Chapter 1: Introduction of the Problem

> As in all previous years, the leading cause of fatalities were continued VFR flight into instrument conditions and low-level maneuvering flight. These rather sanitary descriptions of unfortunate situations should more properly be called 'judgment failures.'
>
> Nall Report (1998)

Learning to Land: A Qualitative Examination of Pre-flight and In-flight Decision-Making Processes in Expert and Novice Aviators

Introduction

In 1983, Jensen and Chappel conducted a survey regarding errors in judgment made by general aviation pilots. Their survey was sent to one hundred fifty pilots in Columbus, Ohio. Over 1,500 errors were reported by eighty pilots. Table 1 (page 5) lists the judgment errors identified in the survey that are applicable to student pilots.

The literature related to aeronautical decision-making (ADM) is extensive. Much of this literature is frequently divided into two categories. The first category has been referred to by numerous researchers (e.g., Cannon-Bowers, Salas & Pruitt, 1996; Hammond, McClelland & Mumpower, 1980) as "classical" decision-making (CDM). CDM mandates that the decision maker proceed through a linear series of steps. Although the specific steps may vary, they typically include: identification of a problem, developing alternatives, comparing potential advantages and disadvantages of each of the alternatives, choosing a particular alternative and evaluating the degree to which the selected alternative resolved the problem. CDM is grounded in mathematical probability and logic and stresses making the "best" or "correct" choice.

A second category of ADM is based on the intuitive competencies of decision-makers and is predicated on their accumulated knowledge and experiences. In recent years the term "naturalistic" decision-making (NDM) has been used to describe this process. NDM strategies involve studies of how people actually behave in natural settings. According to Kaempf and Klein (1994) the characteristics of naturalistic domains include: time pressure, constantly changing settings, high risk, shifting goals, feedback loops, ambiguous information and cue learning (which the researchers pointed out are learned with experience).

Kaempf and Klein (1994) stated that NDM "...provides us with the means to identify, the types of decisions that people make, how they make those decisions and the cognitive skills that enable people to operate effectively in dynamic, stressful environments" (p. 224). The writers believed that NDM could be combined with traditional (CDM) models and that this composite model would assist novices in becoming more skilled and efficient decision makers.

Table 1: Judgment Errors Reported by General Aviation Pilots

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- continued flight with poor radio
- continued flight with malfunctioning alternator
- didn't stop for fuel because of 'get-homeitis' and landed with critical fuel
- lack of cross check to find precise problem
- lack of desire/ability to gain information
- flying in ill health
- omitting engine instrument scan
- failing to recognize symptoms of carburetor ice in icing conditions
- reluctance to declare emergency due to fear of being penalized
- failure to do 180 degree turn when potentially deeper trouble lies ahead
- failure to ask for help when a severe problem develops
- failure to do an emergency or unscheduled landing when necessary
- failure to follow the published or approved procedure
- lack of knowing own equipment and personal limitations
- presuming pilot was better pilot than his recent experience
- making decisions in haste
- not having alternate plan of action formulated in case of weather problems
- failure to provide margin of safety
- proper decision made too late
- interpreting information incorrectly
- failure to weigh conditions in the environment properly
- allowing the desire for instant gratification to cause poor decision
- lack of information (not getting the whole picture)
- optimistic view of a poor situation
- flight with known non-working equipment
- flying overloaded or with improper center of gravity
- continued VFR into IFR weather
- flying while fatigued or while taking medication (e.g., antihistamines)
- flight into icing conditions
- flying at wrong VFR cross-country altitudes
- trying to beat thunderstorm to airport.
- entering clouds without a clearance
- not complying with aircraft limitations
- unable to detect changing conditions that affect safe flight (weather or mechanical)
- lack of self-discipline to maintain performance at an adequate level
- inadequate area clearing procedure — head down on the instruments
- failure to use a check list

Jensen and Chappell (1983)

Existing ADM models, according to the researchers, helped pilots make better decisions, but Kaempf and Klein cautioned that current ADM models:

> "...do not directly address the cognitive processes invoked in making decisions. We believe that decision makers must possess certain cognitive skills and that these skills may be acquired, enhanced and sustained through training....We believe that to maximize the benefits of decision training we should not treat cognitive processes as a black box, but should focus directly on the cognitive skills required to make decisions. Decision training will have the highest payoff if we develop training modules designed to acquire, enhance and sustain these cognitive skills. p. 231.

Several researchers (Kaempf & Orasanu, 1997; Stokes, Kemper & Kite, 1997) indicated that the most important step involved in effective decision-making for pilots is to assess each situation based on one's experience. This would help pilots make effective decisions when time constraints are a factor and stress levels are high. These authors advocated a NDM approach to ADM that stresses one's background in aviation. This presents a problem, however, for decision makers with limited experience, such as novice pilots, who have not acquired sufficient knowledge or skills.

The preponderance of the relevant literature refers to existing ADM guidelines as "models." As with any normative models, they offer a prescriptive method to address a particular problem. Except perhaps, for the "Expert Pilot" model (see Appendix A), they do not offer extensive explanations regarding the decision-making capabilities of pilots. Perhaps a more appropriate description of these "models" would be "cognitive prompts" since they serve primarily to stimulate thought processes. To maintain continuity and avoid confusion, I used the term "models" when referring to these ADM processes.

An often-cited early decision-making model was developed by a team (Berlin, Gruber, Jensen, Holmes, Lau, Mills & O'Kane, 1982) from the Federal Aviation Administration (FAA) and labeled the "Hazardous Attitudes" model. Since then, a number of additional decision-making models have evolved. The goal of these models was to improve decision-making skills of general aviation pilots. I identified five ADM models that appeared to have the potential to be beneficial to student pilots. The five models included: (a) the "Hazardous Attitudes" decision-making model; (b) the "DECIDE" model of decision-making; (c) the "PAVE" aeronautical

decision-making model; (d) the "SDRV" decision model; and (e) the "Expertise" approach to aeronautical decision-making. These models were incorporated into the curriculum of a Private Pilot Ground School (PPGS) courses that I taught from 1999 to 2001 (See Appendix B).

It is important to note that the decision-making models previously mentioned relate to two specific types of decisions made by pilots. The decision types include those made in-flight and those made on the ground prior to flight. Several of the models, therefore, are designed to assist aviators in making a pre-flight choice that is commonly referred to as the "go/no-go" decision. The go/no-go decision involves thought processes that culminate in a decision regarding whether or not to fly. Other decision-making models are related to in-flight decision-making processes. Some of the models are applicable to both types of decisions. The qualitative differences between these two types of decisions will be explored further and comprise part of this study's research. Figure 1 lists the primary decision type (Pre-flight or In-flight) for each of the five ADM models previously cited.

Figure 1: Primary Decision Type For ADM Models

	Hazardous Attitudes	DECIDE	PAVE	SDRV	Expertise
Pre-flight	✓		✓		✓
In-flight	✓	✓		✓	✓

Background of the Problem

General Aviation (GA) includes all aviation other than the military or the airlines. GA includes recreational flying, aerial applications (crop dusting), fire fighting, traffic control and reporting, corporate aviation, charter and sight-seeing flights, aerial photography, medical evacuation flights, and flight instruction. Numerous researchers (e.g., Endres & Keller, 1992; Faulkner, 1996; Hill, 1998; Jensen, 1995; Pettitt, 1993; Smith, 1993) have written about the efforts of commuter and major airlines to improve decision-making skills of their pilots through the establishment and use of what have been termed Crew Resource Management (CRM) training programs. Other researchers (e.g., Buch & Diehl, 1984; Prince, Hartel & Salas, 1993; Salas, Prince, Bowers, Stout, Oser, & Cannon-Bowers, 1999) have written about formal training efforts by the military to improve the decision-making skills of their pilots. Both military and airline

aviators receive formal ADM related training as part of their initial and recurrent training and development.

In comparison, GA pilots typically receive little if any formal ADM training. This appears to be particularly true during their initial training as student pilots, a condition that is most probably due to the ambiguous ADM training requirements for novice GA pilots. There are, for example, no questions on the FAA Private Pilot Written Exam that are related to ADM. The FAA (2000) indicated that GA student pilots who are striving to acquire their private pilot licenses can be tested on their ADM abilities (as part of their private pilot flight test). Accordingly, the FAA (2000) stated that applicants for a private pilot license must receive training in "aeronautical decision-making and judgment." The only relevant guidelines, however, are contained in an FAA Advisory Circular 60-22 (FAA, 1991a) that emphasized *hazardous attitudes*, stress reduction and risk management. In addition, two FAA sponsored studies (FAA, 1987 a & b) underscored the importance of teaching *hazardous attitudes* and stress reduction as well as including ADM activities during routine training flights. The depth and breath of required training, however, is not specified. It is, therefore, often left to individual flight instructors and in some cases flight schools to establish what they consider to be appropriate ADM training.

The National Transportation Safety Board (NTSB, 2000) reported that the number of GA accidents has been declining. In addition, the agency reported that both the number of GA fatalities and the GA accident rate per one-hundred thousand flight hours have been declining. The NTSB data are depicted in Figure 2 (page 9).

As depicted in Figure 2, the number of GA accidents, fatal accidents, and accident rates have been declining steadily since 1982. It should be noted that according to the NTSB (2000), the 1999 data and 1998, flight hours are preliminary. In addition, flight hours for all years were estimated by the FAA. Although GA accident rates appears to be declining, the data in Figure 2 do not provide information regarding the number of accidents that are attributable to faulty decision-making. In addition, Figure 2 does not provide information regarding accidents involving student pilots.

Other sources (Jensen, 1982; NTSB, 1989) provided important supplemental information. Jensen (1982) concluded that up to 85% of GA accidents were due to pilot error. In addition, the NTSB (1989) reviewed three hundred sixty-one accidents that involved non-instrument rated

pilots flying into adverse weather. Of these GA accidents, the agency concluded that 97% were attributable to pilot or flight crew errors.

Figure 2: U.S. General Aviation Accidents, Fatalities and Rates, 1982-1999 *

Year	Accidents		Fatalities		Flight Hrs.	Accidents per 100,000 Flight Hours	
	All	Fatal	Total	Aboard		All	Fatal
1982	3,223	591	1,187	1,170	29,640,000	10.90	1.99
1983	3,077	556	1,069	1,062	28,673,000	10.73	1.94
1984	3,017	545	1,042	1,021	29,099,000	10.36	1.87
1985	2,739	498	956	945	28,322,000	9.66	1.75
1986	2,583	475	969	881	27,073,000	9.54	1.75
1987	2,495	447	838	823	26,972,000	9.25	1.65
1988	2,385	460	800	792	27,446,000	8.69	1.68
1989	2,233	431	768	765	27,920,000	7.98	1.53
1990	2,215	443	767	762	28,510,000	7.77	1.55
1991	2,175	433	786	772	27,678,000	7.85	1.56
1992	2,073	446	857	855	24,780,000	8.36	1.80
1993	2,039	398	736	732	22,796,000	8.94	1.74
1994	1,994	403	725	718	22,235,000	8.96	1.80
1995	2,053	412	734	727	24,906,000	8.23	1.64
1996	1,908	360	632	615	24,881,000	7.67	1.45
1997	1,853	353	643	637	25,464,000	7.28	1.39
1998	1,909	365	623	617	26,796,000	7.12	1.36
1999	1,908	342	628	622	27,080,000	7.05	1.26

* *Includes all categories of GA aircraft*

Many GA publications involved with providing instruction to student pilots have little information related to ADM. For example, the FAA's Airplane Flying Handbook (1999a) states in its preface that the handbook "is developed to assist student pilots learning to fly airplanes." There is, however, little information related to ADM. A total of four pages is devoted to

hazardous attitudes and a "personal minimums checklist" (see Appendix C).

An exception to this trend is Jeppeson-Sanderson's Private Pilot Manual (Willits, 2000). This manual, according to Bowman (1993), was the most often sited text (that included decision-making and judgment content) used by post-secondary educational institutions. A review of this text revealed that a significant amount of information (eighteen pages) was devoted to ADM. Subject areas explored in that section of the text included: the decision-making process, poor judgment chains, assessing risk, hazardous attitudes, effective communications, internal and external resources, workload management, prioritizing and situational awareness.

In conversations with numerous ground school instructors and after reviewing the syllabi of a variety of ground school courses, I strongly suspected that most PPGS instructors devoted little, if any, time to the topic of ADM. This appears to be most likely because the Private Pilot Written Exam includes no questions related to ADM. Most PPGS instructors, therefore, understandably devote class time to subjects that are directly related to subject matter that is included on the FAA exam. It is my contention that a PPGS offers ground school instructors a unique opportunity to provide students with a sound foundation in ADM.

Purpose of the Study

The purpose of this study is to determine the decision-making thought processes of novice and expert pilots. I accumulated data related to decision-making behavior from both novice and expert aviators in an attempt to determine the differences in their pre-flight and in-flight decision-making. I then attempted to ascertain whether an ADM training model could be developed that would be particularly beneficial to student pilots. Ultimately, this information could be used to develop ADM curriculum for instructors and flight schools to train student pilots more effectively.

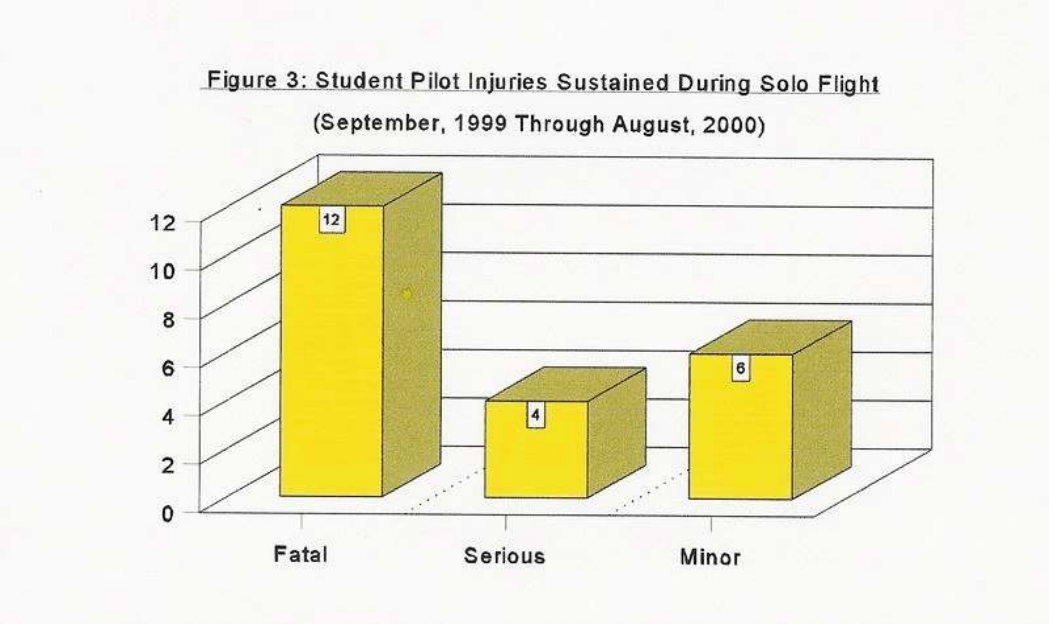
Importance of the Study

The Aircraft Owners and Pilot's Association (AOPA) has served as an advocate for American GA for the past fifty years. Each year the AOPA (1998 & 1999) publishes the *Nall* report. The *Nall* report provides statistical data related to GA accidents. A compilation of data from these reports along with data acquired from the NTSB (1999 & 2000) disclosed that the

percent of GA accidents/incidents involving flight instruction between 1996 and 1999 remained relatively constant (between thirteen and fourteen percent of the total accidents).

From September, 1999 to August, 2000 the NTSB (2000) reported a total of 1637 GA accidents/incidents involving airplanes in the United States. The researcher reviewed these GA mishaps and determined that two hundred thirty of those accidents/incidents (14%) involved flight instruction. Of those two hundred thirty, one hundred forty-three (62%) involved students receiving instruction from an on board certified flight instructor (CFI). Eighty-seven accidents/incidents (38%) involved student pilots flying as the sole occupant of the aircraft.

Of the eighty-seven accidents and incidents involving student pilots from September, 1999 to August, 2000, a total of twenty-two (25%) sustained injuries. Fifty-five percent of these injuries resulted in fatalities. Eighteen percent of the accidents resulted in serious injuries, while twenty-eight percent of the accidents resulted in minor injuries. The data are summarized below in Figure 3.



A complete list of the eighty-seven accidents and incidents involving student pilots in solo flight, along with the phase of flight in which the accident/incident occurred and the injuries sustained can be found in Appendix D.

Formal ADM ground instruction has been routinely included in the training of both military and airline pilots. I hypothesized that GA student pilots would benefit from receiving

formal ADM ground training early in their flying careers and that a PPGS offers an ideal setting for such training. Furthermore, I hypothesized that formal ADM ground training would promote more thorough decision-making processes, help students develop prudent flying habits and ultimately promote safer flying.

An emphasis on ADM, presented early in the training curriculum for student pilots, could be particularly germane to the promotion of safer flying. The "Primacy Effect" is a widely known learning phenomenon that emphasizes what is learned first is most often remembered. Numerous researchers (e.g., Chapman, Bergus & Elstein, 1996; Hogarth & Einhorn, 1992; Sokolov, Pavlova & Ehrenstein, 2000) have written about the significance and value of the primacy effect in a variety of settings. The primacy effect has important consequences for student pilots. I hypothesized that providing ADM activities and models to novice aviators early in their careers would be advantageous to student pilots and result in safer flying. If ADM is either ignored, limited in its presentation or reviewed in a haphazard manner, the credibility of such training may be undermined and student pilots will forego an important opportunity to acquire a sound foundation in ADM.

Today, student pilots have access to a variety of methods to master the subject areas necessary to pass FAA written examinations for their private pilot license. In addition to enrolling in a traditional PPGS course, students can: a. purchase commercial videotaped versions of a PPGS course; b. use commercial interactive software versions of a PPGS course; c. obtain one of the versions of the FAA's question-answer-explanation book from any one of several vendors that offers such publications and review the material independently; d. study key concepts with their flight instructors or e. use a combination of the above listed methods.

In addition to teaching subjects included on the FAA's written exam, a PPGS course can also provide student pilots with unique formal and informal opportunities to acquire ADM knowledge. Specifically, the informal interaction of the student pilots, combined with the PPGS instructor's ADM planning efforts, could provide student pilots with a variety of valuable ADM experiences.

In addition, any ADM program designed for a PPGS must consider the perspectives and inputs from student pilots. It is the students, after all, who will be the recipients of ADM training and will evaluate the value of ADM activities and lessons. Student pilots will also ultimately

decide whether or not they will incorporate such training into their subsequent flying practices and procedures.

Statement of the Problem

There is little written about ADM that is specifically directed toward GA student pilots. In attempting to address this issue, it may be useful to acquire data related to the ADM thought processes of expert and student pilots. That data could shed light on the ADM weaknesses of students and the ADM competencies of experts. The data could also suggest ADM activities that could help student pilots acquire the ADM skills of experts and enhance their willingness to accept future ADM or CRM training. In addition, these efforts could provide information that would be helpful in determining whether it is worth the time, expense and effort to develop unique ADM training curricula for student pilots. If it is deemed worthwhile, a comprehensive student pilot ADM training curricula could serve both as a foundation upon which more in-depth ADM skills could be grounded and as a safety net for novices as they acquire additional skills, knowledge and experience.

Research Question to be Answered

The research attempted to answer one question: How do the responses and thought processes of student pilots compare to those of expert pilots with regard to pre-flight and in-flight decision-making? The answer to this question was acquired through interviewing novice and expert pilot subjects about their reactions to four ADM scenarios and the subsequent analysis of the data.

Assumptions

The researcher made two assumptions upon which this study is based. First, it was assumed that the "expert" pilots are representative of seasoned pilots who have experienced a variety of in-flight and pre-flight ADM occurrences in a variety of settings. Second, the researcher assumed that the ADM scenarios selected will serve as effective surrogates for pre-flight and in-flight experiences.

Conceptual Framework

Although much of the literature related to aeronautical decision-making emanates from the discipline of psychology and psychological research, I viewed ADM primarily from the perspective of a certified flight instructor. Nevertheless, this study attempted to examine some of the cognitive processes as they relate to novice and expert pilot ADM. It should be noted, therefore, that the primary emphasis of this study was to explore the thought processes of students and expert pilots and to relate the data subsequently to teaching and learning ADM by student pilots.

Definition of Terms

For purposes of this study, *Aeronautical Decision-making (ADM)* is defined as any pertinent decision that a pilot must make with regard to a particular flight. ADM includes both pre-flight decisions (commonly referred to as the "go/no-go" decision) and in-flight decisions. The *decision* is the final stage of the judgement process.

The FAA (2000) defines an *Accident* as "...an occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight and all such persons have disembarked, and in which any person suffers death or serious injury, or in which the aircraft receives substantial damage" (p. 387).

The FAA (2000) identifies six *categories of aircraft*. The six categories include airplanes, helicopters, gyroplanes, blimps or dirigibles, balloons and ultra lights *(*This study will confine itself to student and expert pilots flying airplanes.).

Certified Flight Instructors (CFI) are those who have earned their commercial pilot's license and have passed both the written and flight tests (administered by the FAA) to become a CFI. A CFI may provide flight and ground instruction to student pilots and private pilots. In addition, CFIs may provide training to those who seek to obtain their commercial pilot's license and (after meeting additional requirements) provide training to those seeking to become CFIs. Additionally, CFIs can provide all licensed pilots with a biannual flight review that is required for pilots to maintain their flying privileges.

I agreed with Craig's (1998) definition of *Cockpit/Crew Resource Management*, (*cockpit* when referring to one pilot or *crew* when referring to more than one pilot) as a "...concept in

which the pilot or pilots work to maximize the efficiency and safety of their flight operation. The concept involves using all available sources of information that could impact a decision in flight" (p. 7).

General Aviation (GA) includes all flight activities that are not directly connected with the military or the airlines. For practical purposes, general aviation includes: flight instruction, air ambulance, aerial applications, traffic reporting, corporate aviation, aerial photography, recreational flying and charter flights.

Trollip & Jensen (1991) provided a definition of *Human Factors* that related to General Aviation. Their definition, which will be adopted for this study, stated that the term involves:

> The study of how pilot performance is influenced by such issues as the design of the cockpits, the functions of organs of the body, the effects of emotions and the interaction and communication with the other participants of the aviation community, such as other crew members and air traffic control personnel. p. 1-2.

Instrument Flight Rules (IFR) refers to adverse weather conditions that are less than VFR minimums. To fly "IFR," a pilot must acquire an "Instrument" rating and must fly an aircraft that has IFR capabilities as specified by the FAA.

Incidents, according to the FAA (2000), are defined as "...occurrences other than an accident, associated with the operation of an aircraft which affects or could affect the safety of operations" (p. 387). For practical purposes incidents involve events that are minor in nature and involve no significant injuries to the pilot or passengers or damage to aircraft.

Much of the literature uses the terms *judgement* and *decision-making* synonymously. For purposes of this study, the researcher will adopt a definition supplied by Jensen (1982). Jensen stated that cognitive *Judgement* as it pertains to flying aircraft can be thought of as:

> (1)The ability to search for and establish the relevance of all available information regarding a situation, to specify alternative courses of action, and to determine expected outcomes from each alternative.
>
> (2) The motivation to choose and authoritatively execute a suitable course of action within the time frame permitted by the situation, where: (a) 'Suitable' is an alternative consistent with societal norms and (b) 'Action' includes no action, some action or action to seek more information. p. 64.

A *Part 61 flight school* adheres to requirements specified in Part 61 of the Federal Aviation Regulations and is not required to adhere to strict guidelines and requirements developed by the FAA for designation as a Part 141 flight school.

Part 141 flight schools are required to adhere to specific guidelines and procedures as described in Part 141 of the FAA Rules and Regulations. Generally, these rules require extensive record keeping and the development of a detailed curriculum for each phase and type of training.

A *private pilot* must be at least seventeen years old. A private pilot candidate must also be able to read, speak, write and understand the English language and pass a third class medical examination. In addition, applicants must pass an FAA written examination and a flight test administered by the FAA. A private pilot may fly either solo (as sole occupant of the aircraft) or with passengers.

The purpose of a *Private Pilot Ground School (PPGS)* is to prepare student pilots to take the FAA written examination. Most PPGSs are taught at local airports in conjunction with flight training programs. They are also taught at colleges that offer aviation related programs. In addition, it should be noted that enrollment in a PPGS is not required for one to take a Private Pilot written examination. Completion of a home-study course or simply a statement by any flight instructor that a student has received appropriate training and is prepared to take the Private Pilot written examination is the only requirement (FAA, 2000).

To be licensed as a *recreational pilot*, one must pass a written examination, a flight test and a third class physical examination. The flight privileges of a recreational pilot, however, are limited. None of the student pilots in the PPGS taught by the researcher are aspiring to become recreational pilots.

The FAA (2000) states that to be eligible for a *student pilot* certificate one must be at least sixteen years of age, be able to read, speak, write and understand the English language and pass a third class medical examination (provided by a designated aviation medical examiner). For practical purposes *student pilots* include novice aviators who are training to become private pilots. In this study the terms *novice* and *student* will be used synonymously.

Visual Flight Rules (VFR) refers to generally favorable weather conditions (typically, a minimum of three miles visibility and clear of clouds). Student pilots are only permitted to fly solo in VFR weather conditions.

Scope and Delimitations of the Study

The focus of this study will be based on student pilots who are part of a PPGS course offered by Congressional Air Charters (CAC) and taught by the researcher. CAC has been in business at Montgomery County Airpark, Gaithersburg, MD for the past fifteen years. CAC's business involves charter flight operations, aircraft brokering, aircraft maintenance and flight instruction.

The PPGS course was designed by the researcher as part of his graduate studies at Virginia Tech University. It is an up-dated version of a course I had previously taught at Montgomery College, located in Germantown, Maryland. The course consisted of fifteen two and a half hour classes. The classes meet once a week. The PPGS was offered twice a year. A fall PPGS course was offered from August through December, while a spring PPGS course is offered from January through May. The course reviews all of the topics identified by the FAA (2000) as specified knowledge areas required of those who aspire to become private pilots. The subject areas specified by the FAA are listed in Table 2.

In addition to the identified topics in Table 2, the CAC PPGS course includes ADM activities. Each of the fifteen lesson includes an ADM component. A complete list of both the subject areas and ADM components are listed in Appendix B.

Table 2: Subject Areas Included on the Private Pilot Written Exam

1. Aerodynamics
2. Weight and Balance
3. Aircraft Performance
4. Aircraft Instruments and Systems
5. Weather Theory
6. Weather Reports and Forecasts
7. Basic Navigation
8. Radio Navigation
9. F.A.A. Rules and Regulations
10. Medical Aspects of Flight
11. Communications and Air Traffic Control
12. Airspace
13. Airports and Runway Markings

The student pilots enrolled in CAC's PPGS course all reside in the Washington, DC metropolitan area. The subjects were all currently taking flying lessons at Montgomery County Airpark. All of the student pilots were not, however, taking flying lessons at CAC. Some of the student pilots were taking flight lessons either at Montgomery Aviation (also located at

Montgomery County Airpark) or through flying clubs that operate from Montgomery County Airpark.

The PPGS course offered at CAC during the Spring, 2001 session consisted of nine student pilots. Eight of the student pilots were male and one was female. Two of the students had recently begun taking flying lessons and were not included in the study due to their inexperience. One juvenile was also not included. One of the student pilots had his private pilot license but had not flown in over twenty years. That pilot stated that he was using the PPGS as a refresher course prior to beginning his flight training. Five of the remaining students indicated that they were interested in becoming involved in the study. Four of those students were selected as novice subjects.

Outline of the Remainder of the Study

Chapter Two of this study involved a literature review that examined the major works related to the topic. Specifically, the literature review examined three categories of information. These categories included information related to the following topics: a. decision-making and judgement theory; b. expert-novice judgement differences and c. ADM studies.

Chapter Three examined the methods used to conduct the study. The chapter concerned itself with specific topics that were examined and the development of a research design. In addition, Chapter Three discussed the selection of subjects and the methods used to acquire data.

Chapter Four explored the findings of the study. The chapter examined the data acquired during interviews of student and expert pilot subjects. An analysis of the data was followed by a discussion of the findings.

Chapter Five concludes the study. The chapter stated and summarized the major findings based on data acquired from the subjects. The chapter also related the findings to the literature and identified lessons from the data. In addition, Chapter Five explored areas in need of further research. Finally, Chapter Five provided a general conclusion regarding the results of the study, potential applications of the findings and recommendations.