I.F. EFFECTIVE TEACHING (RISK MANAGEMENT & ACCIDENT PREVENTION)

OBJECTIVE & COMPLETION STANDARDS

The learner develops knowledge of risk mitigation & managements and its application to effective teaching per the Instructor ACS.

The learner can not only recognize potentially hazardous situations and effectively mitigate risk but can teach practical risk management.

KEY POINTS

- Accept no Unnecessary Risk
- PAVE Checklist
- IMSAFE

ELEMENTS

1. Principles of Risk Management
2. Risk Management Process
3. Risk Management Tools
4. Teaching Risk Management
5. Obstacles to Maintaining SA
6. ADM, CRM, & SRM

REFERENCES

- Aviation Instructor's Handbook – Chapter 10
- Risk Management Handbook

SCHEDULE

- Introduction
- Development
- Conclusion

EQUIPMENT

- White board
- Markers
- References

INSTRUCTOR

- Present Content
- Ask/Answer Questions
- Assign Homework

STUDENT

- Participate in learning
- Take notes
- Ask/Answer Questions

LEGEND & ABBREVIATIONS

SECTION HEADER FOR EACH LESSON ELEMENT

*Light blue for **Main points and/or brief section summary***

- **Orange** text is used for mnemonics or things to remember
- **RM**: Teal RM denotes an ACS Risk Management concept
- **CE**: Red CE shows an Airplane Flying Handbook listed Common Error

IA: Instructor Action (ex. hop out of the lesson & review a checklist) – Coming soon!

Light gray for notes, examples, extra details & explanations, etc.

INTRODUCTION

ATTENTION

Interesting fact or attention-grabbing story

We're pilots, we like the rush of flight and managing the sense of danger. All flights involve risk; don't let the risk and danger get out of control.

OVERVIEW

Review Objectives, Elements, and Key Points

WHAT

A decision-making process designed to systematically perceive hazards, assess the degree of risk associated with a hazard, and determine the best course of action.

Beyond understanding these principles, this lesson discusses effective techniques for teaching risk management.

WHY

Flying is inherently dangerous, but there are ways to keep the danger to a minimum.

Risk management skills are foundational to every flight, providing the pilot the ability to recognize and mitigate the dangers specific to each flight, and make logical decisions that support safety.

Every single Knowledge & Risk Management task is annotated! Find whatever info you need.

HOW

1. PRINCIPLES OF RISK MANAGEMENT

The goal of risk management is to proactively identify safety-related hazards and mitigate the risks

A. Accept no Unnecessary Risk – Only accept necessary risk

i. Flying is inherently risky, do not make a situation more dangerous than necessary

B. Make Risk Decisions at the Appropriate Level

i. In single pilot situations, the pilot makes decisions (not ATC, or passengers)

ii. In other situations, it may be beneficial to "go up the ladder" for a decision (CFI, Chief Pilot, etc.)

C. Accept Risk When Benefits Outweigh the Costs

i. Analyze costs and benefits, make an informed decision

D. Integrate Risk Management into Planning at *ALL* Levels

i. Safety requires risk management planning in *all* stages of flight

2. RISK MANAGEMENT PROCESS

FI.I.F.K1

A. Step 1: Identify the Hazard

i. Hazards can cause degradation, injury, illness, death, damage to or loss of equipment / property

B. Step 2: Assess the Risk

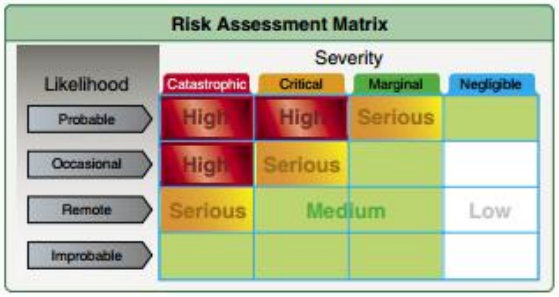
i. Determine the level of risk associated with the identified hazards

ii. Measured in terms of

- **Likelihood**, or probability, a hazard will cause a loss
- **Severity**, or the extent of the possible loss

iii. Develop a method to tangibly measure risk

- Risk Assessment Matrix (pictured)
- Likelihood (probability of occurrence): Probable, Occasional, Remote, Improbable
- Severity: Catastrophic, Critical, Marginal, Negligible



C. Step 3: Mitigate the Risk

i. Look for ways to reduce, mitigate, or eliminate risk

ii. All risks have 2 components (Likelihood/Severity) – Try to reduce or eliminate at least one of them

iii. Use a Cost/Benefit analysis to decide if it is worth accepting the risk

iv. Delay or cancel the flight, change the route / destination, bring a CFI or more experienced pilot, etc.

3. RISK MANAGEMENT TOOLS FI.I.F.K2

A. PAVE Checklist FI.I.F.K2a

A tool to assess & manage risk: Risk is divided into 4 categories – Assess the situation by category and decide whether the risks can be managed safely. If not, cancel the flight

i. **P**ilot in Command: Am I ready? (IMSAFE Checklist, proficiency, recency, currency, etc.)

ii. **A**ircraft: Is the aircraft appropriate for the trip?

- Maintenance, Landing Distance, Performance Capabilities, Equipment, Fuel load, Altitude, etc.

iii. En**V**ironment: Weather, Terrain, Airports, Airspace, Day/Night, etc.

iv. **E**xternal Pressures: Influences outside of the flight that create pressure to complete the flight

- This is the one risk factor that can cause a pilot to ignore all other risk factors
- Follow your own personal operating procedures (don't bend the rules for anyone)

B. 5P Checklist

Used to evaluate the situation at key points during the flight, or when an emergency arises - Based on the idea that the pilot has 5 variables that impact the environment and lead to a decision

i. Procedure

- At least 5 times, review the 5 P's and make a decision based on the current situation
- Preflight – Pre-takeoff – Hourly or Midpoint of flight – Pre-descent – FAF or entering the pattern
- Very helpful part of Single Pilot Resource Management (SRM)

ii. 5 P's:

- **Plan** - The mission. It contains planning, weather, route, fuel, publication currency, etc.
  - Always changing, adjust with it
- **Plane** - Condition, abilities (performance, automation, etc.), equipment, systems, etc.
- **Pilot** - IMSAFE
- **Passengers** - Passenger's desires can have an influence on decision making and risk management
  - Ensure passengers understand the risk and are involved in decision making process
  - Understand what passengers want to do (they may be more risk averse than you)
- **Programming** - Plan when and where programming should (and should not) be accomplished

C. Flight Risk Assessment Tools (FRAT) FI.I.F.K2b

Formal process to remove personal desires & emotion from decision making (numerous FRATs available)

i. Enables proactive hazard identification, is easy to use, and visually depicts risk

ii. Determine an acceptable level of risk for flight based on type of operation, environment, aircraft, etc.

- Create realistic numerical thresholds (min 3) that trigger additional levels of scrutiny, for example:
  - Green (medium): Good to fly, mitigate risk as able
  - Yellow (serious): Some risk needs to be reduced before departure
  - Red (high): Do not fly until risk is reduced/mitigated
- Hazards are scored based on severity
- When risk exceeds the acceptable level, reevaluate hazards and reduce risk or don't fly

iii. National Business Aviation Association (NBAA) Flight Risk Assessment Tool

D. IMSAFE Checklist (can be incorporated into the Pilot portion of the PAVE checklist & the 5 Ps)

i. Mitigate risk by determining your own physical and mental readiness for flight

- **Illness** – Symptoms?
- **Medication** – Taking any?
- **Stress** – Family, money, relationships, work, etc.
- **Alcohol** – Been drinking?
- **Fatigue** – Well rested?
- **Emotion** – Emotionally upset?

4. TEACHING RISK MANAGEMENT (RM)

A. When & How FI.I.F.K3

i. **Most beneficial if RM is taught first (lesson 1) and then integrated into all training going forward**

ii. Should be included in all preflight and postflight briefings

iii. Include in recurrent, transition, flight reviews, IPCs, etc.

B. Teaching Techniques by Phase of Instruction FI.I.F.K4

i. **Private Pilot**

- Pre-Solo
  - Part of every preflight & postflight brief
  - Introduce a non-numerical FRAT – Learner should conduct basic RM analysis by solo
- Post-Solo to XC
  - Perform risk analysis of planned flight with some help from instructor
  - Instructor reviews RM prior to solo, and learner debriefs instructor on RM aspects of the flight
- XC
  - Learner masters RM techniques
  - Learner completes a full risk analysis for every flight and reviews it with instructor

ii. **Instrument**
- Emphasize broad RM techniques to analyze/evaluate complex weather & other elements

iii. **Transition**
- Employ scenarios emphasizing RM & SRM aspects of the new plane

iv. **Recurrent, Flight Reviews, IPCs**
- Use RM scenarios that mirror the pilot's typical operating profile

v. **Operational Flights**
- Encourage operational pilots to practice RM on all their flights
  - **GOAL**: To provide guidance allowing pilots to **think of RM intuitively as part of *every* flight**
- Scale RM procedures to match the complexity of the flight

vi. **Professional Pilots**
- Most professional pilots encounter RM and more (TEM, CRM, etc.) training at their jobs
- Emphasize RM factors specific to this training, outside of their job

C. RM: Managing Risk during Flight Instruction FI.I.F.K5, FI.I.F.R1

Same RM techniques as taught to learners apply to the instructor (maintain SA)

i. **Common Risks** FI.I.F.K5a
- Identify risks using the PAVE acronym (Pilot, Aircraft, Environment, External Pressures)
  - Generic examples below
- **P**ilot (includes learner & instructor pilot)
  - Qualification (experience, currency, proficiency, etc.) & aeromedical risks
  - Flight Risks: Be prepared for the learner to make mistakes
    - Mitigation: Proactive planning based on conditions, providing time & space to allow the learner to practice and allow the instructor to takeover if necessary
- **A**ircraft: Maintenance & payload/performance requirements based on the flight
- En**V**ironmental
  - Collision Hazards: Crowded airspace, restricted visibility due to haze, pollution, other factors
  - Complex airspace
- **E**xternal

- Scheduling problems, which can be aggravated by aircraft problems, weather, etc.
- Learners are subject to work, family, finances, and other issues

ii. **Best Practices** (specific mitigations for the hazards & risks discussed) FI.I.F.K5b
Specific mitigations for the hazards & risks discussed in this lesson
Follow RM procedures discussed in the lesson and always include the learner in RM

- **Pilot**: Be familiar with aircraft & avionics before instructing, IMSAFE, etc.
- **Aircraft**: Determine airworthiness, resolve any concerns (include the learner in the process)
- **EnVironment**: Emphasize precise risk assessment & mitigation with learner (terrain, weather, etc.)
- **External**: Be conscious of learner's limitations, concerns & other factors that affect performance

iii. **Takeoff & Landing Considerations** FI.I.F.K5c

- Takeoff
  - Majority of teaching should be done prior to contacting tower/advising CTAF of takeoff
  - Imperative that the instructor creates realistic training scenarios
- Landing
  - Don't teach landings mechanically
  - Teach when the learner can listen and absorb
  - Certain landings present unique risks (short/soft-fields, emergency, etc.), be aware and ready

5. RM: OBSTACLES TO MAINTAINING SA FI.I.F.R2

A. Distraction

i. Minor problem can result in neglecting proper control of the aircraft
ii. Divide attention – flying always comes first

B. Fatigue

i. Two major phenomena: Sleep loss & circadian rhythm disruption
ii. Fatigue is a normal response to many flight operation conditions (noise, vibration, low pressure)
iii. The only effective treatment is sleep

C. Complacency

i. Overconfidence from repeated experience
ii. Reduces effectiveness in the flight deck
iii. Difficult to recognize

- Be especially alert to complacency in learners with significant experience
- Advanced avionics can promote complacency and inattention

iv. Exercises to recognize complacency and situational awareness

- Ask about positions of other aircraft, instrument indications, and location in relation to references
- Focus the learner's attention on an imaginary problem
  - Point out that SA is not maintained if the learner diverts too much attention from other tasks

6. ADM, CRM, & SRM FI.I.F.K6

A. Aeronautical Decision Making (ADM)

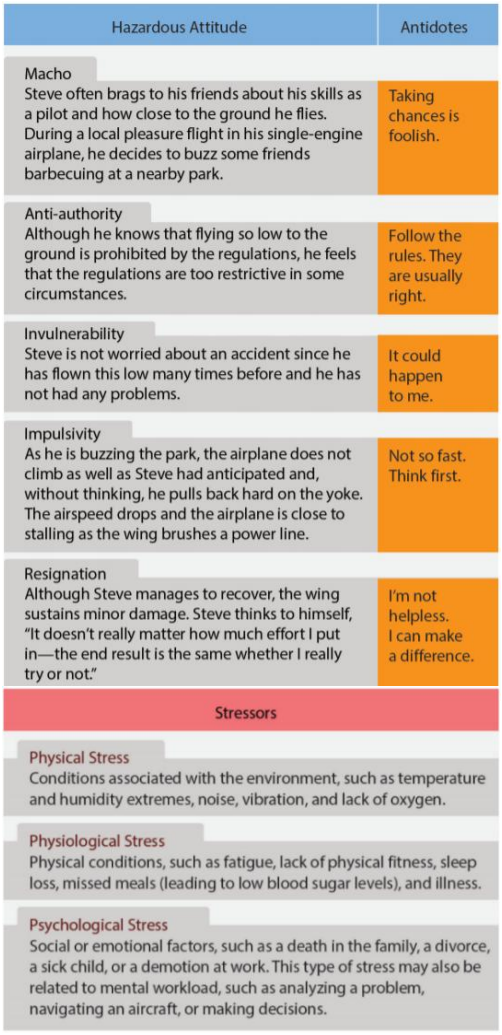
i. Systematic approach to the mental process used to determine the best course of action
- It is estimated that approximately **80% of all aviation accidents are a result of human factors**

ii. **Decision Making Process**
- **Define the Problem**
  - Recognize a change has occurred or an expected change did not occur
  - Critical error: Incorrectly defining the problem
- **Choose a Course of Action**
  - Evaluate the need to react, determine actions to resolve the situation in the time available
  - Consider the expected outcome of each action and associated risks
- **Implement the Decision** and **Evaluate the Outcome**
  - Is it having the desired effect(s)?

B. Factors Affecting Decision Making

i. RM: Hazardous Attitudes (pictured, right) FI.I.F.R3
- Attitude affects the quality of decisions
- Must spot hazardous attitudes & remove them

ii. Stress Management
- A certain amount of stress is normal/good
- Too much can be very bad – stress is cumulative
- 3 types of stress that affect performance
  - **Physical**: Associated with the environment (temperature, noise, vibration, lack of oxygen)
  - **Physiological**: Physical conditions (fatigue, lack of physical fitness, missed meals)
  - **Psychological**: Social or emotional factors (divorce, death in the family, sick child)
- Recognize when stress is affecting a learner
  - Distracted or has a difficult time accomplishing tasks
  - Try to determine the cause (doesn't have to be specific, could be a private matter)
  - Have them self-assess then set realistic goals - Delay training, if necessary
  - Put the learner and their progress first



Hazardous Attitude	Antidotes
Macho Steve often brags to his friends about his skills as a pilot and how close to the ground he flies. During a local pleasure flight in his single-engine airplane, he decides to buzz some friends barbecuing at a nearby park.	Taking chances is foolish.
Anti-authority Although he knows that flying so low to the ground is prohibited by the regulations, he feels that the regulations are too restrictive in some circumstances.	Follow the rules. They are usually right.
Invulnerability Steve is not worried about an accident since he has flown this low many times before and he has not had any problems.	It could happen to me.
Impulsivity As he is buzzing the park, the airplane does not climb as well as Steve had anticipated and, without thinking, he pulls back hard on the yoke. The airspeed drops and the airplane is close to stalling as the wing brushes a power line.	Not so fast. Think first.
Resignation Although Steve manages to recover, the wing sustains minor damage. Steve thinks to himself, "It doesn't really matter how much effort I put in—the end result is the same whether I really try or not."	I'm not helpless. I can make a difference.

C. Single Pilot Resource Management (SRM)/Crew Resource Management (CRM)

i. What is it?
- Methods to gather information, analyze it, & make decisions

- Includes all groups working with the flight crew involved in decisions to operate a flight safely

ii. Use of Resources
- Use all available resources (think outside the box)
- Internal Resources
  - Equipment, systems, charts, books, ingenuity, knowledge, skill, other passengers
- External Resources
  - ATC, flight service specialists, guard, etc.
- Workload Management
  - Plan, prioritize, and sequence to prevent overload
  - Prepare for high workload situations
  - Be able to recognize high workloads

iii. 5 P's Check (in addition to other RM Tools), as discussed, is a very helpful to SRM

Conclusion: Brief review of the main points