aviation. The term bridge used in regional airline-university bridge agreements applies to the gap that must be bridged between college graduation (with approximately 400 flight hours and a Commercial Pilot certificate) and the ATP certificate.

Completing the bridge is an expensive proposition, in terms of aircraft rental, low wages, or both. With the new FOQ rule, high certification standards have been set and Duggar, Smith, and Harrison (2011) say the real question is who will pay for the training necessary to create highly qualified civilian pilots. According to Murphy (2016), “industry experts suggest that airlines need to start subsidizing and overseeing pilot training as in the so-called *ab-initio* programs common in Europe, Asia, and the Middle East. Airlines like British Airways, Lufthansa and China Eastern Airlines pay all or part of new cadet’s training, often at flight schools in the United States” (para. 16). This is not an off-base suggestion, given it works for the U.S. military and some military aviators who work in academia believe the solution to minimize the impact of new legislation is to use a military aviation training model, working with regional and major airlines, to develop and fund college pathway programs (Gibbs, 2014).

In 2012, researchers from six universities and partnered with industry experts to study the current state of the airline pilot labor supply. Finding significant forecast disruptions in pilot supply, Higgins et al. (2013) suggested that the airline industry work to adopt measures that outline a clear path from initial training to the major-airline pilot position, that includes flight cost control measures, scholarships, signing bonuses, increased pay, and other remunerative

methods. The researchers also said the industry should focus its efforts on recruiting and attracting CFIs (Higgins et al., 2013).

Smith et al. (2012) report that flight instructing has historically been the bridge between finishing advanced pilot training and being hired as an airline pilot. The FAA considers CFIs to be the cornerstone of aviation safety since flight instructors are responsible for training student pilots to learn the airmanship, judgement, flying, and decision-making skills required for student pilots to operate competently and safely in the national airspace system (FAA, 2008). With an average annual salary of \$20,000, CFIs aspiring to become professional airline transport pilots are eager to transition to the regional and then major airlines, as soon as possible (GAO, 2014).

Aviation Week and Space Technology Magazine (2015) reports that the Regional Airline Association is working aggressively to stimulate interest in piloting careers at universities and working with member airlines to establish bridge or gateway programs where air carriers make early connections with prospective pilots and provide them a clear career path that may include hiring college graduates who build hours as flight instructors on an airline's payroll. Creating a sustainable pipeline is key and with demand for pilots being so high, turnover of CFIs in bridge program pipelines approaches 85-90%, stability and quality may be hard to maintain (Morton et al, 2016).

To help alleviate the pilot shortage, editors at Aviation Week and Space Technology magazine (2015) suggest that the FAA consider increasing the flight-hour allowance for college credit hours at approved schools. When discussed, this suggestion often leads back to the issue of quality vs. quantity. Sullenberger (2015) says choosing between quality and quantity is a false dichotomy, and that the airline industry must have both since it allows the airlines time to

evaluate the skills and temperament of a pilot, which benefits both pilots' career and the safety of the traveling public. In describing the ability to create a pathway that offers both, he states:

Since the 1,500-hour standard has been put in effect, flight schools, regional airlines and major airlines have been working together to create a true career path that benefits the industry and most importantly, the traveling public. This is being accomplished by creating partnerships between aviation training academies and regional carriers such as the career program at the aptly named ATP Flight School where a beginning pilot is interviewed and provisionally hired by a regional carrier early in their career. Once an airline makes an offer of employment the pilot continues on at the flight school as a flight instructor building time and experience while training the next generation of pilots to enter the field. The regional carrier even contributes financially to the pilot's education, and most importantly, the prospective airline pilot can be observed, evaluated, and nurtured while they attain the required flight time necessary for a restricted ATP.

The second piece of the pathway is flow through agreements between regional carriers and major airlines allowing pilots from the regional to matriculate upwards to a major airline cockpit (Sullenberger, 2015, para. 42-43).

Such bridge programs with flow-through agreements may aid in helping students reach their goal of becoming an ATP certificated pilot, but they still must sense the investment of money and time is worth the return. Morus (2016) believes that if a solid career pipeline is built that provides opportunities for prospective major airline pilots to build time through instruction, then flow to the regional airlines, and finally to the major airlines, students will commit to the journey required to become a professional airline transport pilot.

ALPA contends that unless the pilot profession is an "attractive career, providing livable wage, benefits, and career-progression opportunities," the U.S. will be faced with a shortage of qualified pilots (ALPA, 2015, p. 6). ALPA president Captain Tim Canoll asserts "by manufacturing a crisis, we are ignoring the truth — that lack of a career path, combined with rock-bottom pay and benefits by some airlines are failing to attract pilots. Professional pilots want promising careers with growth potential and stability" (Smith, 2015, para. 40). Canoll explains "New airline pilots know the difference between a one-time bonus and a permanent



salary increase. While some regional airlines are offering temporary incentives to entice new pilots, these one-time payments may never happen again and new pilots know it” (ALPA, 2016, p. 9).

In analyzing the career aspirations of college aviation students and recent graduates, Lovelace, Lutte, and Bjerke (2015) found that between 2013 and 2015, following the implementation of FOQ, there was no significant change in airline career aspiration. When students were asked “what will most influence your decision when selecting a regional airline to apply to for a pilot position?”, the top answers were salary, base location, upgrade time, pathway to a major, equipment, pilot pathway at university, not applying (automatic flow through to major), and hiring bonus (Lovelace et al., 2015). In discussing the study’s findings with ALPA, Lutte said from a collegiate perspective, solutions to the pilot shortage include “(1) financing options for training, (2) developing pipeline programs (including in high schools), and (3) “focusing the conversation on the positive—pay is coming up, everyone is hiring, so upgrades are happening, and six regional airlines now have first-year pay, when bonuses are included, greater than \$30,000” (Steenblik, 2015, para. 12).

Anderson et al. (2016) suggest carriers will “need to consider what they can offer pilots both in terms of compensation and work rules” (Anderson et al., 2016, p. 12). The Regional Airline Association cites salary, quality of life, and flow through as top incentives to encourage new pilots to the profession and touts member airlines’ efforts to partner with collegiate institutions to create tuition reimbursement agreements, internships, leadership development programs, and preferred/guaranteed hiring agreements to include a guaranteed interview or flow to a major airline (RAA, 2016a). ALPA’s resource manager, Captain Paul Ryder, at the 2016 National Training Aircraft Symposium (NTAS), stated that the three main issues for attracting

new pilots to choose the profession of airline pilot are money, work-life balance, and career progression (Greubel et al., 2016).

Delta Air Lines and United Airlines have taken steps to minimize the impact of a pilot shortage by reinvesting in their aircraft fleet, reducing the size of their regional fleets, and better employing (and paying) their pilots by using larger aircraft. American Airlines has not yet announced the purchase of any mainline regional jet replacements, and to attract pilots to its regional airlines, offers large bonuses. American Airlines Group reports getting about half its pilots from its three wholly owned subsidiaries, Envoy Air, Piedmont Airlines, and PSA Airlines, via flow through agreements that allow employees at the regional carriers flow directly to the major airline (Schlangenstein & Sasso, 2016). In 2016, American announced that all three subsidiary airlines would pay \$15,000 bonuses to newly hired pilots and \$5,000 to employees who referred new pilots (Hemmerdinger, 2016). In reviewing signing bonuses, ALPA's Captain Paul Ryder says because the bonuses are short-lived and not sustainable for a long period in terms of recruitment and retention, they are simply deal sweeteners that are little more than a temporary fix because they don't get to the root of the problem, adding that carriers who offer better compensation packages, career-advancement opportunities, and a comfortable work-life package aren't experiencing any shortages (Cox, 2016).

Despite compensation increases for some regional airline first officers, fewer new pilot certificates are being issued during a period of unprecedented pilot retirements at the major airlines, causing regionals to be unable to meet hiring goals (RAA, 2016a). Regional airline-academic partnerships will help fill the shortage of pilots and some airlines such as Republic Airways, call their agreements with universities "crucial for our company in combatting the serious pilot shortage" (Hemmerdinger, 2016, para. 26). Market forces will ultimately balance

the relationship between pilot supply and industry demand, while providing a clear pathway to the cockpit that government regulators, industry leaders, labor unions, and the traveling public can support.

## Chapter 3

### Methods

#### Overview

The labor supply of U.S. airline transport pilots is diminishing in part because of new pilot training and certification requirements. The industry needs a sustainable model for commercial airline transport pilot development. This study sought the volunteer participation of U.S. collegiate flight students from across the U.S. to answer a series of questions related to bridge programs, which are emerging as a key component of a new pilot workforce development model. The purpose of this non-experimental research was to answer the following questions:

1. What are the preferred characteristics of regional airline-university bridge agreements by collegiate aviation flight students?
2. What is the relationship between preferred characteristics of regional airline-university bridge agreements and academic classification, R-ATP eligibility, total flight hours, and Certified Flight Instructor (CFI) status?
3. What are the differences in perceived importance of flow-through time, from the regional to major airlines, based on collegiate aviation flight students' academic classification, R-ATP eligibility, total flight hours, and Certified Flight Instructor (CFI) status?

Non-experimental research is the most common research type employed in education. Wiersma and Jurs (2009) describe this form of research as “broad in scope, ranging from status quo to ex post facto research, which may be causal-comparative or correlational in nature” (p. 190). Since many important variables in education (i.e. – socioeconomic status, age, gender)

don't lend themselves to manipulation in an experimental setting, they are best observed (research surveys are popular) in their natural (non-experimental) setting. This research helps identify naturally occurring independent and dependent variables and through careful analysis, draw conclusions about relationships amongst variables.

### **Sampling**

The sample population for this study was career-track pilot students from 4-year collegiate aviation programs that are accredited by Aviation Accreditation Board International (AABI), the leading professional accreditation body for aviation programs around the world.

The sampling approach used was purposive sampling. Individuals were chosen for participation because they are on an educational track to become an airline transport pilot. Using purposive sampling, results may not be as generalizable to a larger population as if it were random.

### **Instrumentation**

In their analysis of online surveys, Evans and Mathur (2005) found that the major strengths of online surveys include: global reach, flexibility, timeliness, convenience, question diversity, ease of data entry and analysis, low administrative cost, ease of follow-up, and ability to control sampling. Evans and Mathur (2005) identified potential weaknesses of online surveys as: perception as junk mail, quality of sample representativeness, unclear answering instructions, impersonal nature, privacy issues, and low response rate. Online surveys have become pervasive in academia and data collected from well-designed instrumentation has significant research value.

Wiersma and Jurs (2009) describe measurement as a process of assigning numerals according to rule, to objects such as responses to items or events. To measure the attitudes of

prospective pilots who aspire to careers as airline pilots, a self-administered on-line survey was developed. The survey collected respondent demographic data (10 items), measured 38 interpretive variables describing bridge agreement characteristics using a Likert-scale, and gaged student orientation towards bridge agreements.

The 38 interpretive variables were organized into six constructs: Compensation, Benefits, Employer Reputation, Operating Environment, Flow-Through, and Work-Life Balance. Responses were collected using a 4-item Likert-scale and then coded with a numeric value. For the 4-reponse Likert-scale, the following coding was used:

- Strongly Agree = 4.0 points
- Agree = 3.0 points
- Disagree = 2.0 points
- Strongly Disagree = 1.0 points

To gage student orientation towards bridge agreements, a 5-response Likert-scale was employed that used the following coding:

- A great deal = 5.0 points
- A lot = 4.0 points
- A moderate amount = 3.0 points
- A little = 2.0 points
- None at all = 1.0 points

Constructs, variables, and demographic questions were developed by studying job satisfaction surveys and regional airline pilot recruiting programs. Regional airline programs reviewed include CommutAir, Endeavor, Envoy, ExpressJet, GoJet, Piedmont, PSA, Republic Airways, and SkyWest. Salary and benefit data, as well as career progression information, was

readily available online. Pilot recruiters from Envoy Airlines and Republic Airways, who routinely promote their company's compensation packages, opportunities for professional growth, work environment, and quality of life to prospective employees, assisted with development of the survey. A summary of RAA (2016b) member airline hiring incentives is available in Table 1.

**Table 1***Summary of Regional Airline Hiring Incentives (March, 2016)*

Airline	Incentives
CommutAir	<ul style="list-style-type: none"> <li>• \$7,000 sign-on bonus</li> <li>• Free ATP/CTP</li> <li>• \$5/flight hour bonus for every Part 121 equivalent hour</li> </ul>
Endeavor	<ul style="list-style-type: none"> <li>• \$3000 training bonus</li> <li>• \$20,000 annual retention payments for new hires</li> <li>• Delta Guaranteed Interview program</li> </ul>
Envoy	<ul style="list-style-type: none"> <li>• \$5,000 signing bonus with two-year agreement</li> <li>• \$10,000 signing bonus for new-hire graduates of partner schools meeting GPA criteria with two-year agreement</li> <li>• Flow-through to American Airlines without interviewing</li> </ul>
ExpressJet	<ul style="list-style-type: none"> <li>• \$7,500 bonus to new hire pilots with regional jet type ratings</li> </ul>
GoJet	<ul style="list-style-type: none"> <li>• \$10,000 first officer sign-on bonus</li> <li>• \$15,000 first officer sign-on bonus for pilots with regional jet type rating</li> </ul>
Piedmont	<ul style="list-style-type: none"> <li>• \$5,000 signing bonus for new hire pilots</li> <li>• \$10/flight hour bonus for current Part 121 time (\$10,000 max)</li> </ul>
PSA	<ul style="list-style-type: none"> <li>• \$10,000 bonus with additional \$5,000 to pilots with 1,000 or more hours of Part 121 experience</li> </ul>
Republic/Shuttle	<ul style="list-style-type: none"> <li>• New hires receive full uniforms, electronic flight bag, cooler, and free suitcase for free</li> <li>• \$7,500 to \$20,000 signing bonus based on Part 121 experience</li> </ul>
SkyWest	<ul style="list-style-type: none"> <li>• \$7,500 bonus for new hire pilots currently qualified in a regional jet</li> </ul>



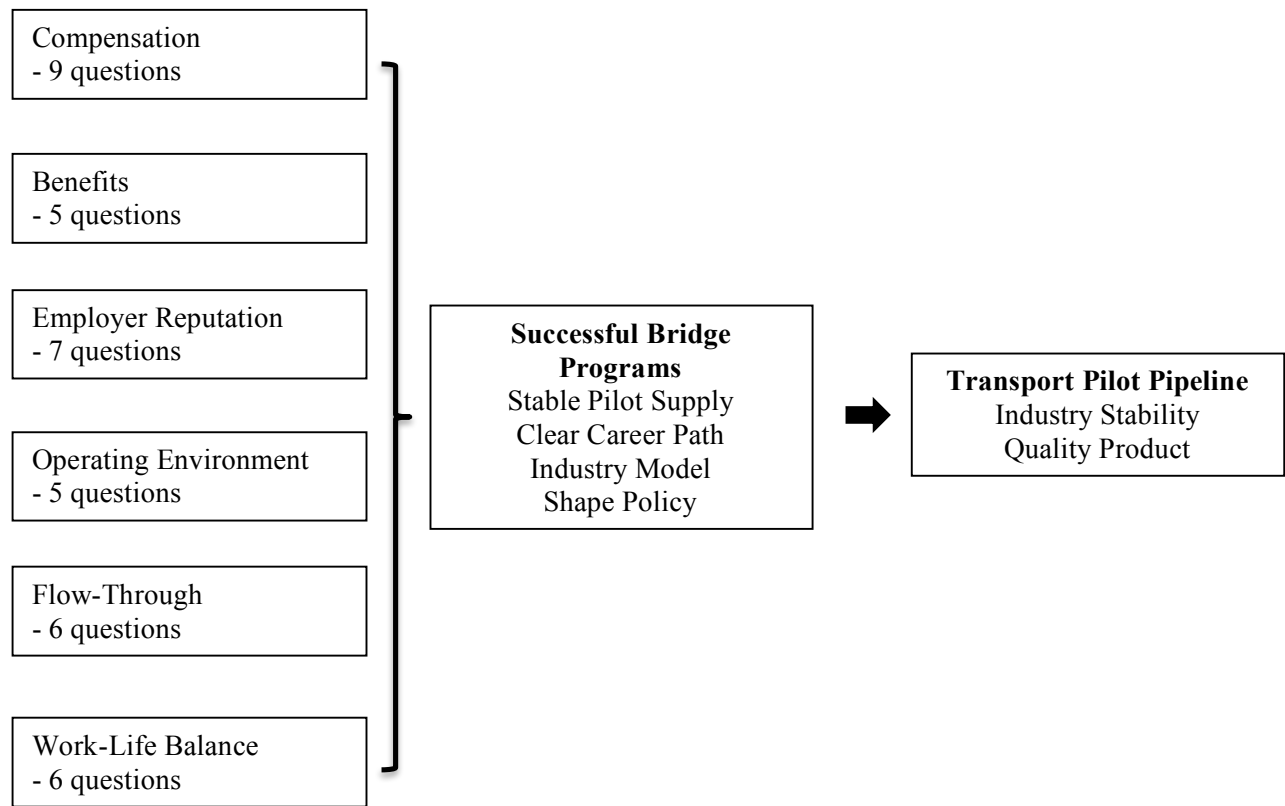
A concept map helps graphically represent and organize ideas and relationships.

Variables were matched with constructs after careful consideration, per the concept map in

Figure 1.

**Figure 1**

*Research Survey Concept Map*



A matrix of survey questions, linked to the three research questions, is available in Table

2.

**Table 2***Survey Question Matrix*

Question	Related Survey Questions
1. What are the characteristics of regional airline-university bridge agreements preferred by collegiate aviation flight students?	<ul style="list-style-type: none"> <li>• Compensation: 1.1 – 1.9</li> <li>• Benefits: 2.1 – 2.5</li> <li>• Employer Reputation: 3.1 – 3.7</li> <li>• Operating Environment: 4.1 – 4.5</li> <li>• Flow-Through: 5.1 – 5.6</li> <li>• Work-Life Balance: 6.1 – 6.6</li> </ul>
2. What are the differences in collegiate aviation flight students' orientation towards regional airline-university bridge agreements based on academic classification, R-ATP eligibility, total flight hours, and Certified Flight Instructor (CFI) status?	<ul style="list-style-type: none"> <li>• Section 8: How much do bridge agreements influence your decision on which regional airline to seek employment with?</li> <li>• Demographics: 9.1, 9.8, 9.9, and 9.10</li> </ul>
3. What are the differences in collegiate aviation flight students' perception of the importance of flow-through time, from the regional to major airlines, based on academic classification, R-ATP eligibility, total flight hours, and Certified Flight Instructor (CFI) status?	<ul style="list-style-type: none"> <li>• Flow-Through: 5.1 – 5.6</li> <li>• Demographics: 9.1, 9.8, 9.9, and 9.10</li> </ul>

**Instrument Testing**

To determine if the survey was appropriate and logical for the intended audience, the expertise of a panel of collegiate aviation and air transportation industry professionals reviewed and tested the instrument, and provided verbal and written feedback. Panel members are identified in Appendix 1. Since the purpose of the survey was to identify characteristics of a quality bridge program that spans academia and industry, having both academic and industry

perspectives was important to the pilot test. Members selected to review the survey shared characteristics of the intended survey respondents as one-time student pilots, or serve in leadership positions that supervise intended survey respondents. Specific job titles included: Director, Auburn University Aviation Center; Chief Pilot, Auburn University Aviation Center; Aviation Faculty, Auburn University Harbert College of Business; Retired Captain, Delta Air Lines; Captain/Gateway University Program Director, JetBlue Airways; Captain/Pilot Recruiter, United Airlines; Pilots/Pilot Recruiters, Envoy Airlines; and Pilot Recruiter, Republic Airways. Pilot recruiters for Envoy Airlines and Republic Airways were especially helpful since they have relationships with other collegiate aviation programs and communicate with their students and faculty on a regular basis.

Initial feedback from the pilot test included 45 suggested changes to the survey. 41 suggestions were made regarding the Likert-scale variables, 3 regarding demographic information, and 1 regarding the survey title. Suggested changes were considered and most were incorporated into the survey presented to the committee. Following committee review, a few minor revisions to construct and question alignment were made. The final instrument is available in Appendix 2.

### **Validity**

No one type of validity evidence alone is sufficient, and given the population for this survey, the two most appropriate types of validity to focus were construct and content validity. By examining popular job satisfaction surveys, variables for this survey were organized by assigning them to defined buckets or constructs. A review by industry subject matter experts helped confirm that the constructs made sense and the groups were factored appropriately. By further drawing upon the judgment of collegiate aviation and industry experts to confirm survey

content validity, the survey appeared well tuned and to ask the right questions to measure student attitudes without seeking irrelevant information. There was no under-representation of domains important to the airline transport pilot education and employment pipeline.

### **Reliability**

The survey was designed to be straightforward and clear so that if a respondent were to repeat the survey, they would provide the same answer again. The more questions provided, the more reliable the survey was expected to be. To get respondents' best efforts (through good will), attitudinal questions were asked first, and demographics questions asked last. Test-retest, inter-rater reliability, and the Cronbach alpha procedure were the most appropriate measures of reliability for this survey.

By administering at least two pilot tests to the same individuals, at two different times, if the test was reliable, a high positive association between scores was expected. The same answers were expected on this survey regardless of a respondent's mood, health, motivation, etc. Andres (2012) found that self-administered surveys were likely to have more thoughtful, reflective responses. To minimize survey administration differences between campuses and increase inter-rater reliability, respondents self-administered the online survey in a setting they deemed as relaxed and comfortable. Undue influence from survey proctors (Flight Education Directors who distribute the survey electronically), if it existed, should not have biased survey results as students should not have felt pressured into taking the survey. Participating institution Flight Education Directors were simply asked to forward the survey link to their students.

Gliem and Gliem (2003) found that when using Likert-type scales, to determine the reliability of scale items, it is imperative to calculate and report Cronbach's alpha. Alpha coefficients typically range between 0 and 1, and a score of 0.70 is recommended as the

minimum score for reliability with a higher score preferred (Nunally, 1978). George and Mallery (2003) provide the following rules of thumb: “ $\alpha > .9$  – Excellent,  $\alpha > .8$  – Good,  $\alpha > .7$  – Acceptable,  $\alpha > .6$  – Questionable,  $\alpha > .5$  – Poor, and  $\alpha < .5$  – Unacceptable” (p. 231). Using Statistical Package for the Social Science (SPSS) software, once data were obtained from completed surveys, Cronbach’s alpha, based on 38 Likert-scale survey items in the Compensation, Benefits, Employer Reputation, Operating Environment, Flow-Through, and Work-Life Balance constructs, was 0.872. This instrument for this research is reliable with good internal consistency.

### **Data Collection**

Data collection occurred via an online survey that was distributed to 4-year U.S. collegiate aviation programs accredited by Aviation Accreditation Board International (AABI). Qualtrics was selected as the online data collection vehicle as it is available to Auburn University students. By default, Qualtrics collects the user’s Internet Protocol (IP) address. By following directions in the Qualtrics operating manual, this feature was turned off to meet the requirement of not collecting identifying information -- all data were collected anonymously. Electronic data downloaded from Qualtrics was stored on secure, password-protected Auburn University network computers that are stored in locked offices.

To maximize the Qualtrics online survey response rate, AABI forwarded the survey (see Appendix 3) to all member collegiate aviation programs with a four-year accredited flight education program. Specific steps for data collection included:

1. Seeking approval from Director, AABI to gain assistance in distributing online dissertation survey to member institutions.

2. AABI contacting target collegiate aviation program directors via email, requesting their students' participation in this survey. Survey link embedded in the email complete with directions and Auburn University Institution Review Board (IRB) cover letter. Email body stressed importance of how student participation can help build a sustainable model for commercial airline transport pilot development that will in-turn benefit program director's programs (and students) for decades to come.
3. Tracking response rates for a three-week period.
4. During the first week, sending a follow-up email from the researcher, to 18 AABI accredited collegiate aviation program directors, reminding them of the survey and requesting they forward it to their students.
5. Sending a final contact email thanking respondent participant institutions that confirmed they forwarded the survey to their students.

### **Data Analysis**

Data analysis for all three research questions consisted of descriptive statistics to include mean score, distribution, and standard deviation. Further analysis related to demographics and the differences among groups was accomplished using analysis of variance (ANOVA).

### **Summary**

Student participation provided data to help build a sustainable model for commercial airline transport pilot development that will in-turn benefit the airline industry by providing a stable pipeline of well-educated professional pilots.

## **Chapter 4**

### **Findings**

#### **Introduction**

Research findings are presented in this chapter. Data gathered from the instrument entitled Improving the Path from College to the Cockpit: Regional Airline-University Bridge Agreements was analyzed using descriptive statistics and analysis of variance (ANOVA).

#### **Purpose**

The purpose of this study was to identify the characteristics of successful bridge agreements, explore the influence of bridge agreements toward regional airline employment, and examine the perception of regional airline-university bridge agreements among collegiate aviation flight students.

#### **Research Questions**

The research examined the following questions:

1. What are the characteristics of regional airline-university bridge agreements preferred by collegiate aviation flight students?
2. What are the differences in collegiate aviation flight students' orientation towards regional airline-university bridge agreements based on academic classification, R-ATP eligibility, total flight hours, and Certified Flight Instructor (CFI) status?
3. What are the differences in collegiate aviation flight students' perception of the importance of flow-through time, from the regional to major airlines, based on academic

classification, R-ATP eligibility, total flight hours, and Certified Flight Instructor (CFI) status?

### **Data Collection and Analysis**

Potential research participants at Aviation Accreditation Board International (AABI) accredited colleges and universities were contacted via email through their collegiate aviation program directors, on behalf of AABI, who fulfilled the researcher's request for distribution assistance with the online survey. The email sent by AABI contained a survey link embedded in the body of the email, along with directions, and the Auburn University Institution Review Board (IRB) cover letter.

The survey used the Qualtrics platform to administer the online survey and collect participant responses, which were anonymous and non-traceable. Research data were exported from Qualtrics and then imported to Statistical Package for the Social Science (SPSS) software for analysis.

Demographic and Likert scale responses were sorted and coded, as described in Chapter III, for analysis using descriptive statistics and analysis of variance (ANOVA). Descriptive statistics were used to determine preferred characteristics of regional airline-university bridge agreements. An ANOVA was used to determine differences in orientation towards regional airline-university bridge agreements, and the perceived importance of flow-through time, from the regional to major airlines, among different groups of collegiate aviation students.

### **Description of Sample**

The sample for this research effort was volunteer career-track pilot students from AABI accredited 4-year collegiate aviation programs across the U.S. Sample participants included male and female students who were at least 19 years old (per the Institutional Review Board



requirement) and currently enrolled as a student pilot in a collegiate aviation program. Seventy-six participants initiated the survey. Nine participants were prohibited from taking the survey because they identified as currently not enrolled as a student in a collegiate aviation program. Sixty-seven participants identified themselves as currently enrolled in a collegiate aviation program. Out of the 67, 60 indicated they attended a university with a bridge agreement. 42 of these 60 students fully completed the online survey.

**Gender of Participants**

Participants were predominantly male (81.00%). 19.00% were female. Distribution of participants by gender is shown in Table 3.

**Table 3**

*Distribution of Participants by Gender*

Gender	<i>n</i>	%
Male	34	81.00
Female	8	19.00

*Note: N = 42*

**Academic Classification of Participants**

Participants included freshmen, sophomore, junior, senior, and other students. Seniors comprised the largest academic classification segment (35.70%) of research participants. Both students who indicated their academic status as other, identified themselves as graduate students. Distribution of participants by academic classification is shown in Table 4.

**Table 4***Distribution of Participants by Academic Classification*

Academic Classification	<i>n</i>	%
Freshman	4	9.50
Sophomore	10	23.80
Junior	11	26.20
Senior	15	35.70
Graduate School	2	4.80

*Note: N = 42*

**Flight Certification of Participants**

Participants reported having flight certification as a Student Pilot, Private Pilot, and Commercial Pilot. Private pilot (38.10%) and commercial pilot (38.10%) shared the largest segment of flight certification. Distribution of participants by highest flight certification achieved is shown in Table 5.

**Table 5***Distribution of Participants by Highest Flight Certification Achieved*

Highest Flight Certification Achieved	<i>n</i>	%
Student Pilot	10	23.80
Private Pilot	16	38.10
Commercial Pilot	16	38.10

*Note: N = 42*

## Flight Ratings by Participants

Participants reported having multiple flight ratings that include single engine land, instrument, and multi-engine land. Pilots can hold multiple ratings except for student pilots who cannot hold any ratings since they have not achieved their Private Pilot certification. 64.30% of participants reported holding a single engine land rating; 33.30% reported holding a multi-engine land rating; and 54.80% of participants reported having an instrument rating. Distribution of participants by flight ratings possessed is shown in Table 6.

**Table 6**

*Distribution of Participants by Flight Ratings*

Flight Ratings	<i>n</i>	%
Single Engine Land	27	64.30
Multi-Engine Land	14	33.30
Instrument	23	54.80

## Certified Flight Instructor (CFI) Status of Participants

Most participants reported being a Certified Flight Instructor (11.90%) or intending to become a CFI (71.40%). Only 16.70% reported not being a CFI. Distribution of participants by Certified Flight Instructor (CFI) status and intentions is shown in Table 7.

**Table 7***Distribution of Participants by CFI Status*

Certified Flight Instructor (CFI) Status	<i>n</i>	%
CFI	5	11.90
Not a CFI	7	16.70
Not a CFI, but intend to become one	30	71.40

*Note: N = 42*

**Restricted Airline Transport Pilot (R-ATP) Certificate Eligibility of Participants**

The preponderance of participants indicated that they are eligible for a Restricted Airline Transport Pilot (R-ATP) certificate (either 1,000 hour or 1,250 hour). Only 11.90% of participants reported not being eligible for a R-ATP certificate. Distribution of participants by Restricted Airline Transport Pilot (R-ATP) eligibility is shown in Table 8.

**Table 8***Distribution of Participants by R-ATP Eligibility*

R-ATP Eligibility	<i>n</i>	%
Eligible, 1,000-hour R-ATP	20	47.60
Eligible, 1,250-hour R-ATP	17	40.50
Not Eligible	5	11.90

*Note: N = 42*

## Total Flight Time of Participants

Most participants indicated having less than 500 flight hours. 57.10% of participants reported having less than 250 flight hours and 33.30% reported having between 250-500 flight hours. Distribution of participants by total flight hours is shown in Table 9.

**Table 9**

*Distribution of Participants by Total Flight Time*

Total Flight Hours	<i>n</i>	%
Less than 250 hours	24	57.10
250 – 500 hours	14	33.30
501 – 1,000 hours	1	2.40
1,001 – 1,500 hours	1	2.40
More than 1,500 hours	2	4.80

*Note: N = 42*

## Preferred Characteristics of Regional Airline-University Bridge Agreements

Research Question #1: What are the characteristics of regional airline-university bridge agreements preferred by collegiate aviation flight students? To measure the preferred characteristics of regional airline-university bridge agreements, a self-administered online survey was developed. The survey included 38 Likert-scale items organized under six constructs: Compensation, Benefits, Employer Reputation, Operating Environment, Flow-Through, and Work-Life Balance. The 38 items provide insight into collegiate aviation flight student priorities regarding regional airline-university bridge agreements. Responses were coded as described in Chapter 3 to allow analysis of survey response descriptive statistics. Mean and

standard deviation are included for each survey item, grouped by construct, in Tables 10 – 15 below.

Student response means and standard deviation for the Compensation construct are provided in Table 10.

**Table 10**

*Participant Perception of Compensation*

Compensation	<i>M</i>	<i>SD</i>	<i>n</i>
Base salary is important	3.86	0.42	42
Sign-on bonuses are important	3.22	0.66	42
Retention bonuses are important	3.26	0.59	42
Tuition reimbursement programs are important	3.24	0.79	42
Employer-paid ATP Certification Training Program is important	3.81	0.40	42
401K employer matching is important	3.45	0.67	42
Employee stock ownership plan is important	2.88	0.77	42
Pilot referral incentive programs are important	3.05	0.79	42
The ability to work overtime for more pay is important	3.52	0.63	42

Student response means and standard deviation for the Benefits construct are provided in

Table 11.

**Table 11**

*Participant Perception of Benefits*

Benefits	<i>M</i>	<i>SD</i>	<i>n</i>
Travel privileges are important	3.67	0.57	42
Health care and dental benefits are important	3.76	0.43	42
Employer wellness programs are important	3.45	0.59	42
Uniform allowances are important	3.33	0.72	42
Employer-provided IT equipment (IE – iPads) is important	3.36	0.66	42

Student response means and standard deviation for the Employer Reputation construct are provided in Table 12.

**Table 12**

*Participant Perception of Employer Reputation*

Employer Reputation	<i>M</i>	<i>SD</i>	<i>n</i>
Corporate culture is important	3.71	0.45	42
Perceived employee job satisfaction is important	3.86	0.35	42
Employee loyalty is important	3.64	0.48	42
Union representation is important	3.17	0.85	42
Employer safety record is important	3.83	0.49	42
Employer commitment to social responsibility is important	3.24	0.88	42
Company financial stability is important	3.88	0.33	42

Student response means and standard deviation for the Operating Environment construct are provided in Table 13.

**Table 13**

*Participant Perception of Operating Environment*

Operating Environment	<i>M</i>	<i>SD</i>	<i>n</i>
Regional airline size (small, medium, large) is important	2.97	0.78	42
Aircraft type is important	3.07	0.78	42
Variety of destinations served is important	3.17	0.79	42
Number of flight hours per year is important	3.79	0.42	42
Working for a regional airline owned by a major airline is important	3.17	0.82	42



Student response means and standard deviation for the Flow-Through construct are provided in Table 14.

**Table 14**

*Participant Perception of Flow-Through*

Flow-Through	<i>M</i>	<i>SD</i>	<i>n</i>
I would commute to work for an airline with a flow-through agreement	3.21	0.90	42
Immediate establishment of seniority is important	3.52	0.74	42
Flow-through time from the regional to major airline is important	3.69	0.64	42
I would take less pay in exchange for a flow agreement	2.74	0.89	42
Automatic flow-through (no interview) from regional to major airline is important	3.29	0.89	42
A clearly defined career path is important	3.50	0.67	42

Student response means and standard deviation for the Work-Life Balance construct are provided in Table 15.

**Table 15**

*Participant Perception of Work-Life Balance*

Work-Life Balance	<i>M</i>	<i>SD</i>	<i>n</i>
Location of pilot base is important	3.64	0.53	42
Commuting is acceptable if I do not live near my pilot base	2.93	0.81	42
Commuter policy is important	3.60	0.50	42
Paid vacation is important	3.52	0.63	42
Schedule flexibility is important (IE – trip trading)	3.67	0.48	42
Variety in trip length is important	3.40	0.70	42

Based on mean scores of items belonging to the six constructs, the most preferred characteristic of regional airline-university bridge agreements by collegiate aviation flight students is employer company financial stability with the least preferred characteristic being taking less pay in exchange for a flow-through agreement. A complete list of characteristics, based on student response means, from most important to least important is available in Table 16.

**Table 16***Participant Preferred Characteristics of Regional Airline-University Bridge Agreements*

Characteristic	<i>M</i>	<i>SD</i>	<i>n</i>
Company financial stability is important	3.88	0.33	42
Perceived employee job satisfaction is important	3.86	0.35	42
Base salary is important	3.86	0.42	42
Employer safety record is important	3.83	0.49	42
Employer-paid ATP Certification Training Program is important	3.81	0.40	42
Number of flight hours per year is important	3.79	0.42	42
Health care and dental benefits are important	3.76	0.43	42
Corporate culture is important	3.71	0.45	42
Flow-through time from the regional to major airline is important	3.69	0.64	42
Schedule flexibility is important (IE – trip trading)	3.67	0.48	42
Travel privileges are important	3.67	0.57	42
Location of pilot base is important	3.64	0.53	42
Employee loyalty is important	3.64	0.48	42
Commuter policy is important	3.60	0.50	42
Immediate establishment of seniority is important	3.52	0.74	42
Paid vacation is important	3.52	0.63	42
The ability to work overtime for more pay is important	3.52	0.63	42
A clearly defined career path is important	3.50	0.67	42

Employer wellness programs are important	3.45	0.59	42
401K employer matching is important	3.45	0.67	42
Variety in trip length is important	3.40	0.70	42
Uniform allowances are important	3.33	0.72	42
Employer-provided IT equipment (IE – iPads) is important	3.36	0.66	42
Automatic flow-through (no interview) from regional to major airline is important	3.29	0.89	42
Retention bonuses are important	3.26	0.59	42
Tuition reimbursement programs are important	3.24	0.79	42
Employer commitment to social responsibility is important	3.24	0.88	42
Sign-on bonuses are important	3.22	0.66	42
I would commute to work for an airline with a flow-through agreement	3.21	0.90	42
Working for a regional airline owned by a major airline is important	3.17	0.82	42
Union representation is important	3.17	0.85	42
Variety of destinations served is important	3.17	0.79	42
Aircraft type is important	3.07	0.78	42
Pilot referral incentive programs are important	3.05	0.79	42
Regional airline size (small, medium, large) is important	2.97	0.78	42
Commuting is acceptable if I do not live near my pilot base	2.93	0.81	42
Employee stock ownership plan is important	2.88	0.77	42
I would take less pay in exchange for a flow agreement	2.74	0.89	42

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## Orientation Towards Regional Airline-University Bridge Agreements

Research Question #2: What are the differences in collegiate aviation flight students' orientation towards regional airline-university bridge agreements based on academic classification, R-ATP eligibility, total flight hours, and Certified Flight Instructor (CFI) status?

Student response frequencies regarding orientation towards regional airline-university bridge agreements are provided in Table 17.

**Table 17**

### *Participant Orientation Towards Regional Airline-University Bridge Agreements*

How much do bridge agreements influence employer decision?	<i>n</i>	%
None at all	2	4.80
A little	6	14.30
A moderate amount	11	26.20
A lot	13	31.00
A great deal	10	23.80

*Note: N = 42*

To determine if there were any statistically significant ( $p < 0.05$ ) differences between independent groups of students, grouped by academic classification, R-ATP eligibility, total flight hours, and Certified Flight Instructor (CFI) status, the one-way ANOVA omnibus test was used. The Tukey, Scheffe, and Bonferonni post-hoc tests were used, as required, following ANOVA to determine specifically which groups were different from one another. Assumptions for the one-way ANOVA include: dependent variable is measured at the interval or ratio level;

participants are randomly selected; distribution is normal; observations are independent of others; and samples should have equal variance.

### **Regional Airline-University Bridge Agreements Orientation by Academic Classification**

A one-way ANOVA was used to determine if there was a difference in regional airline-university bridge agreement orientation based on the participant's academic classification (Freshman, Sophomore, Junior, Senior, or Other).

Evaluating assumptions for the ANOVA:

- The dependent variable is assumed to be measured at the interval or ratio level. Since participants responded to a Likert-scale item, the assumption of being measured on an interval or ratio level is met.
- Participants are assumed to be randomly selected. This is not the case in this test because participants were interested volunteers that were recruited by email. As a result, generalizability is limited.
- Distribution is assumed to be normal. For this test, the distribution appears normal. The data from this test sample do not suggest a distribution that is skewed or affected by Kurtosis. Neither Skew (-.284) or Kurtosis (-.814) measurements are above two times the respective Standard Error of Skewness (.365) or the Standard Error of Kurtosis (.717). Having a sample size larger than 30 helps with the assumption of normality, and in the case of this test, there were 42 participants.
- Responses are assumed to be independent of others. If there is no evidence that the variables are dependent (i.e. - no pairs, no overlap, no influence between participants), they are independent. This appears to be the case in this test.

- Samples are assumed to have equal variance. Using Levene’s test, if  $p > .05$ , we can retain the null hypothesis that the variance is equivalent across all groups. Levene’s Test produced a value of  $p = .102$  which is greater than  $.05$ , therefore variance is equivalent across all groups.  $F_{4,37} = 2.09$ .

No difference was found in regional airline-university bridge agreement orientation based on the participant’s academic classification ( $F_{4,37} = .788, p = .540$ ). The mean, standard deviation, and results of the one-way ANOVA for the effects of academic classification on bridge program orientation are shown in Table 18. Both “Other” participants indicated that they are in graduate school.

**Table 18**

*Orientation Towards Bridge Agreements, by Academic Classification*

How much do bridge agreements influence employer decision?	<i>M</i>	<i>SD</i>	<i>n</i>	<i>df</i>	<i>F</i>	<i>p</i>
Freshman	3.00	.82	4	(4,37)	.788	.540
Sophomore	3.40	1.07	10			
Junior	4.00	1.00	11			
Senior	3.53	1.41	15			
Other	3.00	.00	2			

*Note: N = 42*

### **Regional Airline-University Bridge Agreements Orientation by R-ATP Eligibility**

A one-way ANOVA was used to determine if there was a difference in regional airline-university bridge agreement orientation based on the participant’s eligibility for a Restricted

Airline Transport (R-ATP) certificate (Eligible – 1000 hours R-ATP; Eligible – 1250 hours R-ATP; or Not Eligible).

Evaluating assumptions for the ANOVA:

- The dependent variable is assumed to be measured at the interval or ratio level. Since participants responded to a Likert-scale item, the assumption of being measured on an interval or ratio level is met.
- Participants are assumed to be randomly selected. This is not the case in this test because participants were interested volunteers that were recruited by email. As a result, generalizability is limited.
- Distribution is assumed to be normal. For this test, the distribution appears normal. The data from this test sample do not suggest a distribution that is skewed or affected by Kurtosis. Neither Skew (.615) or Kurtosis (-.692) measurements are above two times the respective Standard Error of Skewness (.365) or the Standard Error of Kurtosis (.717). Having a sample size larger than 30 helps with the assumption of normality, and in the case of this test, there were 42 participants.
- Responses are assumed to be independent of others. If there is no evidence that the variables are dependent (i.e. - no pairs, no overlap, no influence between participants), they are independent. This appears to be the case in this test.
- Samples are assumed to have equal variance. Using Levene's test, if  $p > .05$ , we can retain the null hypothesis that the variance is equivalent across all groups. Levene's Test produced a value of  $p = .184$  which is greater than .05, therefore variance is equivalent across all groups.  $F_{2,39} = 1.77$ .



No difference was found in regional airline-university bridge agreement orientation based on the participant's eligibility for a Restricted Airline Transport (R-ATP) certificate ( $F_{2,39} = 2.00$ ,  $p = .149$ ). The mean, standard deviation, and results of the one-way ANOVA for the effects of R-ATP eligibility on bridge program orientation are shown in Table 19.

**Table 19**

*Orientation Towards Bridge Agreements, by R-ATP Eligibility*

How much do bridge agreements influence employer decision?	<i>M</i>	<i>SD</i>	<i>n</i>	<i>df</i>	<i>F</i>	<i>p</i>
Eligible, 1000-hour R-ATP	3.20	1.28	20	(2,39)	2.00	.149
Eligible, 1250-hour R-ATP	3.94	1.03	17			
Not Eligible	3.60	.55	5			

*Note: N = 42*

### **Regional Airline-University Bridge Agreements Orientation by Total Flight Hours**

A one-way ANOVA was used to determine if there was a difference in regional airline-university bridge agreement orientation based on the participant's total flight hours (Less than 250 hours; 250 – 500 hours; 501 – 1,000 hours; or More than 1,000 hours).

To capture participant flight hours, the survey offered the following selections: Less than 250 hours; 250 – 500 hours; 501 – 1,000 hours; 1,001 – 1,500 hours; and More than 1,500 hours. Only one participant responded to 501 – 1,000 hours and 1,001 – 1,500 hours each, and just two participants responded to More than 1,500 hours. Since all three responses were under-populated and posed a threat to the reliability of analysis, they were combined into one response for the ANOVA: More than 500 hours.

Evaluating assumptions for the ANOVA:

- The dependent variable is assumed to be measured at the interval or ratio level. Since participants responded to a Likert-scale item, the assumption of being measured on an interval or ratio level is met.
- Participants are assumed to be randomly selected. This is not the case in this test because participants were interested volunteers that were recruited by email. As a result, generalizability is limited.
- Distribution is assumed to be normal. For this test, the distribution appears to not be normal. The data from this test sample suggest a distribution that is skewed, but not affected by Kurtosis. Skew (.925) is above two times the respective Standard Error of Skewness (.365), but Kurtosis (-.240) is not above two times the Standard Error of Kurtosis (.717). Having a sample size larger than 30 helps with the assumption of normality, and in the case of this test, there were 42 participants.
- Responses are assumed to be independent of others. If there is no evidence that the variables are dependent (i.e. - no pairs, no overlap, no influence between participants), they are independent. This appears to be the case in this test.
- Samples are assumed to have equal variance. Using Levene's test, if  $p > .05$ , we can retain the null hypothesis that the variance is equivalent across all groups. Levene's Test produced a value of  $p = .595$  which is greater than .05, therefore variance is equivalent across all groups.  $F_{2,39} = .526$ .

No difference was found in regional airline-university bridge agreement orientation based on the participant's total flight hours ( $F_{2,39} = .546, p = .584$ ). The mean, standard deviation, and

results of the one-way ANOVA for the effects of total flight hours on bridge program orientation are shown in Table 20.

**Table 20**

*Orientation Towards Bridge Agreements, by Total Flight Hours*

How much do bridge agreements influence employer decision?	<i>M</i>	<i>SD</i>	<i>n</i>	<i>df</i>	<i>F</i>	<i>p</i>
Less than 250 hours	3.71	1.08	24	(2,39)	.546	.584
250 – 500 hours	3.36	1.15	14			
More than 500 hours	3.25	1.71	4			

*Note: N = 42*

### **Regional Airline-University Bridge Agreements Orientation by CFI Status**

A one-way ANOVA was used to determine if there was a difference in regional airline-university bridge agreement orientation based on the participant’s Certified Flight Instructor (CFI) status (CFI; not a CFI but intend to become one; or not a CFI).

Evaluating assumptions for the ANOVA:

- The dependent variable is assumed to be measured at the interval or ratio level. Since participants responded to a Likert-scale item, the assumption of being measured on an interval or ratio level is met.
- Participants are assumed to be randomly selected. This is not the case in this test because participants were interested volunteers that were recruited by email. As a result, generalizability is limited.

- Distribution is assumed to be normal. For this test, the distribution appears normal. The data from this test sample do not suggest a distribution that is skewed or affected by Kurtosis. Neither Skew (.048) or Kurtosis (.713) measurements are above two times the respective Standard Error of Skewness (.365) or the Standard Error of Kurtosis (.717). Having a sample size larger than 30 helps with the assumption of normality, and in the case of this test, there were 42 participants.
- Responses are assumed to be independent of others. If there is no evidence that the variables are dependent (i.e. - no pairs, no overlap, no influence between participants), they are independent. This appears to be the case in this test.
- Samples are assumed to have equal variance. Using Levene's test, if  $p > .05$ , we can retain the null hypothesis that the variance is equivalent across all groups. Levene's Test produced a value of  $p = .267$  which is greater than .05, therefore variance is equivalent across all groups.  $F_{2,39} = 1.36$ .

No difference was found in regional airline-university bridge agreement orientation based on the participant's CFI status ( $F_{2,39} = 3.11, p = .056$ ). The mean, standard deviation, and results of the one-way ANOVA for the effects of CFI status on bridge program orientation are shown in Table 21.

**Table 21***Orientation Towards Bridge Agreements, by CFI Status*

How much do bridge agreements influence employer decision?	<i>M</i>	<i>SD</i>	<i>n</i>	<i>df</i>	<i>F</i>	<i>p</i>
CFI	2.40	1.67	5	(2,39)	3.11	.056
Not a CFI, but intend to become one	3.70	.99	30			
Not a CFI	3.71	1.11	7			

*Note: N = 42*

**Perceived Importance of Flow-Through Time from Regional to Major Airline**

Research Question #3: What are the differences in collegiate aviation flight students' perception of the importance of flow-through time, from the regional to major airlines, based on academic classification, R-ATP eligibility, total flight hours, and Certified Flight Instructor (CFI) status?

Student responses frequencies regarding perceived importance of flow-through from the regional to major airline orientation are provided in Table 22.

**Table 22***Participant Perception of Importance of Flow-Through Time*

When considering a bridge agreement, flow-through time from the regional to major airlines is important.	<i>n</i>	<i>%</i>
Strongly Agree	32	76.20
Somewhat Agree	8	19.00
Somewhat Disagree	1	2.40
Strongly Disagree	1	2.40

*Note: N = 42*

**Perceived Importance of Flow-Through Time by Academic Classification**

A one-way ANOVA was used to determine if there was a difference in perceived importance of flow-through time, from the regional to major airlines, based on the participant's academic classification (Freshman, Sophomore, Junior, Senior, or Other).

Evaluating assumptions for the ANOVA:

- The dependent variable is assumed to be measured at the interval or ratio level. Since participants responded to a Likert-scale item, the assumption of being measured on an interval or ratio level is met.
- Participants are assumed to be randomly selected. This is not the case in this test because participants were interested volunteers that were recruited by email. As a result, generalizability is limited.
- Distribution is assumed to be normal. For this test, the distribution appears normal. The data from this test sample do not suggest a distribution that is skewed or affected

by Kurtosis. Neither Skew (-.284) or Kurtosis (-.814) measurements are above two times the respective Standard Error of Skewness (.365) or the Standard Error of Kurtosis (.717). Having a sample size larger than 30 helps with the assumption of normality, and in the case of this test, there were 42 participants.

- Responses are assumed to be independent of others. If there is no evidence that the variables are dependent (i.e. - no pairs, no overlap, no influence between participants), they are independent. This appears to be the case in this test.
- Samples are assumed to have equal variance. Using Levene's test, if  $p > .05$ , we can retain the null hypothesis that the variance is equivalent across all groups. Levene's Test produced a value of  $p = .035$  which is less than .05, therefore variance is not equivalent across all groups.  $F_{4,37} = 2.90$ .

No difference was found in perceived importance of flow-through time, from the regional to major airlines, based on the participant's academic classification ( $F_{4,37} = .693, p = .601$ ). The mean, standard deviation, and results of the one-way ANOVA for the effects of academic classification on perceived importance of flow-through time, from the regional to major airlines, are shown in Table 23. Both Other participants indicated that they are in graduate school.

**Table 23***Perceived Importance of Flow-Through Time, by Academic Classification*

Flow-through time from the regional to major airlines is important.	<i>M</i>	<i>SD</i>	<i>n</i>	<i>df</i>	<i>F</i>	<i>p</i>
Freshman	3.75	.500	4	(4,37)	.693	.601
Sophomore	3.60	.699	10			
Junior	3.91	.302	11			
Senior	3.53	.834	15			
Other	4.00	.000	2			

*Note: N = 42*

**Perceived Importance of Flow-Through Time by R-ATP Eligibility**

A one-way ANOVA was used to determine if there was a difference in perceived importance of flow-through time, from the regional to major airlines, based on the participant's eligibility for a Restricted Airline Transport (R-ATP) certificate (Eligible – 1000 hours R-ATP; Eligible – 1250 hours R-ATP; or Not Eligible).

Evaluating assumptions for the ANOVA:

- The dependent variable is assumed to be measured at the interval or ratio level. Since participants responded to a Likert-scale item, the assumption of being measured on an interval or ratio level is met.
- Participants are assumed to be randomly selected. This is not the case in this test because participants were interested volunteers that were recruited by email. As a result, generalizability is limited.



- Distribution is assumed to be normal. For this test, the distribution appears normal. The data from this test sample do not suggest a distribution that is skewed or affected by Kurtosis. Neither Skew (.615) or Kurtosis (-.692) measurements are above two times the respective Standard Error of Skewness (.365) or the Standard Error of Kurtosis (.717). Having a sample size larger than 30 helps with the assumption of normality, and in the case of this test, there were 42 participants.
- Responses are assumed to be independent of others. If there is no evidence that the variables are dependent (i.e. - no pairs, no overlap, no influence between participants), they are independent. This appears to be the case in this test.
- Samples are assumed to have equal variance. Using Levene's test, if  $p > .05$ , we can retain the null hypothesis that the variance is equivalent across all groups. Levene's Test produced a value of  $p = .089$  which is greater than .05, therefore variance is equivalent across all groups.  $F_{2,39} = 2.57$ .

No difference was found in perceived importance of flow-through time, from the regional to major airlines, based on the participant's eligibility for a Restricted Airline Transport (R-ATP) certificate ( $F_{2,39} = .599, p = .555$ ). The mean, standard deviation, and results of the one-way ANOVA for the effects of R-ATP eligibility on perceived importance of flow-through time, from the regional to major airlines, are shown in Table 24.

**Table 24***Perceived Importance of Flow-Through Time, by R-ATP Eligibility*

Flow-through time from the regional to major airlines is important.	<i>M</i>	<i>SD</i>	<i>n</i>	<i>df</i>	<i>F</i>	<i>p</i>
Eligible, 1,000-hour R-ATP	3.60	.821	20	(2,43)	.657	.523
Eligible, 1,250-hour R-ATP	3.82	.393	17			
Not Eligible	3.60	.548	5			

*Note: N = 42*

**Perceived Importance of Flow-Through Time by Total Flight Hours**

A one-way ANOVA was used to determine if there was a difference in perceived importance of flow-through time, from the regional to major airlines, based on the participant's total flight hours (Less than 250 hours; 250 – 500 hours; 501 – 1,000 hours; or More than 1,000 hours).

To capture participant flight hours, the survey offered the following selections: Less than 250 hours; 250 – 500 hours; 501 – 1,000 hours; 1,001 – 1,500 hours; and More than 1,000 hours. Only one participant responded to 501 – 1,000 hours and 1,001 – 1,500 hours each, and just two participants responded to More than 1,500 hours. Since all three responses were under-populated and posed a threat to the reliability of analysis, they were combined into one response for the ANOVA: More than 500 hours.

### Evaluating assumptions for the ANOVA:

- The dependent variable is assumed to be measured at the interval or ratio level. Since participants responded to a Likert-scale item, the assumption of being measured on an interval or ratio level is met.
- Participants are assumed to be randomly selected. This is not the case in this test because participants were interested volunteers that were recruited by email. As a result, generalizability is limited.
- Distribution is assumed to be normal. For this test, the distribution appears to not be normal. The data from this test sample suggest a distribution that is skewed, but not affected by Kurtosis. Skew (.925) is above two times the respective Standard Error of Skewness (.365), but Kurtosis (-.240) is not above two times the Standard Error of Kurtosis (.717). Having a sample size larger than 30 helps with the assumption of normality, and in the case of this test, there were 42 participants.
- Responses are assumed to be independent of others. If there is no evidence that the variables are dependent (i.e. - no pairs, no overlap, no influence between participants), they are independent. This appears to be the case in this test.
- Samples are assumed to have equal variance. Using Levene's test, if  $p > .05$ , we can retain the null hypothesis that the variance is equivalent across all groups. Levene's Test produced a value of  $p = .628$  which is greater than .05, therefore variance is equivalent across all groups.  $F_{2,39} = 0.47$ .

No difference was found in perceived importance of flow-through time, from the regional to major airlines, based on the participant's total flight hours ( $F_{2,39} = .062, p = .940$ ). The mean, standard deviation, and results of the one-way ANOVA for the effects of total flight hours on

perceived importance of flow-through time, from the regional to major airlines, are shown in Table 25.

**Table 25**

*Perceived Importance of Flow-Through Time, by Total Flight Hours*

Flow-through time from the regional to major airlines is important.	<i>M</i>	<i>SD</i>	<i>n</i>	<i>df</i>	<i>F</i>	<i>p</i>
Less than 250 hours	3.71	.550	24	(2,39)	.062	.940
250 – 500 hours	3.64	.842	14			
More than 500 hours	3.75	.500	4			

*Note: N = 42*

**Perceived Importance of Flow-Through Time by CFI Status**

A one-way ANOVA was used to determine if there was a difference in perceived importance of flow-through time, from the regional to major airlines, based on the participant’s Certified Flight Instructor (CFI) status (CFI; not a CFI but intend to become one; or not a CFI).

Evaluating assumptions for the ANOVA:

- The dependent variable is assumed to be measured at the interval or ratio level. Since participants responded to a Likert-scale item, the assumption of being measured on an interval or ratio level is met.
- Participants are assumed to be randomly selected. This is not the case in this test because participants were interested volunteers that were recruited by email. As a result, generalizability is limited.

- Distribution is assumed to be normal. For this test, the distribution appears normal. The data from this test sample do not suggest a distribution that is skewed or affected by Kurtosis. Neither Skew (.048) or Kurtosis (.713) measurements are above two times the respective Standard Error of Skewness (.365) or the Standard Error of Kurtosis (.717). Having a sample size larger than 30 helps with the assumption of normality, and in the case of this test, there were 42 participants.
- Responses are assumed to be independent of others. If there is no evidence that the variables are dependent (i.e. - no pairs, no overlap, no influence between participants), they are independent. This appears to be the case in this test.
- Samples are assumed to have equal variance. Using Levene's test, if  $p > .05$ , we can retain the null hypothesis that the variance is equivalent across all groups. Levene's Test produced a value of  $p = .006$  which is less than .05, therefore variance is not equivalent across all groups.  $F_{2,39} = 5.85$ .

No difference was found in perceived importance of flow-through time, from the regional to major airlines, based on the participant's CFI status ( $F_{2,39} = 2.12, p = .134$ ). The mean, standard deviation, and results of the one-way ANOVA for the effects of CFI status on perceived importance of flow-through time, from the regional to major airlines, are shown in Table 26.

**Table 26***Perceived Importance of Flow-Through Time, by CFI Status*

Flow-through time from the regional to major airlines is important.	<i>M</i>	<i>SD</i>	<i>n</i>	<i>df</i>	<i>F</i>	<i>p</i>
CFI	3.20	1.30	5	(2,39)	2.12	.134
Not a CFI, but intend to become one	3.80	.484	30			
Not a CFI	3.57	.535	7			

*Note: N = 42***Summary**

Findings and statistical analysis were presented in this chapter. Data were gathered anonymously from an online survey distributed by AABI, to flight students in AABI-accredited 4-year flight programs in the U.S. Participants were male and female, and included freshmen, sophomore, junior, senior, and graduate students. All participants attend a school with at least one regional airline-university bridge agreement. Flight students identified themselves as either a student, private, or commercial pilot. Some private and commercial pilots held an instrument and multi-engine ratings. Only a small group of participants indicated that they were Certified Flight Instructors, but the majority of participants indicated they intend to become a Certified Flight Instructor. Most participants reported attending a collegiate flight program that is R-ATP eligible. Most students had less than 500 flight hours.

The first research question asked what are the characteristics of regional airline-university bridge agreements preferred by collegiate aviation flight students. Descriptive statistics indicate that the ten most preferred characteristics are: company financial stability;

perceived job satisfaction; base salary; employer safety record; employer-paid ATP Certification Training Program; number of flight hours; healthcare and dental benefits; corporate culture; flow-through time from the regional to major airline; and schedule flexibility.

The second research question asked what are the differences in collegiate aviation flight students' orientation towards regional airline-university bridge agreements, based on academic classification, R-ATP eligibility, total flight hours, and Certified Flight Instructor status. Using ANOVA, no statistically significant difference in orientation towards bridge agreements, based on academic classification, R-ATP eligibility, total flight hours, or Certified Flight Instructor status was found.

The third research question asked what are the differences in collegiate aviation flight students' perception of the importance of flow-through time, from the regional to major airlines, based on academic classification, R-ATP eligibility, total flight hours, and Certified Flight Instructor status? Through ANOVA, no statistically significant difference in perception of the importance of flow-through time, based on academic classification, R-ATP eligibility, total flight hours, or Certified Flight Instructor status was found.

## **Chapter 5**

### **Limitations, Conclusion, Implications, and Recommendations**

#### **Introduction**

This study examined collegiate aviation flight student perceptions of regional airline-university air transport pilot bridge agreements. The first chapter introduced the U.S. pilot labor shortage affecting the air transport industry due to recent increases in pilot certification requirements and a wave of pilots reaching the FAA-mandated retirement age of 65, and the resulting partnerships between airlines and collegiate aviation programs, known as bridge agreements, that are emerging. The second chapter presented a literature review with a synopsis of the air transport industry, increasing demand for air travel, decreasing pilot, supply, pathways to the airline cockpit, collegiate aviation, and development of bridge programs. The third chapter explained the methods used to design and conduct the study. Sampling, instrument design and development, survey administration, and data collection and analysis were presented. The fourth chapter presented research findings and statistical analysis of data collected using descriptive statistics and analysis of variance. This chapter presents research limitations, conclusions, research implications, and recommendations for future research.

#### **Purpose**

The purpose of this study was to identify the characteristics of successful bridge agreements, explore the influence of bridge agreements toward regional airline employment, and



examine the perception of regional airline-university bridge agreements among collegiate aviation students.

### **Research Questions**

This research examined the following questions:

1. What are the characteristics of regional airline-university bridge agreements preferred by collegiate aviation flight students?
2. What are the differences in collegiate aviation flight students' orientation towards regional airline-university bridge agreements based on academic classification, R-ATP eligibility, total flight hours, and Certified Flight Instructor (CFI) status?
3. What are the differences in collegiate aviation flight students' perception of the importance of flow-through time, from the regional to major airlines, based on academic classification, R-ATP eligibility, total flight hours, and Certified Flight Instructor (CFI) status?

### **Limitations**

The sample consisted of 42 self-selected volunteer participants who anonymously completed the online survey. The survey was distributed by Aviation Accreditation Board International (AABI) to member institution collegiate aviation flight directors a few weeks prior to the holiday season, for their distribution to their flight students. Participation was dependent on the willingness of the flight directors to forward the survey link to their students. Email spam filters may have prevented participants from receiving the survey. November is a notably busy time for students who may have low motivation to complete the survey since there was no compensation or a personal relationship with the researcher.

Since participants self-selected, and were not randomly selected, the results may not be generalizable to a larger population. Students who participated in the survey may have a greater interest in bridge agreements than collegiate aviation students who did not take the survey.

## **Conclusion**

Demand for airline transport pilots is greater than supply, and predicted to stay that way for at least a decade, meaning the job outlook is a buyer's market for future pilots who are currently collegiate aviation flight students. To measure the attitudes of current flight students, regarding bridge agreements, a self-administered on-line survey was developed that collected demographic data and responses to interpretive variables.

Reviewing participant's demographics, 81% of participants were male and 19% were female. Most participants were upperclassmen or graduate students with 4.80% graduate students, 35.70% seniors, 26.20% juniors, 23.80% sophomores, and 9.50% freshman students. Participants held flight certification either as a student pilot (23.80%), private pilot (38.10%), or commercial pilot (38.10%). Most respondents reported either being a Certified Flight Instructor (11.90%) or intending to become a Certified Flight Instructor (71.40%). Most participants indicated they were eligible for either the 1,000-hour Restricted Airline Transport Pilot (47.60%) or the 1,250-hour Restricted Airline Transport Pilot (40.50%) certificate. Total flight hours were reported by participants and 57.10% indicated having less than 250 flight hours; 33.30% reported having between 250 – 500 flight hours; and 9.60% reported having more than 1,000 flight hours.

To determine the characteristics of regional airline-university bridge agreements preferred by collegiate aviation flight students, a 38-item Likert-scale survey was employed to measure student orientation towards five constructs: compensation, benefits, employer

reputation, operating environment, flow-through, and work-life balance. Cronbach's alpha for the survey measured 0.872.

The study found the top ten preferred characteristics of regional airline-university bridge agreements, for the present sample, to be:

1. Company financial stability
2. Employee job satisfaction
3. Base salary
4. Employer safety record
5. Employer-paid ATP Certification Training Program
6. Number of flight hours per year
7. Health care and dental benefits
8. Corporate culture
9. Flow-through time from the regional to major airline
10. Schedule flexibility

These findings suggest that collegiate flight students, who may spend \$150,000 to \$200,000 obtaining a college degree and flight training, when considering bridge agreements, most value working for a company that is financially stable, has happy employees, pays a fair base salary, is safe, and pays for required employee training. Flow-through time from the regional airline to major airline is not the most important characteristic.

To determine whether bridge agreements influence employer decision at some level, participants were asked: How much do bridge agreements influence your decision on which regional airline to seek employment with? For the present sample, 23.80% of the participants reported that bridge agreements influence employer decision a great deal; 31.00% reported that

bridge agreements influence employer decisions a lot; 26.20% indicated that bridge agreements influence their employer decision a moderate amount; 14.30% reported that bridge agreements influence their decision a little; and 4.80% reported that bridge agreements don't influence their employer decision at all. Examining orientation towards regional airline-university bridge agreements within groups, no significant difference ( $p < 0.05$ ) was found in collegiate aviation flight students' orientation towards regional airline-university bridge agreements, based on academic classification, R-ATP eligibility, total flight hours, and Certified Flight Instructor (CFI) status. Bridge agreements influence employer decision at some level for most participants.

To identify the importance of flow-through time from the regional to major airline, participants were asked to evaluate the statement: When considering a bridge agreement, flow-through time from the regional to major airline is important. For the present sample, 76.20% responded strongly agree; 19.00% responded somewhat agree; 2.40% indicated somewhat disagree and 2.40% indicated strongly disagree. By coding and prioritizing responses, the study revealed that out of the 38 bridge agreement characteristics measured by participants, flow-through ranked ninth. Studying the perceived importance of flow-through within groups, no significant difference ( $p < 0.05$ ) was found in collegiate aviation flight students' perceived importance of flow-through, based on academic classification, R-ATP eligibility, total flight hours, and Certified Flight Instructor (CFI) status.

### **Implications**

Successful regional airline-university bridge programs that provide a clear career path between college and industry will improve pilot workforce development and deliver high-quality employees that will be additive to the industry's stellar safety performance.

This study identified and prioritized 38 characteristics of regional airline-university bridge agreements, based on input from collegiate flight students at AABI accredited institutions. In addition, the study found that there is no significant difference in student orientation towards bridge agreements, or perception of importance of flow-through time, from the regional to major airlines, based on academic classification, R-ATP eligibility, total flight hours, and Certified Flight Instructor (CFI) status.

Industry experts forecast that the pilot shortage will last for upwards of a decade and the findings of this study can help shape future bridge agreements and recruiting efforts. Airlines that know what current collegiate flight students value will be most successful in recruiting and retaining pilots. Allocating industry and university resources to best fill the flight-hour gap between college and industry, in the form of bridge agreements, will benefit both the airline and university from a standpoint of employee and student recruiting, respectively. This in turn will help ensure the integrity, safety, and efficiency of the national air transportation system.

This study may serve as a resource to facilitate discussions between industry, academia, and AABI regarding expectations management by all parties, with respect to bridge agreements. The outcome of successful bridge agreement partnerships is a stable, predictable pilot workforce pipeline that will serve as the backbone for the air transport industry, providing a level of safety and efficiency that is the global standard.

### **Recommendations for Future Research**

Over the past five years, in response to new airline transport pilot certification requirements, a substantial forecasted shortage of pilots, and an increase in demand for air travel, there has been a marked increase in research regarding pilot workforce development. Additional research will be needed to continue examination of pilot workforce development and the short

and long term effects of changes in pilot hiring practices. Based on this study, suggested future research includes:

- Replicate this study and increasing marketing effort to generate a larger sample.
- Perform longitudinal study to see if bridge orientation and preferred characteristics of regional airline-university bridge agreements change over time.
- Examine regional airline operational performance of regional airline-university bridge agreement pilots vs non-bridge agreement pilots.
- Examine regional airline operational performance of 1000-hour R-ATP pilots vs 1,250-hour R-ATP pilots, vs 1,500-hour ATP pilots.
- Examine the impact of student enrollment at universities with a bridge agreement vs universities without bridge agreements.
- Examine the potential impact of Air Carrier Enhanced (ACE) R-ATP on regional airline-university bridge agreements.
- Examine the potential impact of multi-crew pilot license (MPL) on collegiate aviation programs.

The air transport industry is vital to the U.S. transportation system and a key enabler to the U.S. economy at the local, regional, national, and global levels. Demand for air travel continues to grow around the world and the U.S. must remain the standard-bearer for excellence in aviation, as it has done for over a century. With a shortage of pilots looming in the U.S., because of increased airline transport pilot certifications and an increasing number of mandated retirements, new models for sustainable pilot workforce development must develop to meet industry demands that achieve the level of safety (or better) that the traveling public has come to expect. Regional airline-university bridge agreements represent the willingness and necessity of

industry and academia to work together to secure the pilot workforce pipeline. Additional research will help fine tune these agreements and push the market for pilots to a point of equilibrium where the labor supply of highly-qualified pilots meets demand.

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## Appendix 1

### Survey Instrument: Assistance from Industry Professionals

The following individuals assisted with the creation of the survey instrument, lending their expertise as collegiate aviation and air transport industry professionals.

- Bill Hutto, PhD, Director, Auburn University Aviation Center
- Wayne Ceynowa, Chief Pilot, Auburn University Aviation Center
- Captain Carl Thompson, Lecturer, Harbert College of Business, and Delta Air Lines  
(Retired)
- Captain Jose Caballero, Director, University Gateway Bridge Program, JetBlue Airways
- Captain Jason Mohrman, United Airlines
- Captain Taylor Hinkley, Pilot Recruiter, Envoy Airlines
- First Officer Scott Deavers, Pilot Recruiter, Envoy Airlines
- Lauren McNamara, Pilot Recruiter, Republic Airways

Appendix 2  
Survey Instrument

Page 1

**Improving the Path from Collegiate Aviation Programs to the Commercial Cockpit:  
A National Study of Collegiate Aviation Student Pilot Attitudes Towards  
Regional Airline-University Bridge Formal Agreements**

The Auburn University Institutional Review Board  
has approved this Document for use  
from 10/20/2016 to 10/19/2019.  
Protocol #16-355 EX 1610.

**INFORMATION LETTER**  
for a Research Study entitled  
*“Improving the Path from Collegiate Aviation Programs to the Commercial Cockpit:  
A National Study of Collegiate Aviation Student Pilot Attitudes Towards  
Regional Airline-University Bridge Formal Agreements.”*

You are invited to participate in a research study to help identify the characteristics of successful regional airline-university bridge agreements. This study is being conducted by James Birdsong, graduate student of the Department of Educational Foundations, Leadership, and Technology (EFLT) at Auburn University, under the direction of Dr. James Witte, a professor of the Department of Educational Foundations, Leadership, and Technology at Auburn University. You were selected as a possible participant because you are currently enrolled as a collegiate aviation student at an Aviation Accreditation Board International (AABI) accredited school. You must be 19 or older to take this survey.

If you decide to participate in this research study, you will be asked to take an anonymous on-line survey through Qualtrics. Your total time commitment will be approximately 7-10 minutes. There are no foreseeable risks associated with this study. If you participate in this study, your answers may help create a sustainable model for commercial air transport pilot development. There are no costs to participants, or compensation.

If you change your mind about participating, you can withdraw at any time during the study by closing your browser window. Your participation is completely voluntary. Once you've submitted anonymous data, it cannot be withdrawn since it will be unidentifiable. Your decision about whether or not to participate will not jeopardize your future relations with the Department of EFLT and Auburn University.

Your privacy will be protected. Any information obtained in connection with this study will remain anonymous. Information collected through your participation may be used for publication or professional presentation.

If you have any questions about this study, please contact James Birdsong at [jgb0013@auburn.edu](mailto:jgb0013@auburn.edu). If you have questions about your rights as a research participant, you may contact the Auburn University Office of Research Compliance or the Institutional Review Board by phone (334) 844-5966 or e-mail at [IRBadmin@auburn.edu](mailto:IRBadmin@auburn.edu) or [IRBChair@auburn.edu](mailto:IRBChair@auburn.edu).

**HAVING READ THE INFORMATION ABOVE, YOU MUST DECIDE IF YOU WANT TO PARTICIPATE IN THIS RESEARCH PROJECT. IF YOU DECIDE TO PARTICIPATE, PLEASE CLICK ON THE LINK BELOW. YOU MAY PRINT A COPY OF THIS LETTER TO KEEP.**

////SIGNED////

James G. Birdsong  
Investigator

October 19, 2016  
Date

The Auburn University Institutional Review Board has approved this Document for use from 10/20/2016 to 10/19/2019. Protocol #16-355 EX 1610.

### Overview

Regional airlines are feeling the initial impact of the pilot shortage and many have been proactive in recruiting student pilots via bridge agreements with collegiate aviation programs that define a clear path from college to the professional cockpit.

### Purpose

The purpose of this survey is to help identify the characteristics of successful regional airline-university bridge agreements. In supporting this research effort, you will help build a sustainable model for commercial air transport pilot development. Thank you in advance for your time in this effort.

### Directions

Please answer the following questions. Your information will be kept confidential and the responses will be anonymous.

Are you currently enrolled as a student pilot in a collegiate aviation program?

- Yes
- No

Does your university currently have a bridge agreement with at least one regional airline?

- Yes
- No

### Section 1: Compensation

Please evaluate each statement below, using the scale provided.

When considering a regional airline-university bridge agreement, \_\_\_\_\_.

	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree
1.1 ...base salary is important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1.2 ...sign-on bonuses are important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1.3 ...retention bonuses are important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1.4 ...tuition reimbursement programs are important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1.5 ...employer-paid ATP Certification Training Program is important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1.6 ...401K employer matching is important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1.7 ...employee stock ownership plan is important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1.8 ...pilot referral incentive programs are important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1.9 ...the ability to work overtime for more pay is important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Section 2: Benefits

Please evaluate each statement below, using the scale provided.

When considering a regional airline-university bridge agreement, \_\_\_\_\_.

	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree
2.1 ...travel privileges are important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.2 ...health care and dental benefits are important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.3 ...employer wellness programs are important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.4 ...uniform allowances are important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.5 ...employer-provided IT equipment (IE - iPads) is important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Section 3: Employer Reputation

Please evaluate each statement below, using the scale provided.

When considering a regional airline-university bridge agreement, \_\_\_\_\_.

	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree
3.1...corporate culture is important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.2...perceived employee job satisfaction is important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.3...employee loyalty is important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.4...union representation is important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3.5...employer safety record is important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.6...employer commitment to social responsibility is important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.7...company financial stability is important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

#### Section 4: Operating Environment

Please evaluate each statement below, using the scale provided.

When considering a regional airline-university bridge agreement, \_\_\_\_\_.

	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree
4.1...regional airline size (small, medium, large) is important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.2...aircraft type is important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.3...variety of destinations served is important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.4...number of flight hours per year is important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.5...working for a regional airline owned by a major airline is important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

#### Section 5: Flow-Through

Please evaluate each statement below, using the scale provided.

When considering a regional airline-university bridge agreement, \_\_\_\_\_.

	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree
5.1...I would commute to work for an airline with a flow agreement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5.2...immediate establishment of seniority is important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5.3...flow-through time from the regional to major airline is important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5.4...I would take less pay in exchange for a flow agreement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5.5...automatic flow-through (no interview) from regional to major airline is important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5.6 ... a clearly defined career path is important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

#### Section 6: Work-Life Balance

Please evaluate each statement below, using the scale provided.

When considering a regional airline-university bridge agreement, \_\_\_\_\_.

	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree
6.1 ...location of pilot base is important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6.2 ...commuting is acceptable if I do not live near my pilot base	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6.3 ...commuter policy is important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6.4 ...paid vacation is important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6.5 ...schedule flexibility is important (IE - trip trading)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6.6 ...variety in trip length is important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### Section 7: Prioritizing Characteristics

Rank the following categories of characteristics (by dragging tiles), from most important (on top) to least important (on the bottom) when considering a regional airline-university bridge agreement.

- Compensation

- Benefits

- Employer Reputation

- Operating Environment

- Flow-Through

- Work-Life Balance

### Section 8: Orientation Towards Bridge Agreements

How much do bridge agreements influence your decision on which regional airline to seek employment with?

- A great deal
- A lot
- A moderate amount
- A little
- None at all

## Section 9: Demographics

### 9.1 What is your academic classification?

- Freshman
- Sophomore
- Junior
- Senior
- Other

### 9.2 What is your sex?

- Male
- Female

### 9.3 What is your race? Check all that apply.

- African-American
- Asian-American
- Caucasian
- Hispanic
- Native-American
- Other

### 9.4 What is your marital status?

- Single
- Married

### 9.5 Are you a Veteran of the US Armed Forces?

- Yes
-



No

**Thank you for your service! Are you using your Post 9/11 GI Bill for flight education?**

- Yes
- No

**9.6 What is the highest flight certification you have achieved?**

- Student Pilot
- Private Pilot
- Commercial Pilot

**9.7 What flight ratings do you currently hold? (Check all that apply)**

- Single Engine Land
- Multi Engine Land
- Instrument

**9.8 Are you a Certified Flight Instructor (CFI)?**

- Yes
- No, but I intend to become one
- No

**9.9 Are you eligible for a Restricted Privileges ATP (R-ATP) Certificate?**

- Yes, 1000 hour R-ATP
- Yes, 1250 hour R-ATP
- No

**9.10 What is your total flight time?**

- Less than 250 hours
- 250 - 500 hours
- 501 - 1000 hours
- 1001 - 1500 hours
- More than 1500 hours

**Please add any additional comments in the space below.**

# Appendix 3

## IRB Approval

### AUBURN UNIVERSITY INSTITUTIONAL REVIEW BOARD for RESEARCH INVOLVING HUMAN SUBJECTS RESEARCH PROTOCOL REVIEW FORM FULL BOARD or EXPEDITED

For information or help contact THE OFFICE OF RESEARCH COMPLIANCE (ORC), 115 Ramsay Hall, Auburn University  
Phone: 334-844-5966 e-mail: IRBAdmin@auburn.edu Web Address: <http://www.auburn.edu/research/vpr/ohs/index.htm>

**Revised 2.1.2014** Submit completed form to [IRBsubmit@auburn.edu](mailto:IRBsubmit@auburn.edu) or 115 Ramsay Hall, Auburn University 36849.

Form must be populated using Adobe Acrobat / Pro 9 or greater standalone program (do not fill out in browser). Hand written forms will not be accepted.

1. PROPOSED START DATE of STUDY: August 1, 2016

PROPOSED REVIEW CATEGORY (Check one):  FULL BOARD  EXPEDITED

SUBMISSION STATUS (Check one):  NEW  REVISIONS (to address IRB Review Comments)

2. PROJECT TITLE: Improving the Path from Collegiate Aviation Programs to the Commercial Cockpit: A National Study of Collegiate Aviation Student Pilot Attitudes Towards Regional Airline-University Bridge Formal Agreements

3. James G. Birdsong Lecturer HCOB Systems & Tech jgb0013@auburn.edu  
PRINCIPAL INVESTIGATOR TITLE DEPT AU E-MAIL

378 Oak Ridge Drive; Auburn, AL 36832 334-750-8922 birdauo@gmail.com  
MAILING ADDRESS PHONE ALTERNATE E-MAIL

4. FUNDING SUPPORT:  N/A  Internal  External Agency: \_\_\_\_\_  Pending  Received

For federal funding, list agency and grant number (if available). \_\_\_\_\_

5a. List any contractors, sub-contractors, other entities associated with this project:

\_\_\_\_\_

b. List any other IRBs associated with this project (including Reviewed, Deferred, Determination, etc.):

\_\_\_\_\_

#### PROTOCOL PACKET CHECKLIST

All protocols must include the following items:

- Research Protocol Review Form (All signatures included and all sections completed)  
(Examples of appended documents are found on the OHSR website: <http://www.auburn.edu/research/vpr/ohs/sample.htm>)
- CITI Training Certificates for all Key Personnel.
- Consent Form or Information Letter and any Releases (audio, video or photo) that the participant will sign.
- Appendix A, "Reference List"
- Appendix B if e-mails, flyers, advertisements, generalized announcements or scripts, etc., are used to recruit participants.
- Appendix C if data collection sheets, surveys, tests, other recording instruments, interview scripts, etc. will be used for data collection. Be sure to attach them in the order in which they are listed in # 13c.
- Appendix D if you will be using a debriefing form or include emergency plans/procedures and medical referral lists  
(A referral list may be attached to the consent document).
- Appendix E if research is being conducted at sites other than Auburn University or in cooperation with other entities. A permission letter from the site / program director must be included indicating their cooperation or involvement in the project.  
NOTE: If the proposed research is a multi-site project, involving investigators or participants at other academic institutions, hospitals or private research organizations, a letter of IRB approval from each entity is required prior to initiating the project.
- Appendix F - Written evidence of acceptance by the host country if research is conducted outside the United States.

#### FOR ORC OFFICE USE ONLY

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COMMENTS:

The Auburn University Institutional  
Review Board has approved this  
Document for use from  
10/20/2016 to 10/19/2019  
Protocol # 16-355 EX 1610

## Appendix 4

### AABI Invitation to Participate in Survey

**Subject:** Research Study: Regional Airline-University Bridge Agreements  
**Date:** Wednesday, November 9, 2016 at 10:11:03 AM Central Standard Time  
**From:** Victoria Montanez  
**To:** Vic Montanez  
**CC:** James Birdsong  
**Priority:** High  
**Attachments:** image001.gif, image002.gif

Greetings!

You are invited to participate in a research study to **help identify the characteristics of successful regional airline-university bridge agreements**. This study is being conducted by James Birdsong, graduate student of the Department of Educational Foundations, Leadership, and Technology (EFLT) at Auburn University, under the direction of Dr. James Witte, a professor of the Department of Educational Foundations, Leadership, and Technology at Auburn University. You were selected as a possible participant because you are currently enrolled as a collegiate aviation student at an Aviation Accreditation Board International (AABI) accredited school. You must be 19 or older to take this survey.

If you decide to participate in this research study, you will be asked to take an anonymous online survey (link below) through Qualtrics. Your total time commitment will be approximately 7-10 minutes. There are no foreseeable risks associated with this study. **If you participate in this study, your answers may help create a sustainable model for commercial air transport pilot development.** There are no costs to participants, or compensation.

If you change your mind about participating, you can withdraw at any time during the study by closing your browser window. Your participation is completely voluntary. Once you've submitted anonymous data, it cannot be withdrawn since it will be unidentifiable. Your decision about whether or not to participate will not jeopardize your future relations with the Department of EFLT and Auburn University.

Your privacy will be protected. Any information obtained in connection with this study will remain anonymous. Information collected through your participation may be used for publication or professional presentation.

The Auburn University Institutional Review Board has approved this document for use from October 20, 2016 to October 19, 2019. Protocol #16-355 EX 1610. If you have any questions about this study, please contact James Birdsong at [jgb0013@auburn.edu](mailto:jgb0013@auburn.edu). If you have questions about your rights as a research participant, you may contact the Auburn University Office of Research Compliance or the Institutional Review Board by phone (334) 844-5966 or email at [IRBAdmin@auburn.edu](mailto:IRBAdmin@auburn.edu) or [IRBChair@auburn.edu](mailto:IRBChair@auburn.edu).

Thank you!

Link to survey: [https://auburn.qualtrics.com/SE/?SID=SV\\_cNpA0U0E4Rbm1W](https://auburn.qualtrics.com/SE/?SID=SV_cNpA0U0E4Rbm1W)

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