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THE RELATIONSHIP OF A PILOT'S EDUCATIONAL BACKGROUND, AERONAUTICAL EXPERIENCE AND RECENCY OF EXPERIENCE TO PERFORMANCE IN INITIAL TRAINING AT A REGIONAL AIRLINE

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A Dissertation

Submitted to the Graduate Faculty

of the

University of North Dakota

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for the degree of

Doctor of Philosophy

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May 2016

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This dissertation submitted by Nancy R. Shane in partial fulfillment of the requirements for the Degree of Doctor of Philosophy from the University of North Dakota, has been read by the Faculty Advisory Committee under whom the work has been done and is hereby approved.

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April 24, 2014
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PERMISSION

Title The Relationship of a Pilot's Educational Background, Aeronautical Experience and Recency of Experience to Performance In Initial Training at a Regional Airline

Department Aviation

Degree Doctor of Philosophy

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Nancy R. Shane

May 4, 2016

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ABSTRACT

The purpose of this study was to determine how a pilot's educational background, aeronautical experience and recency of experience relate to their performance during initial training at a regional airline. Results show that variables in pilots' educational background, aeronautical experience and recency of experience do predict performance in training. The most significant predictors include years since graduation from college, multi-engine time, total time and whether or not a pilot had military flying experience. Due to the pilot shortage, the pilots entering regional airline training classes since August 2013 have varied backgrounds, aeronautical experience and recency of experience. As explained by Edward Thorndike's law of exercise and the law of recency, pilots who are actively using their aeronautical knowledge and exercising their flying skills should exhibit strong performance in those areas and pilots who have not been actively using their aeronautical knowledge and exercising their flying skills should exhibit degraded performance in those areas. Through correlation, chi-square and multiple regression analysis, this study tests this theory as it relates to performance in initial training at a regional airline.

CHAPTER I

INTRODUCTION

It is an interesting time for the commercial airline industry. Accident fatality rates are as low as they have ever been (Boeing, 2014), and air carriers are operating with the highest passenger load factor in the history of air travel (Airlines For America, 2015b). The past decade has witnessed the mergers of several of our nation's largest airlines, and, after weathering the aftermath of the attack on September 11, 2001 and enduring the difficult economic times that followed, the airlines are once again finding themselves profitable (Airlines For America, 2015a). Even with increases in ancillary fees and reduced customer service, passengers are still willing to fly as evidenced by the sheer number of people who take to the skies every year (Airlines For America, 2015b). In 2016, all signs are pointing to overall positivity and prosperity for commercial airlines. However, there is a dark cloud making its way over this otherwise-successful industry. The world is on the threshold of a major global pilot shortage, and that impending shortage has presented the industry with some significant challenges (Higgins et al., 2013). Some refused to believe its existence at first, but they are now realizing that those who predicted the pilot shortage were correct.

There are a number of factors contributing to the pilot shortage. These include extensive recent hiring at the major airlines (Future and Active Pilot Advisors, 2015), mass industry retirements (Higgins et al., 2013), high costs of learning to fly (Air Line

Pilots Association, 2009), new federal regulations on pilot certification and airline growth (Higgins et al., 2013). Because of these factors, the number of pilot trainee slots in training classes, particularly at regional airlines, is exceeding the number of individuals ready to fill them (Greubel, 2014). Regional airlines are now faced with the dilemma of finding pilots who are willing and able to fly for them. This has proven to be more difficult than it may sound, and so many regionals are experimenting with new hiring tactics.

Some airlines are providing free required training courses, such as the Airline Transport Pilot – Certification Training Program (ATP-CTP), to entice pilots to fly with them (ExpressJet, 2014). This course, which is a prerequisite to the Airline Transport Pilot certificate, a required certificate that will be discussed in further detail later, can cost upwards of $4,500 at training centers (Bergqvist, 2015). Presenting it as a free offering is a great incentive to prospective regional airline pilots. Other carriers are offering financial incentives to pilots who get hired and stay at a regional airline for a given amount of time (GoJet Airlines, 2015). While there have not been any formal studies as to the effectiveness of these incentive programs, industry members have anecdotally expressed their beliefs that the incentive programs have been moderately successful in at least attracting pilots to the regional carriers (Regional Airline Human Resources Manager, 2015).

While getting enough applicants is indeed a good start to solving the problem, it is not the end of the issue. Once the new pilots actually arrive at the airline training center, they still have a major hurdle to overcome to complete the rigorous training programs that all carriers require. Unfortunately, just because a pilot responds to a regional airline's

hiring incentive, there is no guarantee that he will actually be successful in training and be able to become a full-fledged pilot at the airline. This is especially true now because the pool of pilot applicants has changed. Regional airline training classes that were originally filled with recent college graduates who were actively flying are now being occupied instead by pilots who are many years removed from college graduation and not necessarily currently exercising their aeronautical knowledge or flying skills (Bjerke et al. 2015). The reasoning for the change in the applicant pool will be discussed in greater detail later in the discussion; however, it is important to understand that the overall characteristics and demongraphics of pilots entering training at regional airlines have changed, and those changed characteristics have inspired and set the foundation for this study.

In summary, the changed certification requirements for new pilots working in Part 121 carriers, the large expense of learning to fly, the expected pilot retirements and the forecasted commercial airline growth are all contributing to the pilot shortage.

Pilot Shortage Background

In 2012, a group of aviation researchers were charged by industry members to embark upon a study to determine both if there was going to be a global pilot shortage and, if so, how serious the shortage would be. After a thorough data collection process and accompanying statistical analysis, the group determined that, yes, there will be a pilot shortage and, furthermore, it will be extensive (Higgins et al., 2013). In fact, the numbers are staggering. According to the study, United States airlines alone will need to hire more than 95,000 pilots over the next 20 years. After examining the reasons why people may

not actually enter the industry, the calculations show that, based on the industry framework of 2012, there will a shortage of about 35,000 pilots (Higgins et al., 2013).

There are several reasons behind this looming pilot shortage. While it is beyond the scope of this study to go into great detail on the reasons for the shortage, it is necessary to provide the current airline employment environment in order to understand the framework for the research presented in this study.

The first piece that is contributing to the pilot shortage is the growth of airlines both domestically and internationally. According to a 2015 forecast made by Boeing, the world will need approximately 558,000 pilots over the next 20 years (Boeing). Even with the current staffing levels the airlines would be facing a shortage with more growth, but it is exacerbated even more by the fact that there are fewer certificated pilots in the industry currently than there have been in the past. As a comparison, in 1984 there were 555,207 pilots who held a private pilot, commercial or airline transport pilot (ATP) certificate (Aircraft Owner and Pilots Association, 2011). In 2014, however, that number had fallen to 432,138 (Federal Aviation Administration, 2015a).

The second reason for the shortage has to do with increased hiring at major airlines. In the past 15 years, the major carriers did very little hiring. In fact, between 2009 and 2013, the major carriers in the United States hired a total of 2,823 pilots. That five-year period is in contrast to 2014 where the major carriers hired 3,053 pilots (Future and Active Pilot Advisors, 2015). This is significant because most of the pilots hired at major carriers come from regional carriers. Conversely, if major carriers are not hiring, then regional airlines do not have a need for pilots either. However, as is happening now, major airlines are hiring, which means that regional airline pilots are leaving their

positions at their regional carriers to fill the vacancies at the mainline carriers. Coupled with the fact that there are fewer pilots available to fly for regional airlines, this leaves the regional carriers without enough pilots to fly their airplanes.

According to a recent conference presentation on the global pilot supply and demand forecast, a single regional airline lost 580 pilots between January and October of 2014 (Greubel, 2014). The same presentation noted that 86 airports that are served by regional carriers showed a 10% or greater decrease in departures in 2014 because regional carriers lacked the pilots to fly those routes (Greubel, 2014). If the trend of hiring at the major airlines continues as expected, the major airlines will need to hire close to 100,000 pilots by 2031 (Greubel, 2014).

The third reason for the pilot shortage has to do with pilot retirements. Federal regulations require pilots to retire upon turning the age of 65, and so there is a large number of pilots who will be leaving the industry in the coming years because they will be at retirement age. This is due to the fact that there was a significant increase of pilot hiring in the 1980s due to deregulation (Scott, 1987). That large pilot group that was hired in the 1980s is now nearing retirement age. According to a 2014 calculation made by the Allied Pilots Association, the union that represents pilots at American Airlines, the company at that time was planning for the loss of nearly half of its then-9,000 pilots in the subsequent 8-10 years (Carey & Nicas, 2014). The union estimated that American Airlines would need to hire 100 pilots a month in order to keep up with the number of expected retirements (Carey & Nicas, 2014).

A fourth explanation for the pilot shortage is due to the fact that the cost of becoming a pilot can be exorbitant. According to the Air Line Pilots Association

(ALPA), flight training costs can be as high as $150,000 - $200,000 (Jansen, 2015). According to ALPA, some regional airlines have a starting average salary of about $20,500 for first officers, which makes it extremely difficult for pilots to repay loans used for flight training (Air Line Pilots Association, 2015). This, paired with the fact that pilots are not earning large salaries during their first few years of employment, is deterring potential pilots from even entering the industry. Students who might have otherwise become pilots are now faced with the prospect of massive loan debt, and they are deciding that a career in the industry may not the best option.

A fifth contribution to the pilot shortage is a new law and set of regulations that have recently put extra flight time and training requirements on pilots that want to fly for regional carriers. Prior to August 2013, pilots were only required to have 250 total flight hours and a Commercial Pilot Certificate in order to fly as first officers at a regional carrier. The new law that stemmed from the 2009 crash of Colgan Airways flight 3407, known officially as the Airline Safety and Federal Aviation Administration Extension Act of 2010 (2010) now requires pilots to have 1500 total flight hours and an Airline Transport Pilot (ATP) Certificate to hold that same job. A pilot can earn a Restricted Airline Transport Pilot (R-ATP) if he has met certain academic or military requirements; however, the total flight time requirement is still much larger than it was prior to the enactment of the law: 750 hours for military pilots, 1000 hours for graduates of certain college baccalaureate degree programs and 1250 hours for graduates of certain associate degree programs. This increase in requirements, which includes both the additional total flight hours and the completion of a new training program called the Airline Transport Pilot – Certification Training Program (ATP-CTP), in order to earn the ATP and/or R-

ATP has made the goal of flying for a regional airline more difficult to attain for new pilots (Federal Aviation Administration, 2013).

The final reason why we are facing a pilot shortage is that many pilots, particularly those who are foreign-born and earning their certificates in this country, are choosing to fly for international carriers instead of staying in this country. In fact, 45% of all Commercial Certificate written examinations completed in 2012 were done by foreign pilots (Higgins et al., 2012).

It is evident that the pilot shortage is a global issue. Without pilots to fly the airplanes, passengers will suffer from lack of service and potentially-higher ticket prices. Moreover, regional airlines are losing pilots to the major carriers at a high rate, and so they must find creative ways to attract pilots, especially those who might not have considered flying for a commercial airline in the first place. That pool of applicants includes those pilots who began their preparation for an airline career early in their education, but it also includes military pilots, pilots who have chosen flying as a second career and those who are qualified and certificated but have not flown often in recent years. This means that the pilots who are entering the regional airline training classes have varied training backgrounds, some of which are of higher quality than others. The next section will describe aviation primary training and will provide some background on where and how pilots receive that training.

Background on Aviation Training and Education

A person who wants to become a commercial airline pilot has several different options for how he can complete his primary training, obtain the required ratings and

accrue the requisite number of hours in order to work as a first officer at a regional airline. The following will describe the basic training options and paths in order to give context for this study.

When it comes to primary training, the first way to complete the private pilot certificate and subsequent instrument, multi-engine and commercial ratings is to learn to fly from a certified flight instructor (CFI) under the rules outlined in Part 61 of Chapter 14 of the Code of Federal Regulations (14 CFR) (Certification, 2015). Programs offered under Part 61 are not audited or approved by the FAA. The content delivery method and in-flight instruction are at the discretion of each individual instructor, and so the quality of training can vary. Part 61 programs are considered by many to be the least structured of all the options. While many programs are of high quality and very effective, their lack of regulatory oversight means that structure is not guaranteed. However, many small airports have small flight schools or a resident instructor who train under Part 61, making this an attainable option for many aspiring pilots (Wallace, 2010).

A second avenue for primary training is attending a flight school that is operated under 14 CFR Part 141. In comparison to Part 61 flight schools, programs delivered by Part 141 schools are both audited and approved by the FAA (Certification, 2015b). The requirements for these programs are stricter and more structured than Part 61 programs. Students who attend them must follow a specific curriculum, which includes specific ground and flight lessons as well as performance evaluations, called stage checks. The stage checks are generally administered by a check instructor and serve to assess the student's progress throughout his flight training program. Successful completion of these stage checks leads to an end-of-course check ride with an examiner, who will award the

student with a pilot certificate upon his meeting the practical test standards set out by the FAA.

A third path for primary training is a college aviation program either at the associate or bachelor's level. Schools that offer these programs combine a Part 141 flight training program with academic courses that relate to aviation safety, operations, regulations, aircraft systems, ethics and other related areas (Kiteley, n.d.). It is important to note that the FAA has recognized the quality and importance of a college degree in aviation and has even determined that certain degree programs can be counted in lieu of total flight hours when pilots are working toward a certain type of Airline Transport Pilot (ATP) certificate called the Restricted Airline Transport Pilot (R-ATP) certificate (Federal Aviation Administration, 2012). The crediting of these hours will be discussed at the end of this section.

A final path for primary training is through the military. A person who applies for and is accepted into a military flight training program receives all of the required training he will need within the framework of the military training environment. Upon leaving the service, the pilot can easily obtain the civilian certificate equivalents in order to qualify to work for a commercial airline. The FAA recognizes the military path as another quality option and also gives credit for military flight hours when a pilot is working toward earning his R-ATP (Federal Aviation Administration, 2012).

As noted in a prior section, the FAA has given authorization to certain colleges and universities to certify their graduates through certain coursework that makes them eligible to apply for the R-ATP certificate (Federal Aviation Administration, 2013). This authorization, known as Institutional Authority, came out after a new set of regulations

regarding first officer qualifications went into effect in July, 2013. (Federal Aviation Administration, 2013b). These new regulations defined the certification and qualification requirements for pilots flying as first officers at all airlines certificated under Part 121. Prior to August 1, 2013, first officers at Part 121 carriers were only required to hold a Commercial certificate and 250 total hours of flight time. However, PL 111-216 stipulated that, after August 1, 2013, first officers at Part 121 carriers would need to possess an ATP certificate and 1500 total flight hours. Furthermore, PL 111-216 charged the FAA with issuing a final ruling within 36 months of the passing of the law (which occurred in 2010) that would outline additional information on the ATP (Airline Safety and Federal Aviation Administration Extension Act of 2010, 2010). Prior to that 36-month timeframe, the FAA did indeed develop a working group to created regulations governing first officer qualifications. The First Officer Qualification ruling (otherwise known as FOQ), which came out in July, 2013, outlined the new certification requirements for first officers. Those certification requirements included those necessary to earn a standard ATP as well as those necessary to earn the R-ATP. Those requirements are as follows:

Standard ATP Requirements:

- Be at least 23 years old
- Hold a Commercial pilot certificate with instrument rating
- Complete the new Air Transport Pilot Certification Training Program before completing the ATP written examination (this went into effect on July 31, 2014)
- Pass the ATP written examination.
- 1500 hours of total flight time

- 500 hours of cross-country time
- 100 hours of night flight time
- 75 hours of instrument flight time (actual or simulated)
- 250 hours of Pilot-in-Command (PIC) time – must include 100 hours of cross-country time and 25 hours of night flight time (Federal Aviation Administration, 2013b)

Restricted ATP (R-ATP) Requirements:

- Be at least 21 years old
- Hold a Commercial pilot certificate with instrument rating
- Complete the new Air Transport Pilot Certification Training Program before completing the ATP written examination (this went into effect on July 31, 2014)
- Pass the ATP written examination.
- Meet at least one of the following qualifications:
    - Have at least 750 hours of total flight time (military pilots)
    - Have at least 1,000 hours total flight time and a bachelor's degree with an aviation major and 60 credit hours of approved aviation coursework
    - Have at least 1,250 hours of total flight time and a bachelor’s or an associate degree with an aviation major and 30 credit hours of approved aviation coursework
    - Have at least 1,500 hours of total flight time (Federal Aviation Administration, 2013).

The requirements for institutions of higher education to have the authority to certify their graduates to be eligible for the R-ATP are described in detail in Advisory Circular (AC) 61-139 (Federal Aviation Administration, 2013). While the AC provides more details, the following are the general requirements:

- The institution must be accredited
- The course of study must include:
    - 30 semester hours of aviation and aviation-related coursework approved by the Administrator for reduction to 1,250 hours
    - 60 semester hours of aviation and aviation-related coursework approved by the Administrator for reduction to 1,000 hours
- The degrees must be granted at either the associate or bachelor's degree level.
- The coursework includes the following topics:
    - Ground and Flight Training for Certificates and Ratings
    - Aerodynamics and Aircraft Performance
    - Aircraft Systems
    - Aviation Human Factors
    - Air Traffic Control (ATC) and Airspace
    - Aviation Law and Regulations
    - Aviation Weather
    - Aviation Safety
- The institution must have:
    - A Part 141 pilot school certificate with Training Course Outlines (TCOs) approved for both ground and flight training; OR

- A Part 141 pilot school certificate with TCOs approved for ground training and a formal agreement with a flight school with TCOs approved for flight training (Federal Aviation Administration, 2013).

AC 61-139 has made it possible for pilots who meet these qualifications to reduce the number of hours required for them to earn the R-ATP. Unfortunately, because of the FOQ ruling certain pilots who used to be eligible for positions at regional airlines are no longer eligible due to the fact that they do not meet the requirements for the ATP or R-ATP. This is significant for two reasons. First, while not a direct cause of the pilot shortage problem, the fact that a whole group of pilots are no longer allowed to be part of the applicant pool certainly exacerbates the shortage (Greubel, 2014). The second significant element – and potentially even more important piece – is that many of the pilots who, since the FOQ ruling, are no longer eligible to work at regional carriers are arguably some of the most qualified and able pilots available (Smith et al., 2012). These are the pilots who have graduated from college aviation programs and have spent time as flight instructors but have not yet met the minimum hour requirements of the R-ATP. Before the FOQ ruling, these pilots would have been awarded jobs at regional carriers with as few as 250 hours. Unfortunately, now they must wait until they have accrued much more flight time – 1000 hours or more – until they can take jobs as first officers (Federal Aviation Administration, 2013b).

Theoretical Framework

Now that the aviation elements have been outlined, the educational theory that forms the framework of this study will be explained. A more detailed discussion of the

literature related to the theory will be included in Chapter Two of this study, but a brief overview is necessary here in order to have a full understanding of the purpose of this study.

In the world of education, there have been many psychologists and education experts who have studied learning and have theorized on the best method for a person to obtain and retain information. While it might be possible to apply any number of theories to flight training, the FAA long ago allied its teaching and learning beliefs with a particular educational psychologist and his theories on learning: Edward L. Thorndike (Federal Aviation Administration, 2008).

Thorndike lived in the early part of the 20th century and made many contributions to the field of intelligence and learning through his research with animals and humans. Although he did his research and theorizing nearly 100 years ago, the FAA still believes in and relies upon his concepts today in its approach to aviation education and training. (Federal Aviation Administration, 2008). It is important to note that there are many areas of Thorndike's theories that have been refuted and changed since his original studies. In fact, educational theorists, with their much better understanding of how our brains work and how humans learn, now largely discount much of what Thorndike originally theorized. However, because his theories are still so heavily relied upon in the current world of aviation training, they will be utilized here as the theoretical framework for this study. The application of Thorndike's original theories to the results of this study will be discussed in more detail in Chapter Five. That final chapter will also discuss how the field of aviation might be able to advance past Thorndike and further into the realm of

current educational theory in order to best prepare its next generation of pilots for the commercial airline industry.

With this understanding of Thorndike's theories and their place in educational theory, the focus will now be on the theories themselves and their application to this study. Through his research and work, Thorndike developed what are known as the laws of learning (Thorndike, 1913). The three laws are known as the law of effect, the law of exercise and the law of readiness. Although all three laws of learning could be applied to aviation, the law of learning that will be the theoretical foundation of this research is the law of exercise.

The law of exercise is comprised of two sub parts: the law of use and the law of disuse. In the words of Thorndike, the law of use and law of disuse are defined as follows:

> "The law of use is: When a modifiable connection is made between a situation and a response, that connection's strength is, other things being equal, increased." (Thorndike, 1913, 2).
>
> "The law of disuse is: When a modifiable connection is not made between a situation and a response during a length of time, that connection's strength is decreased." (Thorndike, 1913, 4).

In simple terms, the law of use and the law of disuse state that the more a person uses or practices a skill or concept, the more likely he will be to remember it. This also means that the less a person uses a skill or concept, the less likely he will be to remember it.

A list of secondary laws of learning have been subsequently added to Thorndike's original laws of learning. These secondary laws of learning include the law of primacy, the law of recency, the law of intensity and the law of freedom (Slamecka, 1985). These additional laws help to support and explain Thorndike's three primary laws. The law of recency, which is the most applicable of the additional laws to the research performed in this study, states that a person will best remember the things that he has learned most recently (Slamecka, 1985). Because of its relevancy to this discussion, the law of recency will be used in conjunction with the law of exercise as the theoretical framework of this study.

The law of exercise and the law of recency have been chosen as the theoretical framework for this study because the data collected on pilots who entered training at regional airlines since August 2013 has shown that many of those pilots have not had recent experience in aviation. For the purposes of this study, "recent" is defined as having actively exercised flying skills in the months leading up to training. As will later be shown in the results of this study, many of the pilots who have entered training since 2013 have had little or no time actively flying in the months preceding training.

Prior to 2013, a typical path for a new pilot at a regional airline consisted of completing a college aviation program, earning the necessary additional ratings, working as a flight instructor to accrue hours and then joining a regional airline. This meant that pilots hired by regional airlines were recent college graduates who were actively flying and exercising their aeronautical knowledge and skills on a regular basis (Bjerke et al., 2015). However, a recent study on the background of pilots entering regional airlines discovered that, since August of 2013, the pool of pilot applicants has changed in terms

of their background. Out of the 55% of the pilots who reported their year of graduation from college, 41% had graduated in the prior five years, 69.5% had graduated in the prior 15 years and 31% graduated more than 15 years prior to beginning work at the regional airline (Bjerke et al. 2015). While exact age cannot be determined by this data, it can be approximated based on college graduation age.

According to the National Student Clearinghouse Research Center (2015), in this country 82.3% of graduates earning a bachelor's degree and 79.7% of graduates earning an associate degree are under the age of 25. Based on that data, if we say that a majority of college graduates are under the age of 25, this would mean that the 31% of pilots who graduated more than 15 years ago are in their late 30's, an age that is much older than that of applicants from the past (Bjerke et al., 2015). With so much time between college graduation and entering the field of aviation, one might question how much aeronautical and recent flying experience those pilots have had in the time since graduation. Furthermore, according to the law of exercise and the law of recency, if those pilots have not used their flying knowledge and skills for a long time, one might expect that their flying skills have degraded over the years. This is in contrast to the skills of those pilots that graduated college more recently and have been actively flying and exercising their skills. The latter group of pilots, according to the law of exercise and the law of recency, should not have degraded flying skills. Based on this concept, this study is examining whether those pilots who are not actively using their aeronautical knowledge nor consistently exercising their flying skills are equally successful in initial training at a regional airline as compared to those pilots who are actively engaging in flying. This is

the premise behind this research and the reasoning for using the law of exercise and law of recency as the theoretical framework for this study.

Purpose of the Study

The purpose of this study was to determine how a pilot's educational background, aeronautical experience and recency of experience relate to his performance in initial training at a regional airline. Due to the pilot shortage, the pilots entering regional airline training classes since August 2013 have varied backgrounds, aeronautical experience and recency of experience. As explained by the law of exercise and the law of recency, pilots who are actively using their aeronautical knowledge and exercising their flying skills should exhibit strong performance in those areas. Conversely, pilots who have not been actively using their aeronautical knowledge and exercising their flying skills should exhibit degraded performance in those areas. This study tests those theories through the research questions presented below.

Research Questions

This study was based upon six research questions that all relate to a pilot's background, aeronautical experience and recency of experience. These research questions were formulated by utilizing Thorndike's Law of Exercise as the framework, as well as additional educational theories based on Thorndike's original work, including the Law of Recency. More details on the independent and dependent variables for each question are outlined in Chapter Three. That chapter also explains the statistical analysis used to answer each question. The research questions are as follows:

1. What are the educational background, aeronautical experience and recency of experience characteristics of pilots hired at this regional carrier from January 2015 – December 2015?
2. What are the training performance results of pilots hired at this regional carrier from January 2015 – December 2015?
3. What is the relationship between a pilot's educational background characteristics and performance results in initial training at a regional airline?
4. What is the relationship between a pilot's aeronautical experience and performance results in initial training at a regional airline?
5. What is the relationship between a pilot's recency of experience and performance results in initial training at a regional airline?
6. How does a pilot's educational background, aeronautical experience and recency of experience predict success in initial training at a regional airline?

Definitions and Acronyms

AABI – Aviation Accreditation Board International.

AC – Advisory Circular.

ALPA – Air Line Pilots Association.

ATP Certificate- Airline Transport Pilot Certificate.

ATP – CTP – Airline Transport Pilot – Certification Training Program.

CFI – Certified Flight Instructor.

CFR – Code of Federal Regulations.

CITI – Collaborative Institutional Training Initiative.

FAA – Federal Aviation Administration.

FTD – Flight Training Device. An FTD is an exact replica of an airplane flight deck. All of the instruments function as they would on the real airplane. While some FTDs can simulate motion on screens, an FTD does not have actual motion capabilities (Definitions, 2016).

FOQ – First Officer Qualification.

FFS – Full Flight Simulator. In this document, the term “simulator” is used in reference to a FFS.

Institutional Authority – Aviation college programs that have been granted the authority to certify its graduates for a Restricted Airline Transport Pilot certificate are said to have Institutional Authority.

IRB – Institutional Review Board.

Major Airline - The major airlines include those that have annual revenues of over $1,000,000.000 (Airlines For America, 2015).

Part 121 – A Part 121 airline is an airline that is certificated by the Federal Aviation Administration to operate under the rules contained in Part 121 of Chapter 14 of the Code of Federal Regulations. Carriers that run scheduled operations with either turbo-jet aircraft, aircraft with 10 or more seats or aircraft with a payload capacity over 7,500 pounds must be certificated under Part 121 (Federal Aviation Administration, 2016).

Part 135 – A Part 135 airline is an airline that is certificated by the Federal Aviation Administration to operate under the rules contained in Part 135 of Chapter 14 of the Code of Federal Regulations. Part 135 carriers are classified as those that run commuter or on-demand operations (Federal Aviation Administration, 2016).

PIC – Pilot-in-Command.

R-ATP Certificate – Restricted Airline Transport Pilot Certificate.

RAA - Regional Airline Association.

Regional Airline: A regional airline provides short and medium-haul scheduled flights that general connect small communities with larger cities. Regional airlines generally have contractual agreements with major airline partners to fly routes for them. (Airlines For America, 2015).

Simulator – In this document a simulator is used as a shortened name for a Full Flight Simulator (FFS). A simulator is an exact replica of an airplane flight deck. All of the instruments function as they would on the real airplane. In addition, a simulator has motion capabilities. This is in contrast to a Flight Training Device (FTD), which does not actually move (Definitions, 2016).

The next chapter will review the literature as it relates to the purpose of the study and the research questions. Chapter Three will describe the research method used to answer the research questions. The final two chapters will describe the results, analysis and final outcomes of the study.

CHAPTER II

REVIEW OF THE LITERATURE

Aeronautical Experience and Pilot Background Characteristics

One only needs to ask the training manager at a regional airline about his new hires to hear a monologue about the quality – or lack thereof – of pilots in new-hire classes and how so many of them are having such a difficult time adapting to the rigor and structure of the airline training environment (Regional Airline Operations Manager, 2015). These same training managers will tell you that the pilot pool has changed significantly and that regional airlines are now being forced to hire pilots that would never have been considered prior to the changes in the industry, including those changes caused by the FOQ ruling (Federal Aviation Administration, 2013b) and increased hiring at the major airlines (Future and Active Pilot Advisors, 2015). One can hear anecdote after anecdote about the new hires now joining regional carriers. There are stories about those who have spent the last 20 years flying only for fun on Sundays in good weather and just cannot seem to fly an instrument approach. There are stories about those who decided at the age of 45 to switch careers and become pilots, and they cannot seem to keep up with the amount of studying required to complete training (Regional Airline Operations Manager, 2015). There are dozens of these stories, but until recently there has not been a lot of hard data to support the claims that new regional airline pilots are less qualified than they have been in the past. While not many studies have been completed,

those that have been done are providing evidence to back up the anecdotes coming out of training departments and provide a good foundation for the research completed in this study.

The first study for this discussion, known as the Pilot Source Study, has set the stage for all subsequent studies. The researchers who performed the study, now in its fourth phase, were originally charged to do so by the Aviation Accreditation Board International (AABI), the group that accredits college aviation programs. Phase I of the study was published in 2010 and looked at the characteristics of pilots hired at regional airlines from 2005 – 2009 and how those characteristics related to pilot success in initial training programs at regional carriers. The study defined "success" as needing fewer extra training events during training and having fewer non-completions in the training program (Smith, Bjerke, NewMyer, Niemczyk and Hamilton, 2010). The results of this phase of the Pilot Source Study showed that the pilots who were most successful had graduated with aviation degrees from a college program accredited by AABI, were flight instructors and had between 500 and 1,000 hours of total flight time (Smith et al., 2010).

In 2013, the same group of researchers published the next iteration of the Pilot Source Study. This study focused on what effects, if any, college and aeronautical background had on extra training events, training completions, number of unsatisfactory scores in first year line observations and the number of unsatisfactory scores in the first year of recurrent training for pilots at regional airlines (Smith et al., 2013). The study had results similar to those found in Phase I of the Pilot Source Study: pilots who graduated from accredited aviation programs were more successful than those with a non-aviation

college degree or no college degree at all. In addition, pilots with only a Commercial certificate were more successful than those with an ATP certificate (Smith et al., 2013).

The Pilot Source Study is significant because, contrary to what the federal regulations suggest, results show that the pilots who are most successful in regional airline training are those that do not meet the requirements for the R-ATP or ATP because they have not accrued enough total flight hours. Furthermore, the study shows that pilots with only their Commercial certificate are more successful than those with the ATP, and this group of pilots is no longer eligible to work as first officers at part 121 regional airlines (Federal Aviation Administration, 2013). These results set the stage for further research on the subject.

After the second round of Pilot Source Study results were published, another research project was completed with the aim of comparing pilots hired after the FOQ ruling with those hired before the FOQ ruling. Specifically, this study looked at one regional airline to see if pilots hired after the FOQ ruling were more or less successful in initial training than those hired before the FOQ ruling. The results of this study were published in 2015.

In this study, the first result to note is that pilots who entered initial training at this single regional airline after the FOQ ruling had an average of 3,095 total flight hours, whereas pilots who entered initial training prior to the FOQ ruling had a mean of 1,654 total flight hours. Even though their total flight time was much higher, the pilots who entered initial training at this particular regional airline after the FOQ ruling were more likely to require extra training events and less likely to complete training successfully than those who entered initial training at the same regional airline prior to the FOQ

ruling. In addition, pilots with 1,500 or more total flight hours who entered initial training at this regional airline after the FOQ ruling were more likely to require extra training events and less likely to complete training successfully than those pilots with 1,500 or more total flight hours who entered initial training at the same regional airline prior to the FOQ ruling. Finally, there was no significant difference in extra training events or training completions between pilots with fewer than 1,500 total flight hours who were hired at this regional airline prior to the FOQ ruling and pilots with fewer than 1,500 total flight hours who were hired after the FOQ ruling (Shane, 2015).

The results of this study are significant because they show that merely having enough flight time to satisfy the regulations (i.e. 1,500 hours) does not necessarily mean that a pilot will be successful in training. In addition, the results show that pilots who have entered training since the FOQ ruling in 2013 are generally less successful in training even though they have more total flight time. Finally, the results show that there is no significant difference in training success for pilots with fewer than 1,500 total hours (Shane, 2015). While data on actual possession of the R-ATP was not specifically gathered, one can infer that pilots hired after FOQ with fewer than 1,500 total flight hours had earned their R-ATP because they would not have been eligible to be hired without it. This means that those pilots either had a military flight background or attended a college with institutional authority to certify students for the R-ATP. This last element is important because, while only speculation in this study, the Pilot Source Study results can be used to support the conclusion (Smith et al., 2013).

In 2015, researchers completed the fourth phase of the Pilot Source Study. This study was similar to the one described above in that it compared pilot background data

for pilots hired at regional airlines prior to the FOQ ruling with those hired after the FOQ ruling (Bjerke, Smith, Smith, Christensen, Carney, Craig and Niemczyk, 2015). Researchers collected data from 22 regional carriers and published their first set of results which showed the backgrounds of pilots hired during the two timeframes. The results of the study showed that the pilots hired after the FOQ ruling, as compared to those hired before the FOQ ruling, had less aviation-related academic experience. In addition, there was a higher percentage of pilots who were military pilots and a lower percentage of pilots who were flight instructors. Those flight instructors hired after the FOQ ruling, however, had more experience instructing than those hired before the FOQ ruling. Those hired after the FOQ ruling had a wide range of flying experience, which, as the study describes, suggests that those pilots might have changed careers to become a regional airline pilot or had left aviation for a time before coming back to be a regional airline pilot. Finally, pilots with less total flying experience also had fewer hours of multi-engine time (Bjerke et al., 2015).

Phase Four of the Pilot Source Study gathered data on many of the same pilot background characteristics that were analyzed in this study, and so it is a good framework for the research performed here. This study has built upon the Pilot Source Study foundation by looking at even more input variables and how those variables might predict success in initial training at a regional airline.

Educational Theory Literature

With the review of literature related to aeronautical experience and pilot background characteristics completed, it is time to turn to the literature that discusses the theoretical framework of this study. As introduced in Chapter One, the pool of regional

airline pilot applicants has changed. Prior to the FOQ ruling in 2013, the pilots who were usually hired at regional airlines were recent graduates of college aviation programs who were actively flying as flight instructors. However, Phase Four of the Pilot Source Study has revealed that the pilots who are now getting hired by regional airlines are much further removed from college graduation and are not currently exercising their aeronautical knowledge or flying skills (Bjerke et al., 2015). According to Thorndike's law of exercise and the law of recency, these pilots would exhibit loss of aeronautical knowledge and degradation of skills. This is due to the fact that they are long-since removed from the college learning environment and have not been actively using their aeronautical knowledge or exercising their flying skills in recent years. It is for this reason that these educational theories are being applied to this study.

Before examining aviation studies that utilize the law of exercise and the law of recency, it is first important to fully understand the theories themselves, their development and how they have been applied in other fields of study.

Edward L. Thorndike was a firm proponent of the psychological theory of learning called associationism. This paradigm rests on the idea that learning occurs because of association between ideas, memories and sensations in the mind. Thorndike's research examined the idea that practice and repetition were the keys to effective learning, a concept that formed the basis for his laws of learning, including the law of disuse (Bruner, 2004). Although aspects of Thorndike's theories on learning were refuted, some psychologists still believed in the basic premise he established and began to build upon it. This was the first step toward the decay theories of memory (Ricker, Vergauwe and Cowan, 2015). Various studies on memory and the decay theory were

continued through the 1950s when Brown published a groundbreaking paper in 1958 on his theory about the decay of short-term memory. In the years following, several different psychologists continued their studies of memory and decay theory, each with a different view and focus on its validity. With their better understanding of the human brain and how our neurons work, many psychologists have refuted the theory and are focusing their research on more complex theories that explain exactly how we learn and process information. However, as noted in Chapter One, there are still parts of Thorndike's theories that are both accepted and in use today in certain fields (Ricker et al., 2015). It is these basic elements, which have their roots in Thorndike's original learning theory of the law of exercise and also the law of recency, that are still utilized in the field of aviation and applicable to this study. Specifically, the areas that relate are those that address skill decay and knowledge loss due to lack of use and regular practice. While the concept will be addressed in further detail in Chapter Five, it is important to note here that, while certain fields, including aviation, are still basing research on these theories, they are being applied at a much broader level than perhaps they should. As mentioned, there have been many advances in the past 100 years that demonstrate that learning is more complex than originally theorized by Thorndike and others, and so this caveat should be kept in mind during this section.

Before delving in to a literature review of studies based on aviation, it is first necessary to look at a related field where the educational theories discussed here are still both relevant and applied. The field chosen for this discussion is medicine as it has many similarities to aviation. First of all, the stakes for both professions are extremely high. Practitioners of medicine, like pilots, are operating in environments where a false move

can be the difference between life and death. Secondly, like a surgeon in an operating room, a pilot flying a commercial airplane must rely on the synthesis of many skills and concepts in order to ensure the safe completion of his mission. Finally, both professions require their practitioners to be proficient one-hundred percent of the time. There is no room for doctors or pilots to be subpar in any way. A less-than-perfect approach could spell disaster in both fields. It is because of these similarities that studies on skill decay and regular use of knowledge in the medical field are applicable to this study.

The first study in this discussion focused on the prevention of surgical skill decay with military surgeons (Perez, Skinner, Weyhrauch, Niehaus, Lathan, Schwaitzberg and Cao, 2013). The basis for the study was the concern that military surgeons receive initial training but then do not use their skills or knowledge for an extended period of time due to not being in the field. The study looked at different types of surgical skills and knowledge in order to determine the rate of decay. The research showed that gross motor skills decayed after about 10 months and that cognitive skills, defined as the ability to accurately recall procedures, decayed within about 6 months (Perez et al., 2013). The study determined that many factors influence the decay, including the following: length of time since the skill was not used, the task characteristics, task complexity, how the person was originally trained, time pressures and the presence and quality of job aids. It is evident from this study that in order for a person to be proficient at a particular task, he must actively exercise it. Moreover, if he has not recently performed it, which in this case mans within a matter of month, he will exhibit signs of skill decay both on a gross motor skill level and cognitive level. These concepts support Thorndike's law of exercise and

the law of recency in that they show that when a person does not use a skill, he is more apt to lose it.

In their research on health care cognitive skill decay and diagnostic error, Weaver, Newman-Toker and Rosen (2012) studied the impact of not using diagnostic skills over an extensive amount of time. The results of their study showed that the decay of diagnostic skills are influenced by individual factors, task-related factors, characteristics of the retention period and the conditions of retrieval. Their recommendation for addressing and rectifying this skill decay is to install continuing education opportunities for practitioners to refresh and practice their diagnosing skills. This study also exhibits elements of Thorndike's theory in that it recommends that health care workers actively exercise their diagnosing skills and have the opportunity to practice said skills by participating in recurrent training on a regular basis. The researchers believe that this recurrent training will ensure that the practitioners are always in a position where they have recently practiced their diagnostic skills (Weaver et al., 2012). While the law of decay is the basis for this research, it is important to note that the authors of this study specifically state that learning and retention are influenced by many things (Weaver et al., 2012). This concept factors into the present study and will be addressed in the discussion presented in Chapter Five.

A third medical study that focused on skill decay looked at intubation training and how long it took practitioners to show significant skill decay of their ability to perform an intubation after completing an initial training program (Latif, Bautista, Duan, Neamtu, Wu, Wadhwa and Akca, 2015). The results of this study showed that the medical practitioners exhibited skill decay after two months if they had not practiced intubation

during that time period. This research again shows that, as Thorndike theorized, a person who does not actively use a skill will lose that skill after a given amount of time. What is important to note about this study is that the researchers were interested in how many intubations should be performed over what time period in order for the practitioners to maintain proficiency (Latif et al., 2015). As will be discussed in Chapter Five in more detail, this addresses the concept of exactly what defines "recency" and how to ensure that practitioners in any field are following that definition to help ensure that their skills and knowledge are maintained.

Anderson, Gaetz and Masse (2011) address skill retention in their study of first responders within the workplace. Their focus was on Cardiopulmonary Resuscitation (CPR) and how quickly after certification a person will forget the skills they learned in training. The results of the study show that CPR skills generally decay after 90 days (Anderson et al., 2011). The results also showed that those who were trained to a higher level of certification showed less decline over time. In addition, those who had renewed their certificate one or more times also performed better than those who had only been trained how to perform CPR one time (Anderson et al., 2011). All of these elements show that exercise and practice are crucial when attempting to retain a skill. As evident in the results of this study, a person who has had additional training and has exercised his skills in CPR on a regular basis will retain skills better than someone who has not practiced said skills as often.

As is evidenced by the medical research presented here, the basic premise of Thorndike's law of exercise and the law of recency still plays a role in certain fields of study. If a person does not actively use a skill, he will not retain it. Likewise, if he has not

recently used a skill, it will decay and it will not be as easily recalled. These are important concepts that will be further discussed as they are applied aviation and specifically to this study on pilot performance in training.

Now that the studies of skill decay and regular use of knowledge in the medical field are understood, the focus of this literature review will shift to aviation. The discussion will describe research that has been completed on the retention of pilot skills as well as how recent flying experience relates to flying performance. Overall, studies have shown that pilots' skills decay when they are not used regularly (Childs and Spears, 1986). This section will outline the results of several of such studies to demonstrate both how the law of exercise and law of recency apply to aviation and how they function as the theoretical framework for the research performed in this study.

Before delving into the literature, it is necessary first to understand the concept of recency and how it is defined and utilized in the field of aviation. The term "recency" is often used interchangeably with the term "currency" and actually refers to a set of regulations that a pilot must follow in order to be legal to fly under certain circumstances. These regulations are outlined in 14 CFR, Part 61 (Certification, 2015). Among other things, a pilot must have performed a given number and type of landings in the preceding 90 days in order to be legal to carry passengers and a given number of instrument approaches in the preceding 6 months in order to fly under instrument flight rules (IFR). In addition, pilots must meet certain requirements on an annual basis, which means that 12 months is another time period that is referred to often (Certification, 2015). Because of these regulations, 90 days (or sometimes described as 3 months), 6 months and 12 months are often used as benchmarks when it comes to gauging a pilot's recency of

experience. This information will be important to understanding some of the data and results in relevant aviation studies as well as this particular study.

The first study relevant to this discussion looked at the aeronautical skills of private and commercial pilots who did not have an instrument rating (Hollister, LaPointe, Oman and Toole, 1973). In this study, the pilots were assessed on maneuvers they perform regularly as well as those they do not employ often. An example of the latter was performing a recovery from an aerodynamic stall. The results of the study showed that pilots had significantly better performance on the maneuvers they perform most often and significantly worst performance on the maneuvers they rarely perform (Hollister et al., 1973). This study, although somewhat general in nature, showed that consistent use of skills leads to better performance while disuse leads to degraded performance, lending support of Thorndike's law of exercise and the law of recency as they relate to aviation.

A second study showed support of the law of exercise and the law of recency by looking at recurrent training intervals for pilots and what skills and knowledge pilots are able to retain over a given timeframe between training events (Hendrickson, Goldsmith and Johnson, 2006). This study divided pilots from a single airline into two groups. The first group was given a six-month timeframe between training and the continuing qualification event, and the second group was given a 12-month timeframe between training and the continuing qualification event. During each event, the pilots were evaluated on their performance on 12 emergency maneuvers and 25 normal maneuvers. The maneuvers were rated on a scale of 1-5 where a score of 1 was considered unsatisfactory and a 5 was excellent. The results of the study showed that pilots who completed the qualifying event after 12 months had significantly more ratings of three or

below and a decline in ratings of four and five. The opposite was found to occur with the pilots who completed the event after only six months: those pilot had significantly fewer ratings of three or below and an increase in ratings of four and five (Hendrickson et al., 2006). As discussed in the results section of this study, it appears that flying skills tend to decay over time when they are not used. In this case, the 12-month period between qualifying events seemed to be too long to retain skills at a rating of four or five. This study supports the theories stated in the law of exercise and the law of recency.

In 1983, Childs, Spears and Prophet examined private pilot skill retention at 8, 16 and 24 months following certification (1983). All pilots in the study had received their private pilot certification at the same time and had their skills measured at the same intervals. This study separated pilots into three groups. The pilots in the first group received additional training during the first eight months after certification. The pilots in the second group received additional training during the period after eight months after certification. The pilots in the third group received no additional training. Results of the study showed that the pilots in the first group, while they did not show a loss of skills over the first eight months, did display decayed skills after the first eight months after certification. The pilots in the second group displayed an initial decay in skills after the first eight months, but they demonstrated less of a decay in skills during the 16-month evaluation after having received the additional training. The pilots in the third group, who did not receive any additional training along the way, showed the greatest decay in skills (Childs et al., 1983). The results here demonstrate that pilots who do not use their skills tend to lose them over time, giving credence to the law of exercise. In addition, the fact that the pilots who received additional training within a recent period of time performed

better on their evaluations than those who had not received the additional training shows that the law of recency is also applicable.

A 2010 study researched the relationship between manual handling performance and recent flying experience for pilots flying at major air carriers (Ebbatson, Harris, Huddlestone and Sears, 2010). In this study, 66 pilots with an air transport pilot license and a B-737 type rating were asked to fly a particular maneuver in a simulator. They were required to fly the maneuver manually as opposed to using the autopilot. To support the study, the study participants supplied data on how much flying they had done in the week prior to the exercise as well as details on their flying backgrounds, including the aircraft types they flew, total number of airline flying hours and training history. The results of the study showed that, while overall flight experience and total hours in aircraft type did not have a significant effect on the results, pilots with more recent flight experience had better performance during the evaluation than those who did not have as much recent flight experience (Ebbatson et al., 2010). This demonstrates that the law of recency certainly is a factor when it comes to pilot performance.

As shown above, several studies have shown how the law of exercise and law of recency are applicable not only to aviation and pilot training but also to this study. By using these theories as a framework, this study examines the aeronautical background, aeronautical experience and recency of experience of pilots in initial training at regional airlines and determine if there is indeed a correlation between these areas and success in training. The details of the methodology used to answer the research questions will now be discussed in detail in Chapter Three.

CHAPTER III

METHOD

This chapter contains specific information on the method used to understand the relationship between a pilot's background, recency of experience and his performance in various phases of regional airline initial training. The chapter explains the study setting, the ethical considerations that were taken into account, the sample and the data collection process. It then describes the independent and dependent variables used for the study. Finally, it concludes with an overview of the statistical analysis used to answer the research questions.

Setting

This study was conducted with data acquired from a United States regional airline. In the interest of maintaining the confidentiality of this airline and its pilots, the airline's name will not be used throughout this study. The only defining characteristics that will be included are that this carrier operates in conjunction with a United States major air carrier and it, as many regional carriers are currently doing, is offering an incentive program to new first officers who successfully complete training and continue their employment with the airline. The purpose of the incentive is to attract pilots and encourage them to stay at the airline for an extended amount of time.

Ethical Considerations

This study utilized data on human subjects, and so it was approved by the Institutional Review Board (IRB) at the University of North Dakota. This satisfies the regulatory requirement of human subject research. As part of the IRB approval process, the chief operating officer of the regional airline that provided the data for this project also sent a letter of permission to the IRB to allow the researcher to gather and utilize its pilots' data for the study. In addition, the researcher has successfully completed the Collaborative Institutional Training Initiative (CITI) program course on social/behavioral human research.

The researcher was previously employed at a regional airline (not the one in this study) as the vice president of training. She is also an active member of the Aviation Accreditation Board International (AABI). Because of her close connection to the regional airline training world and her belief in the importance of an AABI-accredited education, it was necessary that bias be removed from this study to the greatest extent possible. For this reason, this research was conducted using solely quantitative data.

The data from this study was pre-existing, and the researcher personally collected it from the regional airline's records. In order to ensure that the identities of the individuals were kept anonymous and confidential, the researcher utilized a specific process where the data was collected based on employee identification numbers. At no point were names connected with the data. Once the data points were verified for accuracy and completeness, the identification numbers were removed and replaced with a study number. The only identifying information that the researcher maintained was the study number. This meant that, upon leaving the data-collection site, there was no way for the researcher to connect the study number with the identity of the pilot it represented.

Sample

The sample for this study consists of pilots hired at the regional airline between January 1, 2015 and December 31, 2015. As described in the previous chapter, Public Law 111-216 took effect in August, 2013. This law requires all first officers at Part 121 air carriers to possess an Airline Transport Pilot (ATP) certificate or a Restricted Airline Transport Pilot (R-ATP) certificate. Because August 2013 is a pivotal date, it would have been beneficial to have collected data dating back from August 2013. However, the regional airline that provided the data did not hire any pilots in 2013. While they did hire a small number of pilots in 2014 (fewer than 50), data on those pilots was not readily available for analysis. Therefore, the start date of January 1, 2015 and the end date of December 31, 2015 were chosen. These dates proved to be beneficial because the regional airline instituted its incentive program during 2015. The incentive program attracted a large number of pilot applicants, and so including a year of data afforded the researcher the opportunity to take full advantage of a larger sample size.

Data Collection

The data used in this study was obtained directly from the regional airline and consisted of two existing sets of data. The first set of data was acquired from the applicant database, which is managed and maintained by the pilot recruitment staff at the airline. The airline utilizes a program called Airline Apps, an outsourced online program, for its pilot application process, and the database consists of information collected directly from those pilot applications. The second set of data was acquired from the airline's training department. The training department is responsible for tracking each pilot's performance at the various stages of training. This tracking includes pilot

performance on ground school examinations, informal proficiency checks in the flight simulator, formal proficiency checks in the flight simulator, operational experience sign-off and the formal final check flight.

For the actual data collection process, the researcher contacted both the recruiting department and the training department at the regional airline in order to get their assistance in gathering the data needed to conduct the study. The recruiting department provided the application data for each pilot hired during the specific timeframe, and the training department provided their own assessment data for that same group of pilots. The researcher traveled to the regional airline's headquarters to obtain and combine the information into a single usable data set. After all of the information was gathered and the data set was complete, the researcher de-identified the entire set by replacing employee numbers with study numbers.

This study utilized a quantitative approach to predict first officer performance in initial training at a regional airline. Pilot background information was obtained from applications for employment and included the following variables: college degree(s), dates of college graduation, name of college(s), college major, military flight experience, type of military flight experience (fixed wing or rotary wing), most recent employment, previous Part 135 Experience, Previous Part 121 experience, possession of an ATP, type of ATP (traditional or restricted), date of ATP or R-ATP certificate, possession of a CFI certificate, whether or not flight instruction had been given, number of instrument approaches within the past 6 months, number of instrument approaches within the past 12 months, total hours in the past 3 months, total hours in past 12 months, total airplane

pilot-in-command (PIC) time, total airplane multi-engine time and total flight time. Information on each pilot's training class start date was also obtained.

Each of the variables collected was then put into one of three categories: educational background, aeronautical experience and recency of experience. These categories formed the basis of the research questions. Table 1, Table 2 and Table 3 give details on these variables.

Table 1. Input (Independent) Variable List – Educational Background

Variable Name	Variable Description	Values	Source
CLASSDATE	Start Date of Initial Training	Nominal	Training Department
COLLDEG	College Degree	Nominal	Application
GRADDATE	Years since graduation	Interval Variable Ratio	Application
COLLEGE	Name of College	Nominal	Application
MAJOR	College Major	Nominal	Application
MILITARY	Military Pilot	0 – No 1 – Yes	Application
TYPEMIL	Type of Military Pilot	0 – Fixed Wing 1 – Rotary Wing 2 – Fixed and Rotary	Application

Table 2. Input (Independent) Variable List – Aeronautical Experience

Variable Name	Variable Description	Values	Source
PART 121	Part 121 Pilot Experience	0 – No 1 – Yes	Application
PART 135	Part 135 Pilot Experience	0 – No 1 – Yes	Application
ATP CERT	ATP	1 - Standard ATP 2 – No ATP or only RATP	Application
CFI	Flight Instructor Certificate	0 – No 1 – Yes	Application
INSTGIVEN	Instruction Given	0 – No 1 - Yes	Application
DUALGIVEN	Dual Time Given	Interval Variable Ratio	Application
PICTIME	Airplane PIC Time	Interval Variable Ratio	Application
MULTITIME	Airplane Multi-engine Time	Interval Variable Ratio	Application
TOTALTIME	Total Hours	Interval Variable Ratio	Application

Table 3. Input (Independent) Variable List – Recent Experience

Variable Name	Variable Description	Values	Source
RECEMPLOY	Most Recent Employment	0 – Non-aviation 1 - Aviation: Pilot 2 - Aviation: Non-pilot	Application
INSTRAPP6	Number of Instrument Apps in past 6 months	Interval Variable Ratio	Application
INSTRAPP12	Number of Instrument Apps in past 12 months	Interval Variable Ratio	Application
HOURS3	Total Hours in Past 3 Months	Interval Variable Ratio	Application
HOURS12	Total Hours in Past 12 Months	Interval Variable Ratio	Application

The outcome or dependent variables in this study include pilot performance on the three ground school examinations, the requirement for extra training events in a Flight Training Device (FTD) and/or flight simulator, performance on the proficiency check and successful completion of the entire training program. Pilot performance on written examinations was determined by a passing score of 80%. Any pilot who scored lower than 80% on any written examination required a retake of that particular examination. Pilot performance in the FTD and simulator portion of training was indicated by satisfactory or unsatisfactory performance. Unsatisfactory performance required additional training sessions. Pilot performance on the proficiency check was indicated by satisfactory or unsatisfactory performance. A pilot performed successfully in training overall if he ultimately completed the initial training program.

The purpose of this study was to determine how a pilot's educational background, aeronautical experience and recency of experience impact his/her performance in initial training at a regional airline. In order to measure this, training performance data was collected on each pilot in the study. This data, which are the dependent variables in this study, included the following: required retake of the General Subjects written examination, required retake of the Basic Indoctrination written examination, required retake of the Systems written examination, required retake of one or more written examination, extra training event in the simulator, extra training event in the Flight Training Device (FTD), extra training event in the simulator and/or FTD, successful completion of the proficiency check, successful completion of the entire training program. Table 4 provides detail on these variables.

Table 4. Dependent Variables

Variable Name	Variable Description	Values	Source
GENSUBEXAM	Required retake of general subjects written exam	0- No 1 - Yes	Training Department
BASICINDOCEXAM	Required retake of basic indoctrination written exam	0 – No 1 – Yes	Training Department
SYSTEMSEXAM	Required retake of systems written exam	0 – No 1 - Yes	Training Department
WRITTENEXAM	Required retake of any of the written exams	0 – No 1 - Yes	Training Department
SIMEXTRATRAIN	Extra Training - Simulator	0 – No 1 - Yes	Training Department
FTDEXTRATRAIN	Extra Training – FTD	0 – No 1 - Yes	Training Department
FTDSIMEXTRATRAIN	Extra Training – FTD and/or Simulator	0 – No 1 - Yes	Training Department
PROFCHECK	Successful Proficiency Check	0 – No 1 – Yes	Training Department
TRAINCOMP	Overall Successful Completion of Initial Pilot Training Program	0 – No 1 - Yes	Training Department

Data Analysis

The data for this study was collected from a single regional airline and was obtained from that airline's recruiting department and training department. The researcher initially collected the data from pilot employment applications and training records and then transferred it to an Excel spreadsheet. Upon completion of the data collection process, the researcher de-identified all the data on the spreadsheet and then imported the data into the Statistical Package for the Social Sciences (SPSS) computer program for analysis.

The initial analysis of the data was descriptive. The descriptive report included frequencies, means and standard deviations for each independent and dependent variables. After completing the descriptive phase, correlation and multiple regression analysis were used to answer the research questions. Details on the statistical analysis used for each question are explained below. The significance for this study was set at the .05 level.

Research Questions and Statistical Analysis

The following lists each of the research questions and explains the statistical analysis that was used to answer each of them. The outcomes of the analyses for each question are described fully in Chapter Three.

1. What are the educational background, aeronautical experience and recency of experience characteristics of pilots hired at this regional carrier from January 2015 - December 2015?
2. What are the training performance results of pilots hired at this regional carrier from January 2015 – December 2015?

A descriptive analysis was used to answer the first two research questions. In this initial data analysis, frequencies, means and standard deviations were calculated for both the independent and dependent variables.

3. What is the relationship between a pilot's educational background characteristics and performance results in initial training at a regional airline?
4. What is the relationship between a pilot's aeronautical experience and performance results in initial training at a regional airline?

5. What is the relationship between a pilot's recency of experience and performance results in initial training at a regional airline?

For the third, fourth and fifth research questions, the data was analyzed to determine if there was a relationship between the independent and dependent variables. Two different tests were conducted to determine this. The first was a correlation. A correlation measures the strength of a relationship between two variables when one is continuous. It is expressed by a single number known as Pearson's correlation coefficient (Field, 2013). The second test that was utilized was the chi-square test of significance. This test is best used when determining relationships between categorical variables.

6. How does a pilot's educational background, aeronautical experience and recency of experience predict success in initial training at a regional airline?

For the final research question, a multiple regression analysis was utilized. Multiple regression is used to predict an outcome when there are two or more predictor variables (Field, 2013). In this study, the predictor variables were a pilot's educational background, aeronautical experience and recency of experience. The outcome variable was successful completion of initial training at regional airline. The Stepwise method was utilized to determine which variable(s) had the most effect on the variance (Field, 2013).

CHAPTER IV

RESULTS

This chapter contains the following sections: restatement of the purpose of the study, description of the sample, results of the six research questions and a summary. The statistical significance level was set at the .05 level in this study.

Purpose of the Study

The purpose of this study was to determine how a pilot's background, aeronautical experience and recency of experience relate to his performance in initial training at a regional airline. As explained by the law of exercise and the law of recency, pilots who are actively using their aeronautical knowledge and exercising their flying skills should exhibit strong performance in those areas. Conversely, pilots who have not been actively using their aeronautical knowledge and exercising their flying skills should exhibit degraded performance in those areas. This study tests those theories through the research questions presented previously and answered in detail below.

Description of the Sample

The sample used for this study was pilots hired at a single regional airline during the 2015 calendar year. The reason for using this sample was that this particular airline implemented a financial incentive for their pilots at the beginning of 2015. Due to the incentive, the airline has continued to receive a large pool of applicants and has since

been able to hire many pilots, making this pilot group an ideal sample for this study. The sample represents 311 pilots who were hired since January of 2015 when the incentive was first offered.

Research Questions

This study examined the effects of background, aeronautical experience and recency of experience on a pilots' success in initial training. The following will give the results of the statistical analyses as they pertain to each of the research questions.

Research Question 1

What are the background characteristics of pilots hired at this regional carrier from January 2015 – December 2015? The background data collected on the pilots was broken down into three main categories: educational background, aeronautical experience and recent experience. Tables 1, 2 and 3 break down each of these areas into specifics, and their accompanying descriptions will summarize the information for each category.

The frequencies in Table 5 and Table 6 depict the pilots' educational background. The listings include highest degree earned, whether or not the college program was accredited by AABI, whether or not the college program had institutional authority to certify its graduates, whether or not the college program was related to aviation, whether or not the pilot was a military pilot and, if so, what type of military pilot, and the number of years since the pilot graduated with an associate or bachelor's degree.

Table 5. Educational Background (N=311)

Characteristics	N	%
Highest Degree		
No college	52	16.7
Associate	28	9.0
Bachelor	192	61.7
Master and Above	39	12.5
AABI Program		
No	227	73.0
Yes	84	27.0
Program with Institutional Authority		
No	207	66.6
Yes	104	33.4
Aviation College Program		
No	164	52.7
Yes	147	47.3
Military Pilot		
No	261	83.9
Yes	50	16.1
Type of Military Pilot		
Fixed Wing	41	13.2
Rotary Wing	6	1.9
Both Fixed and Rotary	4	1.3
Not Applicable/Missing	260	83.6

Table 6. Educational Background - Years Since Graduation with Associate or Bachelor Degree.

Mean	Median	Mode	Standard Deviation	Minimum	Maximum
10.8	8.0	2.0	9.09	.00	37.0

The pilots in the sample ranged from having no college degree to having a doctorate. A majority of the sample (61.7%) had graduated with a bachelor's degree.

Pilots with no college degree made up 16.7% of the sample. Data on college programs was collected and reported based on three different categories. The first category shows whether or not the program was accredited by AABI. The second category shows whether or not the program has been granted institutional authority by the FAA to certify its graduates for the restricted ATP. The third category shows whether or not the college program is related to aviation. Due to the fact that a program can be included in one or more of these categories, there is crossover among them. In this sample, 84 pilots (27.0%) graduated from AABI programs, 104 pilots (33.4%) graduated from a program with institutional authority, and 147 (47.3%) graduated from aviation programs. In this sample, 50 pilots (16.1%) were military pilots. Of those pilots, 41 (82% of military pilots and 13.2% of the sample) had fixed wing experience, 6 (12% of military pilots and 1.9% of the sample) had rotary wing experience, and 4 (8% of military pilots and 1.3% of the sample) had both fixed and rotary wing experience. The number of years since graduating from an associate or bachelor's degree ranged from 0 to 37 years. The mean number of years since graduation was 10.8, and the standard deviation was 9.09. In this sample, 103 pilots (39.5%) graduated between 0 and 5 years from the time of their application, the majority of pilots (61.2%) graduated in the previous 10 years, and 23 pilots (8.7%) graduated more than 25 years prior to submitting their application.

The frequencies in Table 7 depict the aeronautical experience of the pilots in the sample. The listing includes whether or not the pilot had Part 121 experience, Part 135 experience, an ATP certificate, a CFI certificate and whether or not the pilot has any time as an instructor. Table 8 includes information on the amount of dual time given as an instructor, total multi-engine time, total pilot-in-command (PIC) time and total time.

Table 7. Aeronautical Experience (N=311).

Characteristics	N	%
Part 121 Experience		
No	215	69.1
Yes	83	26.7
Missing	13	4.2
Part 135 Experience		
No	185	59.5
Yes	112	36.0
Missing	14	4.5
ATP		
ATP	119	38.3
No ATP or only R-ATP	191	61.5
Missing	1	.3
CFI		
No	87	28.0
Yes	222	71.4
Missing	2	.6
Instructor Time		
No	69	22.2
Yes	242	77.8

Table 8. Aeronautical Experience – Flight Time.

Flight Time	Mean	Median	Mode	Standard Deviation	Minimum	Maximum
Instructor Time	754.96	637	.00	890.75	0	6,583
Airplane PIC Time	1,992.53	1371	.00	2,568.06	31	30,012
Multiengine Time	1,585.22	581	50.00	2,383.65	6.00	13,579
Total Time	3,152.24	1928	.00	2952.89	665	21,114

In this sample, 83 pilots (26.7%) had experience in a Part 121 operation and 215 (69.1%) had no experience in a Part 121 operation. This information was missing for 13

(4.2%) pilots. The report for Part 135 experience shows that 112 pilots (36.0%) did have experience in that type of operation while 185 pilots (59.5%) did not have experience. This information was missing for 14 pilots (4.5%). The report on ATP certification showed that 119 pilots (38.3%) possessed an ATP certificate, 7 pilots (2.3%) had an R-ATP certificate, ad 184 pilots (59.2%) had neither an ATP nor R-ATP. Data was missing for 1 pilot (.3%). In this sample, 222 pilots (71.4%) possessed a CFI certificate, and 87 pilots (28.0%) did not possess a CFI certificate. Data was missing for 2 pilots. The report for whether or not a pilot had any dual time given showed that 242 pilots (77.8%) had given some instruction, and 69 pilots (22.2%) had not. It is important to note that some of the pilots had reported instruction time even though they did not hold a CFI certificate. This may have occurred because those pilots were in the military and were not required to hold a CFI certificate in order to act as instructors.

The mean number of hours of dual time given was 754.96 with a standard deviation of 890.75. The lowest number of hours of dual time given was 0 and the highest number of hours of dual given was 6,583. The mean number of hours of airplane multi-engine time for the pilots in this sample was 1,585.22 with a standard deviation of 2,383.65. The lowest number of hours of multi-engine time was 6 and the highest number of hours of multi-engine time was 13,579. The mean number of hours of airplane PIC time (defined as PIC time + instructor time on the application) for the sample was 1,992.53, and the standard deviation was 2,568.06. The lowest amount of PIC hours reported was 31 and the highest was 30,012. The mean number of hours of total time for the sample was 3,152.2, and the standard deviation was 2,952.89. The lowest number of

hours of total time reported was 665 and the highest number of hours of total time reported was 21,114.

The frequencies in Table 9 and Table 10 depict the recent experience of the pilots in the sample. The listing includes most recent employment, number of instrument approaches in the past 6 months, number of instrument approaches in the past 12 months, total hours in the past 3 months and total hours in the past 12 months.

Table 9. Recent Experience – Recent Employment.

Characteristics	N	%
Recent Employment		
Non-aviation	34	10.9
Aviation – Pilot	264	84.9
Aviation – Non-Pilot	12	3.9
Missing	1	.3

Table 10. Recent Experience – Instrument Approaches and Recent Time

Recent Experience	Mean	Median	Mode	Standard Deviation	Minimum	Maximum
Instrument Approaches – 6 months	32.75	18.0	.00	52.89	.00	405.00
Instrument Approaches – 12 months	63.24	18.00	.00	110.64	.00	900.00
Total Time – 3 Months	106.91	87.00	.00	99.27	.00	451.00
Total Time – 12 Months	382.48	376.00	.00	303.07	.00	1150.00

The data shows that 264 pilots (84.9%) worked in aviation as pilots as their most recent employment, 12 pilots (3.9%) worked in aviation as non-pilots, and 34 pilots (10.9%) did not work in aviation in any capacity in their most recent employment. Data was missing for 1 pilot in this category.

The mean number of instrument approaches that pilots reported for the six months preceding employment was 32.7, and the standard deviation was 52.9. The fewest number of approaches reported was 0 and the greatest number of approaches reported was 405. The mean number of instrument approaches that pilots reported for the 12 months preceding employment was 63.2, and the standard deviation was 110.6. The fewest number of approaches reported was 0, and the greatest number of approaches reported was 900. The mean number of hours of total time in the three months preceding the application for employment for the sample was 106.9, and the standard deviation was 99.3. The fewest number of hours reported for the preceding three months was 0, and the greatest number of hours reported for the preceding three months was 451. Data was missing for 2 pilots in this category. The mean number of hours of total time in the 12 months preceding the application for employment for the sample was 382.5, and the standard deviation was 303.1. The fewest number of hours reported for the preceding 12 months was 0, and the greatest number of hours reported for the preceding 12 months was 1150. Data for 2 pilots was missing for this category.

The first research question addressed the background of the pilots researched in this study. It included information on the pilots' educational background, aeronautical experience and recent experience.

Research Question 2

What are the training performance results of pilots hired at this regional carrier from January 2015 – December 2015? The training data collected on the pilots in the sample included information on ground school written examinations, simulator and flight training device (FTD) training events, proficiency checks and successful completion of

training. The definitions for FTD and simulator are described in Chapter One. As a reminder for this discussion, both an FTD and simulator are exact replicas of an aircraft flight deck, and all the instruments function just as they would in a real airplane. However, an FTD does not have motion capabilities where a simulator (also known as a Full Flight Simulator) does actually move (Description, 2016). Table 11 and the accompanying descriptions give information on the data collected for this question.

Table 11. Pilot Performance in Initial Training (N=311)

Characteristics	N	%
Basic Indoctrination Written Test Retake Required		
No	300	96.5
Yes	11	3.5
General Subjects Written Test Retake Required		
No	296	95.2
Yes	15	4.8
Systems Written Test Retake Required		
No	293	94.2
Yes	18	5.8
Ground School Written Test Retake Required		
No	273	87.7
Yes	28	12.2
Extra Simulator Session(s) Required		
No	202	65.0
Yes	88	28.3
Not Applicable	21	6.8
Extra FTD Session Required		
No	235	75.6
Yes	55	17.7
Not Applicable	21	

Table 11 cont.

Characteristics	N	%
Extra Simulator or FTD Session Required		
No	182	58.5
Yes	108	34.7
Not Applicable	21	6.8
Unsatisfactory Proficiency Check		
No	266	85.5
Yes	6	1.9
Not Applicable	39	12.5
Successful Completion of Training		
No	45	14.5
Yes	266	85.5

In this sample, 300 pilots (96.5%) passed their Basic Indoctrination written examination on the first take, and 11 pilots (3.5%) failed the first attempt and were required to retake the examination. The second examination, General Subjects, had 296 pilots (95.2%) successfully pass it on the first take, and 15 pilots (4.8%) who failed the first attempt and were required to retake the examination. The data on the third examination, Systems, showed that 293 pilots (94.2%) successfully passed on the first take while 18 pilots failed the first attempt and were required to retake the examination. When all of this data is aggregated into one set of data, the results show that 273 pilots (87.8%) successfully passed all three of the written examination on the first try, and 28 pilots (12.2%) failed on the first attempt of one, two or all three of the examinations and were required to retake said examination(s).

During practical training, 201 pilots (64.6%) completed training in the simulator without requiring extra training events, and 88 pilots (28.3%) were required to complete

extra training events in the simulator. Due to the fact that they had separated from the company prior to entering this phase of training, data on 21 pilots was not applicable. In the FTD, 235 pilots (75.6%) completed training without requiring extra training events, and 55 pilots (17.7%) were required to complete extra training events. Because they had separated from the company prior to entering this phase of training, data on 21 pilots was not applicable. When data from these two categories was aggregated, results showed that 182 pilots (58.5%) successfully completed both simulator and FTD training without requiring any extra training events, and 108 pilots (34.7%) required extra training in either one or both segments of this training phase. Again, because they had separated from the company prior to entering this phase of training, data for 21 pilots was not applicable.

When faced with the final proficiency check, 266 pilots (85.5%) satisfactorily completed the check, and 6 pilots (1.9%) did not satisfactorily complete the check. Because they had already separated from the company before this stage of training, data on 39 pilots was not applicable for this part of the study. Finally, of the 311 pilots in the sample set, 266 pilots (85.5%) successfully completed the entire training program, and 45 pilots (14.5%) did not successfully complete the training program. Training completion data was available for all 311 pilots in the sample set.

The second research question addressed the training performance results of the 311 pilots in the sample. It included information on written examinations, simulator and FTD training events, performance checks and training program completions.

Research Question 3

What is the relationship between a pilot's educational background characteristics and performance results in initial training at a regional airline? Since two types of variables, categorical and continuous, were collected for this study, it was necessary to use two different tests to answer this research question. A correlation analysis was utilized as the statistical test for the years since graduation since this type of analysis tests the relationship between variables when one is continuous. A chi-square test of significance was used to test the relationship between the other variables as it is the best choice when comparing categorical variables. In this analysis, the independent variables utilized were the following: highest degree earned, years since associate or bachelor's degree, AABI program, institutional authority, aviation college program and military pilot. See Table 1 for details on these variables. The dependent variables utilized included the following: required retakes of ground school written examinations (combined data), simulator or FTD extra training events (combined data) and successful completion of training. See Table 4 for details on these variables.

To determine if there was a relationship between educational background and performance in training, both a correlation analysis and chi-squares were performed utilizing SPSS, the statistical software. For the correlation analysis, a two-tailed test of significance was performed utilizing the Pearson's product-moment correlation. The results of the test are shown in Table 12.

Table 12. Relationship Between Educational Background and Performance in Training

	Written Test Retake	Extra Simulator and/or FTD	Training Completion
Years Since Bachelor or Associate	.059	.156*	-.379

*. Correlation is significant at the 0.05 level (2-tailed).

The results of the correlation analysis between educational background and performance in initial training showed that there was a significant positive relationship between the years since graduating with an associate or bachelor's degree and the need for extra simulator and/or FTD training events (r = .156, p = .156). This means that pilots who were further removed from the structured academic and training environment were more likely to require an extra simulator and/or FTD training event. There was also a significant negative relationship between years since graduation and successful completion of training (r = -.379, p = .000). This means that pilots who were further removed from graduation were less likely to complete training successfully.

The results of the chi-square test of significance comparing highest degree earned and training performance are contained in Table 13, Table 14 and Table 15 below.

Table 13. Relationship Between Highest Degree Earned and Required Test Retake in Ground School.

		Required Test Retake (No)	Required Test Retake (Yes)
No College Degree	Expected/Observed	45.6/42	6.4/10
Associate	Expected/Observed	24.6/25	3.4/3
Bachelor	Expected/Observed	168.5/173	23.5/19
Master and Above	Expected/Observed	34.2/33	4.8/6

X^2 (1, N=311) = *3.77*, p =.287

Table 14. Relationship Between Highest Degree Earned and Required Extra Simulator and/or FTD Training Event.

		Extra Simulator and/or FTD (No)	Extra Simulator and/or FTD (Yes)
No College Degree	Expected/Observed	30.1/26	17.9/22
Associate	Expected/Observed	15.7/11	9.3/14
Bachelor	Expected/Observed	114.8/127	68.2/56
Master and Above	Expected/Observed	21.3/18	12.7/16

X^2 (1, N=290) = *10.14*, p =.017

Table 15. Relationship Between Highest Degree Earned and Training Completions

		Training Completion (No)	Training Completion (Yes)
No College Degree	Expected/Observed	7.5/13	44.5/39
Associate	Expected/Observed	4.1/6	23.9/22
Bachelor	Expected/Observed	27.8/18	164.2/174
Master and Above	Expected/Observed	5.6/8	33.4/31

X^2 (1, N=311) = *10.93*, p =.012

The results of the chi-square test show that there was not a significant relationship between level of college degree and the requirement for a retake of a written examination in ground school ($X^2 = 3.77$, p =.287) The results of the chi-square test show that there was a significant relationship between level of college degree and the requirement for a simulator and/or FTD extra training event ($X^2 = 10.14$, p =.017). The results of the chi-square test show that there was also a significant relationship between level of college degree and training completions ($X^2 = 10.93$, p =.012).

The results of the chi-square test comparing whether or not a pilot had graduated from an AABI program and performance in training are contained in Table 16, Table 17 and Table 18 below.

Table 16. Relationship Between AABI Program and Required Test Retake in Ground School.

		Required Test Retake (No)	Required Test Retake (Yes)
AABI Program – No	Expected/Observed	199.3/192	27.7/35
AABI Program - Yes	Expected/Observed	73.7/81	10.3/3

X^2 (1, N=311) = *8.023*, p =.005

Table 17. Relationship Between AABI Program and Required Extra Simulator and/or FTD Training Event.

		Extra Simulator and/or FTD (No)	Extra Simulator and/or FTD (Yes)
AABI Program – No	Expected/Observed	130.5/123	77.5/85
AABI Program - Yes	Expected/Observed	51.5/59	30.5/23

X^2 (1, N=290) = *4.13*, p =.042

Table 18. Relationship Between AABI Program and Training Completions.

		Training Completion (No)	Training Completion (Yes)
AABI Program – No	Expected/Observed	32.8/41	194.2/186
AABI Program - Yes	Expected/Observed	12.2/4	71.8/80

X^2 (1, N=311) = *8.76*, p =.003

There was a significant relationship between a pilot's graduation from an AABI program and the need to retake a ground school examination ($X^2 = 8.023$, p =.005), the need for extra simulator and/or FTD training events ($X^2 = 4.13$, p =.042) and successful completion of training ($X^2 = 8.76$, p =.003). These results show that pilots who graduated

from an AABI program were less likely to require a written examination retake or an extra simulator and/or FTD training event. Pilots who graduated from an AABI program were also more likely to successfully complete the training program.

The results of the chi-square test comparing whether or not a pilot had graduated from a college program with FAA institutional authority and performance in training are contained in Table 19, Table 20 and Table 21 below.

Table 19. Relationship Between Program with Institutional Authority and Required Test Retake in Ground School.

		Required Test Retake (No)	Required Test Retake (Yes)
Institutional Authority – No	Expected/Observed	181.7/173	25.3/34
Institutional Authority - Yes	Expected/Observed	91.3/100	12.7/4

X^2 (1, N=311) = *10.21*, p =.001

Table 20. Relationship Between Program with Institutional Authority and Required Extra Simulator and/or FTD Training Event.

		Extra Simulator and/or FTD (No)	Extra Simulator and/or FTD (Yes)
Institutional Authority – No	Expected/Observed	118.0/110	70.0/78
Institutional Authority - Yes	Expected/Observed	64.0/72	38.0/30

X^2 (1, N=290) = *4.13*, p =.042

Table 21. Relationship Between Program with Institutional Authority and Training Completions.

		Training Completion (No)	Training Completion (Yes)
Institutional Authority – No	Expected/Observed	30.0/41	177.0/166
Institutional Authority - Yes	Expected/Observed	15.0/4	89.0/100

X^2 (1, N=311) = *14.25*, p =.000

There was a significant relationship between a pilot's graduation from a program with FAA institutional authority and the need to retake a ground school examination ($X^2 = 10.21$, $p = .001$), the need for extra simulator and/or FTD training events ($X^2 = 4.13$, $p = .042$) and successful completion of training ($X^2 = 14.25$, $p = .000$). These results show that pilots who graduated from a program with institutional authority were less likely to require a written examination retake or an extra simulator and/or FTD training event. Pilots who graduated from a program with institutional authority were also more likely to successfully complete the training program.

The results of the chi-square test comparing whether or not a pilot had graduated from an aviation college program and performance in training are contained in Table 22, Table 23 and Table 24 below.

Table 22. Relationship Between Aviation College Program and Required Test Retake in Ground School.

		Required Test Retake (No)	Required Test Retake (Yes)
Institutional Authority – No	Expected/Observed	144.0/135	20.0/29
Institutional Authority - Yes	Expected/Observed	129.0/138	18.0/9

X^2 (1, N=311) = *9.66*, $p = .002$

Table 23. Relationship Between Aviation College Program and Required Extra Simulator and/or FTD Training Event.

		Extra Simulator and/or FTD (No)	Extra Simulator and/or FTD (Yes)
Institutional Authority – No	Expected/Observed	92.9/84	55.1/64
Institutional Authority - Yes	Expected/Observed	89.1/98	52.9/44

X^2 (1, N=290) = *4.66*, $p = .031$

Table 24. Relationship Between Aviation College Program and Training Completions.

		Training Completion (No)	Training Completion (Yes)
Institutional Authority – No	Expected/Observed	23.7/36	140.3/128
Institutional Authority - Yes	Expected/Observed	21.3/9	125.7/138

X^2 (1, N=311) = *15.69*, p =.000

There was a significant relationship between the type of college program (aviation or non-aviation) and the need to retake a ground school examination ($X^2 = 9.66$, p =.002), the need for extra simulator and/or FTD training events ($X^2 = 4.66$, p =.031) and successful completion of training (X^2 (1, N=311) = *15.69*, p =.000). These results show that pilots who graduated from an aviation college program were less likely to require a written examination retake or an extra simulator and/or FTD training event. Pilots who graduated from an aviation college program were also more likely to successfully complete the training program.

The results of the chi-square test comparing whether or not a pilot had military flying experience and performance in training are contained in Table 25, Table 26 and Table 27 below.

Table 25. Relationship Between Military Pilot and Required Test Retake in Ground School.

		Required Test Retake (No)	Required Test Retake (Yes)
Military Pilot – No	Expected/Observed	229.1/224	31.9/37
Military Pilot - Yes	Expected/Observed	43.9/49	6.1/1

X^2 (1, N=311) = *5.8*, p =.016

Table 26. Relationship Between Military Pilot and Required Extra Simulator and/or FTD Training Event.

		Extra Simulator and/or FTD (No)	Extra Simulator and/or FTD (Yes)
Military Pilot – No	Expected/Observed	152.5/154	90.5/89
Military Pilot - Yes	Expected/Observed	29.5/28	17.5/19

X^2 (1, N=311) = *.243*, p =.622

Table 27. Relationship Between Military Pilot and Training Completions.

		Training Completion (No)	Training Completion (Yes)
Military Pilot – No	Expected/Observed	37.8/39	223.2/222
Military Pilot - Yes	Expected/Observed	7.2/6	42.8/44

X^2 (1, N=311) = *.294* p =.588

There was a significant relationship between being a military pilot and the need to retake a ground school written examination ($X^2 = 5.8$, p =.016). There was no significant relationship between being a military pilot and the need for extra simulator and/or FTD training events ($X^2 = .243$, p =.622), nor was there a significant relationship between being a military pilot and training completions ($X^2 = .294$ p =.588).

Question 3 addressed the relationship between educational background and success in initial training at the regional airline. The significance found pertained to highest degree earned, years since graduating with an associate or bachelor's degree, completion of an AABI program, completion of a program with institutional authority, type of college program and being a military pilot and the relationship of those variables to performance results in initial training.

Research Question 4

What is the relationship between a pilot's aeronautical experience and performance results in initial training at a regional airline? Since two types of variables, categorical and continuous, were collected for this study, it was necessary to use two different tests to answer this research question. A correlation analysis was utilized as the statistical test for the years since graduation since this type of analysis tests the relationship between variables when one is continuous. A chi-square test of significance was used to test the relationship between the other variables as it is the best choice when comparing categorical variables. In this analysis, the independent variables utilized were the following: Part 121 experience, Part 135 experience, ATP certification, CFI certification, whether or not dual instruction has been given, amount of dual instruction given, total PIC time, total multi-engine time and total time. See Table 2 for details. The dependent variables utilized included the following: required retake of a ground school written examinations (combined data), simulator or FTD extra training events (combined data) and successful completion of training. See Table 4 for details on these variables.

The correlation analysis was performed utilizing the bivariate function in SPSS, the statistical software. A two-tailed test of significance was performed utilizing the Pearson's product-moment correlation. The results of the test are shown in Table 28.

Table 28. Relationship Between Aeronautical Experience and Performance in Training

	Written Test Retake	Extra Sim or FTD	Training Complete
Instructor Time	.171**	.021	-.303**
Total PIC Time Airplane	-.001	.026	-.097
Total Airplane Multiengine Time	-.042	-.156**	.023
Total Time	-.006	-.034	-.172**

The results of the correlation analysis between aeronautical experience and performance in training showed that there was a significant relationship between some of the independent variables and some of the dependent variables. These relationships are described below.

There was a significant positive relationship between the amount of instructor time given and a required retake of a ground school written examination (r = .171, *p* = .008). This means that pilots with more instructor time were more likely to require a retake of a ground school examination. There was a significant negative relationship between the amount of dual time given and successful completion of initial training (r = .303, *p* = .000). This shows that pilots with more dual time were less likely to completely training. There was no significant relationship between instructor time and the requirement for extra simulator and/or FTD training events.

There was a significant negative relationship between the amount of multi-engine time and the requirement for extra simulator and/or FTD training events (r = -.156, *p* = .008). This shows that pilots with more multi-engine time were less likely to require an extra simulator and/or FTD training event. There was no significant relationship between

the amount of multi-engine time and the requirement for a retake of a ground school examination or successful completion of training.

There was a significant negative relationship between the amount of total time and the successful completion of training (r = -.172, p = .002). This shows that pilots with more total time were less likely to successfully complete training. There was no significant relationship between the amount of total time and the requirement for a retake of a ground school examination or the requirement for a simulator and/or FTD extra training event. There was no significant relationship between the amount of PIC time and performance in training.

The results of the chi-square test comparing whether or not a pilot had Part 121 experience and performance in training are contained in Table 29, Table 31 and Table 31.

Table 29. Relationship Between Part 121 Experience and Required Test Retake in Ground School.

		Required Test Retake (No)	Required Test Retake (Yes)
Par 121 Exp. – No	Expected/Observed	189.0/186	26.0/29
Part 121 Exp. - Yes	Expected/Observed	73.0/76	10.0/7

X^2 (1, N=298) = *1.44*, p =.158

Table 30. Relationship Between Part 121 Experience and Required Extra Simulator and/or FTD Training Event.

		Extra Simulator and/or FTD (No)	Extra Simulator and/or FTD (Yes)
Par 121 Exp. – No	Expected/Observed	126.2/111	76.9/92
Part 121 Exp. - Yes	Expected/Observed	47.9/63	29.2/14

X^2 (1, N=280) = *17.48*, p =.000

Table 31. Relationship Between Part 121 Experience and Training Completion.

		Training Completion (No)	Training Completion (Yes)
Par 121 Exp. – No	Expected/Observed	31.0/30	184.0/185
Part 121 Exp. - Yes	Expected/Observed	12.0/13	71.0/70

X^2 (1, N=298) = *.142*, p =.707

The results show that there was a significant relationship between Part 121 experience and the requirement for extra simulator and/or FTD training events (X^2 = *17.48*, p =.000). There was not a significant relationship between Part 121 experience and the requirement to retake a ground school written examination or successful completion of training.

The results of the chi-square test comparing whether or not a pilot had Part 135 experience and performance in training are contained in Table 32, Table 33 and Table 34.

Table 32. Relationship Between Part 135 Experience and Required Test Retake in Ground School.

		Required Test Retake (No)	Required Test Retake (Yes)
Par 135 Exp. – No	Expected/Observed	162.6/162	22.4/23
Part 135 Exp. - Yes	Expected/Observed	98.4/99	13.6/13

X^2 (1, N=297) = *.045*, p =.833

Table 33. Relationship Between part 135 Experience and Required Extra Simulator and/or FTD Training Event.

		Extra Simulator and/or FTD (No)	Extra Simulator and/or FTD (Yes)
Par 135 Exp. – No	Expected/Observed	109.8/104	66.2/72
Part 135 Exp. - Yes	Expected/Observed	64.2/70	38.8/33

X^2 (1, N=279) = *2.178*, p =.140

Table 34. Relationship Between Part 135 Experience and Training Completion.

		Training Completion (No)	Training Completion (Yes)
Par 135 Exp. – No	Expected/Observed	26.8/24	158.2/161
Part 135 Exp. - Yes	Expected/Observed	16.2/19	95.8/93

X^2 (1, N=297) = *.898*, p =.343

The results show that there was not a significant relationship between Part 135 experience and the requirement for a retake on a ground school examination, the requirement for extra simulator and/or FTD training events or successful completion of the training program.

The results of the chi-square test comparing whether or not a pilot held a standard ATP certification and performance in training are contained in Table 35, Table 36 and Table 37.

Table 35. Relationship Between ATP Certification and Required Test Retake in Ground School.

		Required Test Retake (No)	Required Test Retake (Yes)
Standard ATP	Expected/Observed	104.4/110	14.6/9
No ATP or only R-ATP	Expected/Observed	167.6/162	23.4/29

X^2 (1, N=310) = *3.96*, p =.047

Table 36. Relationship Between ATP Certification and Required Extra Simulator and/or FTD Training Event.

		Extra Simulator and/or FTD (No)	Extra Simulator and/or FTD (Yes)
Standard ATP	Expected/Observed	68.3/79	40.7/30
No ATP or only R-ATP	Expected/Observed	112.7/102	67.3/78

X^2 (1, N=289) = *7.25*, p =.007

Table 37. Relationship Between ATP Certification and Training Completion.

		Training Completion (No)	Training Completion (Yes)
Standard ATP	Expected/Observed	17.3/19	101.7/100
No ATP or only R-ATP	Expected/Observed	27.7/26	163.3/165

X^2 (1, N=310) = *.327*, p =.567

There was a significant relationship between ATP certification and the requirement for a retake of a written examination in ground school ($X^2 = 3.96$, p =.047). There was also a significant relationship between ATP certification and the requirement for extra simulator and/or FTD training events ($X^2 = 7.25$, p =.007). There was no significant relationship between ATP certification and successful completion of the training program.

The results of the chi-square test comparing whether or not a pilot was a CFI and performance in training are contained in Table 38, Table 39 and Table 40.

Table 38. Relationship Between CFI Certification and Required Test Retake in Ground School.

		Required Test Retake (No)	Required Test Retake (Yes)
CFI – No	Expected/Observed	76.3/71	10.7/16
CFI – Yes	Expected/Observed	194.7/200	27.3/22

X^2 (1, N=309) = *4.17*, p =.041

Table 39. Relationship Between CFI Certification and Required Extra Simulator and/or FTD Training Event.

		Extra Simulator and/or FTD (No)	Extra Simulator and/or FTD (Yes)
CFI – No	Expected/Observed	48.8/51	29.3/27
CFI – Yes	Expected/Observed	131.3/129	78.8/81

X^2 (1, N=288) = *.380*, p =.538

Table 40. Relationship Between CFI Certification and Training Completion.

		Training Completion (No)	Training Completion (Yes)
CFI – No	Expected/Observed	12.7/14	74.3/73
CFI – Yes	Expected/Observed	32.3/31	189.7/191

X^2 (1, N=309) = *.227*, p =.633

There was a significant relationship between CFI certification and required retakes on ground school written examinations ($X^2 = 4.17$, p =.041). There was no significant relationship between CFI certification and the requirement for an extra simulator and/or FTD training event. There was also no significant relationship between CFI certification and successful completion of the training program.

The results of the chi-square test comparing whether or not a pilot had given any flight instruction and performance in training are contained in Table 41, Table 42 and Table 43.

Table 41. Relationship Between Instruction Time Given and Required Test Retake in Ground School.

		Required Test Retake (No)	Required Test Retake (Yes)
Instruction Given – No	Expected/Observed	60.6/54	8.4/15
Instruction Given – Yes	Expected/Observed	212.4/219	29.6/23

X^2 (1, N=311) = *7.49*, p =.006

Table 42. Relationship Between Instruction Time Given and Required Extra Simulator and/or FTD Training Event.

		Extra Simulator and/or FTD (No)	Extra Simulator and/or FTD (Yes)
Instruction Given – No	Expected/Observed	38.3/39	22.7/22
Instruction Given – Yes	Expected/Observed	143.7/143	85.3/86

X^2 (1, N=290) = *.046*, p =.831

Table 43. Relationship Between Instruction Time Given and Training Completions.

		Training Completion (No)	Training Completion (Yes)
Instruction Given – No	Expected/Observed	10.0/13	59.0/56
Instruction Given – Yes	Expected/Observed	35.0/32	207.0/210

X^2 (1, N=311) = *1.369*, p =.242

There was a significant relationship between whether or not flight instruction had been given and required retake of a ground school written examinations ($X^2 = 7.49$, p =.006). This means that pilots who had given flight instruction were less likely to require

a retake on a written examination in ground school. There was no significant relationship between whether or not flight instruction had been given and required extra simulator and/or FTD training events. There was also no significant relationship between whether or not flight instruction had been given and the successful completion of the training program.

Question 4 addressed the relationship between aeronautical experience and performance in initial training at a regional airline. There was a significant relationship between most of the aeronautical experience variables and the performance variables. The only variable that did not show any a significant relationship was Part 135 experience.

Research Question 5

What is the relationship between a pilot's recency of experience and performance results in initial training at a regional airline? Since two types of variables, categorical and continuous, were collected for this study, it was necessary to use two different tests to answer this research question. A correlation analysis was utilized as the primary statistical test testing the relationship between the number of instrument approaches and flight time and performance in training. A chi-square test of significance was used to test the relationship between recent employment and performance in training. In this analysis, the independent variables utilized were recent employment, number of instrument approaches in the preceding six months, the number of instrument approaches in the preceding 12 months, total time in the preceding three months and total time in the preceding 12 months. See Table 3 for details. The dependent variables utilized included the following: a required retake of ground school written examinations simulator extra

training events, simulator and/or FTD extra training events (combined data), and successful completion of training. See Table 4 for details on these variables.

The correlation analysis was performed utilizing the bivariate function in SPSS, the statistical software. A two-tailed test of significance was performed utilizing the Pearson's product-moment correlation. The results of the test are shown in Table 44.

Table 44. Relationship Between Recency of Experience and Performance in Initial Training

	Written Test Retake	Extra Sim and/or FTD	Training Complete
Instrument App - 6 months	-.020	-.092	-.061
Instrument App - 12 months	-.024	-.084	-.081
Total Time - 12 months	-.035	-.033	.123*
Total Time - 3 months	-.030	.036	.131*

*. Correlation is significant at the 0.05 level (2-tailed).

The results of the correlation analysis between recency of experience and performance in initial training showed that there was a significant relationship between two of the recency of experience independent variables and the training performance variables. All of the results for this question are below.

There was a significant positive relationship between total time in the preceding three months and successful completion of training, r = .131, p = .021. This means that pilots with more flight time in the preceding three months were more likely to successfully complete the training program. There was a significant relationship between total time in the preceding 12 months and successful completion of training, r = .123, p = .031. This means that pilots with more flight time in the preceding 12 months were more

likely to successfully complete training. There was no significant relationship between the number of instrument approaches in the preceding 6 months and the number of instrument approaches in the preceding 12 months and performance in initial training. There was also no significant relationship between any of the independent variables and the required retake of a written examination in ground school or the requirement for extra simulator and/or FTD training events.

The results of the chi-square test comparing a pilot's recent employment and performance in training are contained in Table 45, Table 46 and Table 47 below.

Table 45. Relationship Between Recent Employment and Required Test Retake in Ground School.

		Required Test Retake (No)	Required Test Retake (Yes)
Non-aviation	Expected/Observed	29.9/28	4.1/6
Aviation – Pilot	Expected/Observed	232.5/236	31.5/28
Aviation – Non-Pilot	Expected/Observed	10.6/9	1.4/3

X^2 (1, N=310) = *3.45*, p =.178

Table 46. Relationship Between Recent Employment and Required Extra Simulator and/or FTD Training Event.

		Extra Simulator and/or FTD (No)	Extra Simulator and/or FTD (Yes)
Non-aviation	Expected/Observed	19.5/18	11.5/13
Aviation – Pilot	Expected/Observed	155.6/160	92.4/88
Aviation – Non-Pilot	Expected/Observed	6.9/4	4.1/7

X^2 (1, N=290) = *3.899*, p =.142

Table 47. Relationship Between Recent Employment and Training Completion.

		Training Completion (No)	Training Completion (Yes)
Non-aviation	Expected/Observed	4.8/9	29.2/25
Aviation – Pilot	Expected/Observed	37.5/33	226.5/231
Aviation – Non-Pilot	Expected/Observed	1.7/2	10.3/10

X^2 (1, N=310) = *4.890*, p =.087

The results of the chi-square test show that there is no significant relationship between recent employment and performance in initial training.

Question 5 addressed the relationship between recency of experience and performance in initial training at a regional airline. There was a significant relationship between the independent variables of total time in the preceding 3 months and total time in the preceding 12 months and the performance variables. There was no significant relationship between recent employment, the number of instrument approaches in the preceding 6 months and the number of instrument approaches in the preceding 12 months and performance in initial training.

Research Question 6

How does a pilot's educational background, aeronautical experience and recency of experience predict his success in initial training at a regional airline? Since this question is attempting to predict an outcome, multiple regression analysis was utilized as the statistical test. The dependent variable assessed was training completions.

The first analysis was completed by placing the educational background predictor variables into a full model regression utilizing the stepwise method. The

stepwise method was utilized in order to determine which variables had a significant impact on the variance. The variables that were included were years since graduation, highest degree, AABI program, institutional authority, aviation college program and military pilot. The variables that had a significant impact on the variance were years since graduation, whether or not a pilot was a military pilot and aviation college program. These three variables accounted for 17.3% of the variance. ($F = 17.89$, $df = 3, 257$, $p = .000$). Table 48 shows the results.

Table 48. R^2 Change Results Based on Stepwise Regression for Educational Background Variables for Training Completions for the Total Sample.

Factor	R	R^2	R^2 Chg.	Sig. Chg.
Years Since Graduation	.379	.144	.144	.000
Military Pilot	.399	.159	.016	.030
Aviation College Program	.416	.173	.013	.042
Factors not in equation: highest degree, AABI program, institutional authority,				

The second analysis was completed by placing the aeronautical experience predictor variables into a full model regression utilizing the stepwise method. The stepwise method was chosen in order to determine which variables had a significant impact on the variance. The variables that were included in this analysis were Part 121 experience, Part 135 experience, ATP certificate, total airplane multi-engine time, instructor time, total airplane PIC time and total time. The two variables that had a significant impact on the variance were total time and total airplane multi-engine time. These variable accounted for 12.3% of the variance. ($F = 20.02$, $df = 2, 286$, $p = .000$). See Table 49 for results.

Table 49. R^2 Change Results Based on Stepwise Regression for Aeronautical Experience Variables for Training Completions for the Total Sample.

Factor	R	R^2	R^2 Chg.	Sig. Chg.
Total Time	.191	.037	.037	.001
Airplane Multi-Engine Time	.350	.123	.086	.000
Factors not in equation: Part 121 experience, Part 135 experience, ATP certification, Instructor Time and PIC time.				

The third analysis was completed by placing all the recency of experience predictor variables into a full model regression utilizing the stepwise method. This method was performed in order to determine which variables had a significant impact on the variance. The variables that were included in the analysis were recent experience, instrument approaches in the preceding 6 months, instrument approaches in the preceding 12 months, total time in the preceding 3 months and total time in the preceding 12 months. The only variable that had a significant impact on the variance was total time in the preceding three months. This variable accounted for 1.5% of the variance. ($F = 4.762$, *df = 1,206, p = .030).* See Table 50 for results.

Table 50. R^2 Change Results Based on Stepwise Regression for Recent Experience Variables for Training Completions for the Total Sample.

Factor	R	R^2	R^2 Chg.	Sig. Chg.
Total time – 3 months	.124	.015	.015	.030
Factors not in equation: recent experience, instrument approaches – 6 months, instrument approaches – 12 months, total time – 12 months.				

A final analysis was performed by placing all of the predicting factors that showed significant impact on the variance in the preceding three regression analyses into

a single full model regression utilizing the stepwise method. The variables that were included were the following: years since graduation, aviation college program, military pilot, total airplane multi-engine time, total time in the preceding three months and total time. The results showed that the variables with a significant impact on the variance were years since graduation, total airplane multi-engine time, total time and military pilot. These variables accounted for 27.9% of the variance. ($F = 24.534$, $df = 4, 253$, $p = .000$). See Table 51 for results.

Table 51. R^2 Change Results Based on Stepwise Regression for Significant Input Variables for Training Completions for the Total Sample.

Factor	R	R^2	R^2 Chg.	Sig. Chg.
Years Since Graduation	.378	.143	.143	.000
Airplane Multi-Engine Time	.471	.222	.079	.000
Total Time	.513	.263	.041	.000
Military Pilot	.529	.279	.016	.017

Factors not in equation: aviation college program, military pilot, total time – 3 months and total time.

Question 6 addressed how a pilot's educational background, aeronautical experience and recency of experience predict his performance in initial training at a regional airline. Significance was found between all three categories of predictor variables, including educational background aeronautical experience and recency of experience, and performance in initial training.

Summary

This chapter addressed the six research questions, the results of which looked at the educational background, aeronautical experience and recency of experience of pilots in the data sample, as well as their performance in initial training at a regional airline. The results also addressed the relationship between each area of educational background, aeronautical experience and recency of experience and a pilot's performance in initial training. The conclusions from the analyses performed will be discussed in detail in Chapter Five.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

This chapter includes an overview of the results of the research and how the results relate to the literature review and theoretical framework of the study. The chapter will also include a discussion on the relationship of this study to industry practices as well as recommendations for further research.

Summary

The results of this study show that there is a relationship between some of the predictive variables and performance in initial training at a regional. Most of the relationships occur when comparing the variables related to educational background and aeronautical experience with performance in initial training.

Research Question 1: What are the background characteristics of pilots hired at this regional carrier from January 2015 – December 2015?

This results of this question show that pilot backgrounds are varied. It was beyond the scope of this study to do a comparison between pilots hired since 2013 and those hired prior to the first officer qualification ruling; however, a previous study has shown that pilots hired by regional airlines prior to 2013 had fewer total flight hours as compared to pilots hired since then (Shane, 2015). This current study corroborates that previous study in that the pilots in the current study sample group, like the previous

study, also had an average of 3000 hours of total time. Although impossible to determine based on the data, this increase in total time might indicate that the pilots hired since 2013 are generally a bit older than those hired in the years prior to 2013. A second indicator of the age of the pilots is the data in the current study that describes the number of years since the pilot graduated with either an associate or bachelor's degree. In this study, the mean number of years since graduation was 10.8. While not a fully accurate indicator of age, one might surmise that a person who is more than 10 years from graduation is in his thirties. It is important to note that more than 30% of the pilots in this study graduated more than 10 years prior to submitting their application, with ~16% having graduated more than 20 years prior to submitting their application. This information was certainly unexpected and somewhat surprising. The first reason for this could be that, as noted in Chapter One, there was a time period of more than 10 years where major airlines were doing very little hiring. Someone who may have originally wanted to be an airline pilot might have been forced to work in another profession for a time because airline jobs were not available. A second reason for this could be that, due to the incentive at this particular airline and the fact that the major airlines are now hiring again, would-be commercial pilots who might have been working in other professions for a time have now decided to return to the commercial airline industry. As will be noted later in the study, the length of time since graduation does have a significant relationship with success in initial training and is an argument supporting Thorndike's law of exercise and law of recency. This variable and it implications will be addressed in detail later in this chapter when the relationship between educational background and performance in training is discussed.

The other variables that deserve mention are whether or not a pilot graduated from a program accredited by the Aviation Accreditation Board International (AABI), whether or not a pilot graduated from a program with the authority to certify its graduates for a restricted ATP (R-ATP) and whether or not a pilot graduated from an aviation college program. These variables deserve mention because of the crossover of data. Because AABI programs and programs with institutional authority are both considered aviation programs, some of the pilots in the latter category will also be included in one or both of the former categories. It is important to note, however, that not all aviation programs are AABI accredited or have institutional authority. In addition, while some programs are both AABI accredited and have institutional authority, not all programs with institutional authority are AABI accredited, and not all AABI programs have institutional authority. This can be somewhat confusing to understand, but the key is that the designators for aviation programs are exclusive of one another. This information will be important to note in the discussion of Research Question 3.

The remainder of the data that answers Research Question 1 will be addressed in more detail when the relationship between it and the other research questions are discussed later in this chapter.

Research Question 2: What are the training results of pilots hired at this regional carrier from January 2015 – December 2015?

The overall results show that 14.5% of pilots hired in 2015 did not successfully complete training. Because data was not collected to determine if the rate at this airline was higher or lower than in the past, it is not possible to make a statement as to whether or not this is a high or low rate of completion at this particular airline. Also, because this

airline did not technically exist in its current form prior to the first officer qualification ruling, it would not be possible to do a comparison of training completion rates from both before and after the first officer qualification ruling. It is important to note that a previous study indicated that pilots at another regional airline had a higher rate of overall training failures since the first officer qualification ruling went into effect as compared to the failure rate before the ruling (Shane, 2015), but, as mentioned, that particular comparison was not made in this study. In addition, the Pilot Source Study, which collected data on pilots prior to 2013, showed that regional airlines during the time period studied had a 96% completion rate (Smith et al., 2012). This would indicate that the 14.5% failure rate at the regional airline in this study is higher now than it has been in the past. Further details about specific training elements and their relationship to the predictor variables will be addressed during the discussions of the applicable research questions.

Research Question 3: What is the relationship between a pilot's educational background characteristics and performance results in initial training at a regional airline?

There were many significant relationships between the pilots' educational background and performance in initial training. Because of the number of significant relationships identified, this section will be broken down into three separate discussions: years since graduation, type of college program and military training.

The first area for discussion is how the number of years since a pilot has graduated from college relates to his performance in training. For the pilots in this study, the mean number of years since gradation was 10.8. The data showed a positive relationship between years since graduation and the requirement for an extra simulator and/or FTD training event as well as having an unsatisfactory proficiency check. This

means that the pilots who have more years since graduation show a strong relationship to also needing additional simulator and/or FTD training sessions as well as not successfully completing their proficiency check. In addition to this, the results show that there is a negative relationship between years since graduation and successful completion in training. This means that the pilots who have been out of college for a longer period of time show a strong relationship to not successfully completing the training program. It is important to note that all of these results only show a relationship between the independent and dependent variables and do not indicate any causation. Although further research would be needed to determine why these variables are correlated, one possible explanation is that pilots who are further removed from college are not easily able to adapt to a rigorous and structured air carrier training environment, whereas those pilots who are closer to their college days are more capable of handling such an environment. Regardless of the reasoning, this is a noteworthy set of results and one that supports the theories found in Thorndike's law of exercise and law of recency. Thorndike's theories state that a person who is actively exercising a particular skill and has practiced it more recently is more likely to remember it and perform it well than someone who is not actively exercising or practicing said skill. This is illustrated in this study with the pilots with more years since graduation. Because these pilots were not actively and recently exercising their training and learning skills, they were less likely to perform well in initial training.

The second area for discussion relates to the type of college program attended and how that relates to success in training. As noted in the discussion on Research Question 1, there is overlap between the AABI program variable, the Institutional Authority

variable and the Aviation College Program variable. When examining the result, it is evident that there is a strong relationship between having completed one of these programs and success in training. For all three programs there is a negative relationship between having completed one of the programs and both needing to retake a written examination and requiring an extra simulator and/or FTD training session. In other words, the pilots who did indeed graduate from an AABI program, a program with institutional authority or an aviation college program were less likely to have failed a written test and less likely to have required an additional simulator and/or FTD training session during training. Moreover, there was a very strong positive relationship between the pilots who did complete one of those programs and the successful completion of the training program. Again, while this analysis addressed only correlation and not causation, the evident strong relationship between the type of college aviation programs and success in training is a very good indicator that pilots who do complete a college aviation program are also likely to successfully complete an initial training program at a regional airline.

The third area of note for this research question is that the data shows a strong negative relationship between being a military pilot and requiring a retake on a written examination. This means that pilots with a military flying background were also less likely to need to retake one of the written examinations. While not part of this study, the reasoning for this might be similar to that for the relationship between years since graduation and performance in training. Military pilots are accustomed to a rigorous training and flying program and the written assessments that are part of such a program.

For that reason, they are able to adapt to a rigorous airline training program with similar types of written assessments.

In summary, the results of Research Question 3 indicate that years since graduation, type of college program and a military flying background all have significant relationships with performance in initial training at a regional airline.

Research Question 4: What is the relationship between a pilot's aeronautical experience and performance results in initial training at a regional airline?

Every variable except for one (Part 135 experience) in the area of aeronautical experience showed a significant relationship with performance in training. In order to understand the results for this particular question, the results will be discussed with a focus on the dependent variables and how the specific independent variables relate to the outcomes.

The first significant relationship for this discussion includes that between the variables relating to being a flight instructor and performance in training. The correlation analysis showed that, overall, pilots with a flight instructor certificate showed a negative relationship with the requirement for needing to retake a written examination. In simple terms, pilots who possessed a flight instructor certificate were less apt to need a written examination retake. Similarly, pilots who had given dual instruction time, which might have included both those certificated as flight instructors and those that may have given dual instruction in the military where a flight instructor certificate was not required, also showed a significant negative relationship with the need to retake a written examination in ground school.

When it comes to hours of dual instruction given, however, the results showed that more hours of flight instruction had a positive significant relationship with the need to retake a written examination in ground school. This means that, as the amount of dual instruction time increased, the need for a retake of a written examination in ground school also increased. The relationships between these three independent variables and the requirement for a written examination retake are interesting in that the results show that being a flight instructor and having given dual instruction do correlate with successful performance on written examinations but that having many hours of flight instruction time correlates negatively with successful performance on written examinations.

A further important relationship to explain here is that the amount of instructor time given correlates negatively with successful completion of training. This means that, similar to performance on the written examination, when the hours of flight instruction increase, the likelihood of successfully completing training decreases. While further research would be needed, it might appear that being an instructor and having actually given instruction is generally a good trait when it comes to performance in training but that it is possible to have given too much instruction. This might be the case because, when instructing, pilots do not get a lot of actual hands-on flying time even though they are frequently in an airplane. It is possible that many hours of instruction time might lead to degraded flying skills due to lack of practice.

This leads back to Thorndike's theories stated in his law of exercise and law of recency. Flight instructors, while they spend a lot of time watching other pilots practice their flying skills, do not actually get to fly much themselves. This means that they are

not exercising their skills as often as they should in order to maintain them. If a pilot spends a great deal of time watching other pilots fly instead of practicing flying himself, he might lose his skills to the point where it becomes too difficult to recover them to the standard needed to successfully complete a training program. As Thorndike contends, a pilot needs to actively exercise his skills in order to maintain them. If he does not, they will degrade, and he will lose them. The results of this study showing that pilots with a great deal of flight instruction time do not perform successfully in training supports Thorndike's theories.

The next area for discussion relates to the need for extra simulator and/or FTD training sessions. The results showed a negative relationship between having Part 121 experience and the need for extra training sessions. This means that pilots with Part 121 experience were less likely to require those extra training sessions than those without that experience. This might indicate that having previously worked in an airline environment is helpful when it comes to successfully handling a rigorous training program because pilots are accustomed to the type of operation and are familiar with the expectations of such an environment.

The last two variables for discussion here are total airplane multiengine time and overall total time. The results show that the amount of multiengine time correlates negatively with the need for extra simulator and/or FTD training sessions. Generally, pilots with more multiengine time are less apt to require those extra training sessions. While not tested in this study, this relationship makes sense in that pilots with more multiengine time may indeed have more airline experience in general and are used to the type of flying that is required during simulator and/or FTD training sessions. This

outcome would support Thorndike's law of exercise and will be discussed in more detail later on in this chapter.

The variable of total time, however, does not have the same relationship to training success as total airplane multiengine time. In this study, the amount of total time had a negative relationship to successful completion of the training program. This means that pilots with more total time were less likely to successfully complete training. Again, while not tested in this study, it would appear that a pilot could indeed enter initial training at a regional airline with too much total time for him to be successful. This theory would certainly require additional study.

The results for Research Question 4 show that the variables related to flight instruction, Part 121 airline experience and flight time relate both positively and negatively to performance in initial training. The results also indicate areas for further research and testing, which will be mentioned again later in this chapter.

Research Question 5: What is the relationship between a pilots recency of experience and performance results in initial training at a regional airline?

The two variables that showed a positive relationship with performance in training were total time in the preceding 12 months and total time in the preceding 3 months. The relationships between each of these two variables and successful completion in training were both positive. This means that pilots with more time in the preceding 12 and 3 month periods were also more likely to successfully complete the training program. This result is interesting in that it shows that recent flying experience is an important variable when it comes to performance in training. It is apparent that Thorndike's law of

exercise and law of recency are evident here and that recency of experience does indeed play a role in pilot performance in initial training. Because the pilots with more flight time in the preceding 3 months and 12 months were more likely to complete training than pilots with less flight time, there is a strong argument that pilots who are hired by regional airlines should demonstrate that they have been actively flying in the months leading up to employment. It is this active and recent exercising of their skills that helps these pilots to perform well in initial training.

Research Question 6: How does a pilot's educational background, aeronautical experience and recency of experience predict his success in initial training at a regional airline?

This research question utilized multiple regression analysis to see which of the independent variables were significant in predicting successful completion of training. Variables in all three groups showed significance as predictors of success in training.

The predictor variables in the educational background model accounted for 17.3% of the variance in training completions. This is a relatively high number and considered significant for this type of test. The significant predictors of success were years since graduation, highest degree, military pilot and aviation college program. These results essentially show that the amount of time that has passed since being in a college learning environment and whether or not the pilot graduated an aviation college program all play a role on whether or not he will be successful in training at a regional airline. These results would indicate that, to ensure success, a pilot should be a relatively-recent graduate of a college aviation program. How close to graduation the pilot should be is not determinable in this study, nor is how old or removed from college graduation is too old or too

removed. However, this study has shown that these are significant variables that should be examined more fully in order to get a better understanding of their role in training. This study also did not attempt to differentiate between the quality of AABI programs, programs with institutional authority and aviation programs in general. This study only showed that graduating from an aviation program, whether or not it is AABI accredited or has institutional authority, is an important indicator for success in training.

The results of the analysis of the aeronautical experience variables show that too much instructor time and too much total time had a negative effect on training performance. While it is not possible in this study to determine the definition of what constitutes too much instructor or total time, the results suggest that there may be a set number of hours that, when exceeded, could be a detriment to a pilot's ability to successfully complete training at a regional airline. Furthermore, when it comes to total time, there might also be a breakdown of what type of flying constitutes that total time (e.g. flight instruction, single-engine time, etc.) and how the ratios of each type of flying might contribute to success and or failure in initial training.

The results of the analysis of the recency of experience variables show that the total amount of flight time accrued in the preceding three months has a significant effect on performance in initial training. This is significant because it supports the theory that recency of experience plays a factor in determining whether or not a pilot is successful in training. Pilots who have not been actively flying in recent months are less likely to perform well in training, and this should be taken into account during the hiring process.

The final regression analysis performed fully exhibits the concept presented in the law of recency: years since graduation is the highest predictor of successful completion

of initial training. Pilots who have graduated from college more recently are more likely to complete training successfully than those who have graduated from college less recently, and this must be taken into account during the hiring process.

The results of this study show that there are indeed certain attributes of newly-hired pilots that have a strong relationship to their performance in initial training at a regional airline. On a general level, these results support the idea that actively-flying pilots who are relatively-recent graduates of aviation programs are likely to be successful in the regional airline training program. These results and how they relate to Thorndike's law of exercise and law of recency will be discussed in more detail in a later section of this chapter.

Limitations

The first limitation of this study was the fact that the data was collected from a single regional airline. This is a limitation because results gleaned from a single regional airline cannot necessarily be generalized to all regional airlines. In order to determine if the results would be applicable to other airlines, additional studies would need to be undertaken.

The second limitation of this study was the fact that the independent variables were gathered from employment applications where all the information was self-reported by the pilots themselves. For that reason, there is no way to verify if the data is indeed accurate and true. In addition, the dates of the job applications, while very close to the start date of the pilots' training classes, were not necessarily completely up-to-date and accurate as of the first day of training. This means that some pilots might have had

additional flying hours, instrument approaches completed and even degrees granted in the time between submitting the application and beginning training. Finally, the application itself is a standard application utilized by many regional airlines. While there are a few areas of the application that can be tailored for a specific airline's needs, most of the application cannot be altered. Moreover, because the application was utilized as the source for the background data in this study, the researcher was bound by the questions asked and information provided. This means that certain areas, such as timeframes for recency of experience, were defined by the application and, as described in Chapter Two of this study, informed by recency requirements in the federal regulations (Certification, 2015).

A final limitation of this study was that the data was collected over a single year. In order to determine if the results found are consistent over a longer period of time, more data from a longer timeframe would need to be collected and analyzed.

One last element to note is that some of the data points used in the study did fall at an extreme end of the spectrum in certain areas. While acknowledged and noticed, these points were not addressed specifically as outliers in the statistical analyses performed.

Conclusion and Recommendations

Thorndike's Law of Exercise and Law of Recency

With this study completed, there are results that show that Thorndike's law of exercise and the law of recency do play a role when it comes to performance in initial training at a regional airline. As Thorndike's theory suggests, the results do show that there is a relationship between performance in initial training and how far removed the

pilot is from formal training and education, how much experience he has in an airline environment and how much flying he is actively doing. Pilots who have recently flown and have been in a structured training environment tend to perform better in training. Likewise, pilots who are actively exercising their flying skills, have recently been employed as pilots and have experience flying in a similar type of flying operation also tend to perform better in training. However, as stated in previous chapters, it is important to note that many elements of Thorndike's theories have been discounted since they were originally formulated and other elements have evolved into newer and more reliable theories. Moreover, in the fields where the theories are still in use, the conclusions of studies can be seen as being simplified and over-generalized because they do not take into account the many changes and evolutions that have occurred since the inception of the original theories. For this reason, it is not possible nor responsible to put full support of or belief in the original theories as being accurate explanations for success in training. In short, while Thorndike's theories are a starting point, they do not give a thorough explanation for all elements related to performance in training and should not be relied upon to do so.

While this study has focused on Thorndike and his theories because they are currently accepted and utilized in the aviation industry, it is important to highlight again that educational theory has evolved and advanced in many ways since Thorndike originally presented his laws of learning. With our much better understanding of the human brain and how it works, educational theorists have been able to better determine how humans both learn new information and how they retain it. If the aviation industry wants to ensure that its pilots are as well-trained and qualified as possible, then it must

move beyond Thorndike and start to really understand current theories on learning and retention. While professors at aviation colleges may be utilizing new methods of instruction that are aligned with current educational theory in their classes, this is not enough to really ensure that our future pilots are learning and retaining information in the best possible way. Industry practitioners must also start to apply new learning methods in their training programs. With an advanced understanding of adult learning theory and a focus on scenario-based and related programs instead, the industry can and should focus more on competency-based indicators of pilot quality and qualifications and less on hours as indicators. This shift in approach offers great opportunity and potential for improvement in the way pilots are trained and qualified.

Although practitioners and researchers may be ready to take the next steps in improving their approach to training, the only real way for the industry as a whole to move forward in its approach to training is if there is a shift in the way regulatory agencies, most namely the FAA, approach training. It is the belief of this researcher that, once the FAA can understand that learning and retention go far beyond Thorndike and his theories, all of the entities that provide training, including flight schools, flight training centers and airlines, can begin to shift their approach to training as well. If all of the stakeholders can collectively shift their approaches to training so that they encompass the most current theories and methodologies, then the aviation industry as a whole will have a better educated and trained set of pilots in the cockpits of our commercial airliners. This will be beneficial to pilots, airlines and the passengers themselves. However, the key to this positive outcome will be for the aviation industry to finally move beyond Thorndike's theories.

Recommendations for Further Research

The results of this study have given an initial indication of what background variables might indicate successful completion of initial training at a regional airline. However, the results also support the idea that a great deal of further research is needed in order to get a thorough understanding of what will lead to training success.

The first recommendation for further research is in the area of college aviation programs and which ones prepare pilots best for a career as a commercial airline pilot. The results of this study show that there is a positive relationship between AABI programs, programs with institutional authority and aviation programs in general, and performance in training. The study did not discern quality among the three categories, however. A more in-depth study looking at whether or not a certain type of aviation program better prepares pilots for an aviation career would be beneficial both to industry members and potential pilots.

A second area where further research is recommended relates to flight time. As noted in the results of the study, pilots with more multiengine time required fewer extra training events in the simulator and/or FTD. However, the study results do not indicate exactly what the ideal number of hours is. In addition, the study results showed that pilots with more instructor time and total time are less likely to successfully complete training. As in the previous example, that threshold number of hours is unknown where "just right" becomes "too many." A study that could determine the ideal number of hours and even the number of hours by type (single-engine, multi-engine, instructor time, etc.) in these three categories would benefit industry members who are hiring pilots, as well as aspiring commercial pilots as they plan out their career.

A third area that requires further study is related to how many years have passed since graduating college. The study might look at whether it is indeed a pilot's age that makes completing training difficult or if it is just that he has been removed from a structured educational and training environment for so long that he has lost his ability to study, learn and perform. Perhaps it is a combination of the two. This type of study would help industry members in determining which pilot candidates to hire and might also help those who are becoming commercial airline pilots later in life make an educated decision about whether or not this is the best career for them.

A fourth area for further research is to find out why pilots are applying to regional airlines after having been out of college for an extended amount of time, as well as why they did not try to become commercial pilots earlier in their careers. This type of study would be qualitative in nature and would include interviews with pilots from various regional airlines. By having this information, airlines could get a full understanding of their workforce and its priorities and needs.

The final area for further research is related to flight training itself. As explained previously, educational theory and teaching methodologies have changed drastically since Thorndike developed his laws of learning, yet the FAA still aligns itself with those original theories. A study that focuses on teaching methodologies at various regional airlines and how those different methodologies relate to performance in training and also performance on the line would be beneficial to understanding what is working well and what could be improved. Studies of this type might be the first step in convincing the FAA that there is more to learning and retention than once believed and that it is time to move beyond Thorndike's theories.

Implications for Practitioners

The aviation industry is facing a major pilot shortage (Higgins et al., 2013), and something must be done to ensure that airlines are able to attract, train and keep qualified candidates. By having a strong understanding of what criteria will make a pilot successful in training, each stakeholder in the aviation industry can then more successfully do its part to support our future pilots. Educational institutions can work to attract more students and, hopefully, expand and improve their programs so that more students graduate with aviation degrees. Regional airlines can target pilots who possess the qualifications that will make them successful in training during the hiring process. Major airlines, because they count on the regional airlines for their pilot supply, can then play an important role by offering financial and other support to the educational institutions, the regional airlines and even the pilots themselves in order to increase the stream of qualified pilots entering the industry.

The results of this study show that Thorndike's law of exercise and law of recency do play a role in performance in initial training at a regional airline. For that reason, regional airlines should pay particularly close attention to certain hiring traits in their candidates. The first important trait is to hire pilots who graduated college relatively recently. As shown in the results of this study, pilots who are further removed from graduation are less likely to perform well in training. By choosing pilots who are not far removed from the rigorous training and educational environment of college, regional airlines can increase their chances of having pilots successfully complete training.

The second important trait that regional airlines should focus on is the completion of a college aviation program. As shown in the results, pilots who graduated an aviation

college program, including those with AABI accreditation and/or institutional authority, are more likely to be successful in training. These pilots are accustomed to high academic and training standards and will be familiar with the expectations of the training environment at a regional airline.

Regional airlines should also consider the type and amount of hours in certain categories when hiring new pilots. While being a flight instructor has shown to help pilots in certain areas during the training process, having too much time as an instructor was shown to be detrimental to a pilot's success in training. Having a higher amount of multi-engine time, however, was shown to be a predictor for success in training. It is important to note here that regional airlines have lowered their minimum hour requirement for multi-engine time to 25 hours. Because the results of this study show that pilots with more multi-engine time are more likely to be successful in training, regional airline should consider either raising their minimum hour requirement for multi-engine time or should expect to spend more training time in with those students with fewer hours of multi-engine time. Finally, the results showed that having too much total time was also a detriment to success in training. Determining the "right" amount of time in each of those areas and then targeting pilots with that amount of time will help regional airlines choose the best candidates.

The final trait is to hire pilots who have been actively and recently exercising their skills as pilots. The results of this study have shown that pilots who have flown regularly in the preceding 3 months and 12 months are more likely to perform well in training and successfully complete the training program. By choosing pilots who indicate on their application that they have been actively flying in recent months, regional airlines can

ensure that the pilots entering their training classes have been practicing their skills and are fully prepared for the challenges of training.

If regional airlines can target these four particular areas in their hiring, they can increase the chances that their new hires will successfully complete their training program. In the process, the regional airlines will not only get new pilots flying the line and producing revenue for the carrier, they will also eliminate the extra costs that are lost when a pilot is hired and does not successfully complete training. In short, if regional airlines can hire pilots that are almost guaranteed to perform well in training, they can not only have a more robust workforce and efficient operation, but they will also have a much stronger bottom line.

Conclusion

The purpose of this study was to determine how a pilot's educational background, aeronautical experience and recency of experience relate to his performance in initial training at a regional airline. As explained by the law of exercise and the law of recency, pilots who actively use their aeronautical knowledge and exercise their flying skills on a regular basis should exhibit strong performance in initial training. The results of the study showed that there is a relationship between many of the educational background variables, aeronautical experience variables and recency of experience variables, and performance in training. The specific variables that showed significant relationships in the correlation analyses included recent employment, type of college program, years since graduation, flight instructor certificate, flight instruction time, multi-engine time, total time and time within the preceding 12 months and 3 months. In addition, the multiple regression analysis showed that the predictive variables of years since

graduation, multi-engine time, total time and whether or not a pilot had military flying experience accounted for a significant percentage of the variance in training completions.

While the results of this study are only a starting point for determining the best pilot candidate, the relationships between variables that were identified as being significant do indicate the areas that might account for specific performance in initial training. This information can begin to assist regional airlines as they define their hiring criteria and aim for higher success rates in initial training. Overall, as further studies are completed and more and more information becomes available, the regional airline industry will be able to improve its hiring practices and, hopefully, will be better prepared as we all work together to tackle the challenge of the looming pilot shortage and ensure that the pilots at regional airlines are as qualified as possible.

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