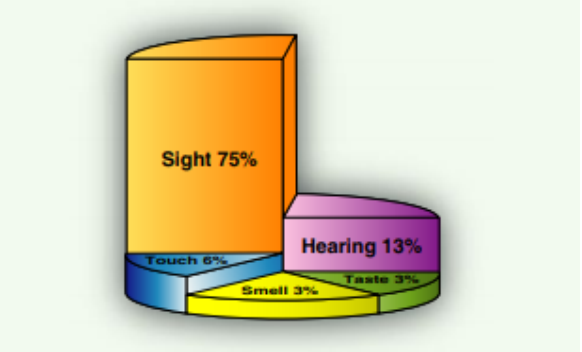
The Learning Process

Objective	
To ensure the applicant learns the elements of the learning process and can exhibit a clear understanding of the factors which affect learning.	
Purpose	
Flight Instructors are continuously engaged in the learning process, whether or not they consciously realize it. The elements of the learning process affect all flight instruction activities and learning about these elements can help aspiring instructors to provide better, more effective instruction.	

Schedule	**Equipment**
• **Ground Lesson**: 15 minutes • **Student Q&A**: 10 minutes	• Whiteboard / Markers (optional)
Student Actions	**Instructor Actions**
• Ask any questions, receive study material for the next lesson. • Watch linked video. • Review listed references.	• Deliver the ground lesson (below). • Answer student questions.

Completion Standards

- Student can explain the following concepts:
  - Definition of Learning, Two Types of Learning Theory, Perceptions vs. Insight
  - The Laws of Learning, Domains of Learning
  - Levels of Learning
  - Stages of Acquiring Skill Knowledge, Types of Practice, Scenario-Based Training
  - Evaluation vs Critique - When to use each
  - How to deal with Fixation and Inattention
  - Errors
  - Memory and Forgetting, Retention of Learning
  - Transfer of Learning, Positive vs. Negative Transfer
  - Difficulties with Learning

References

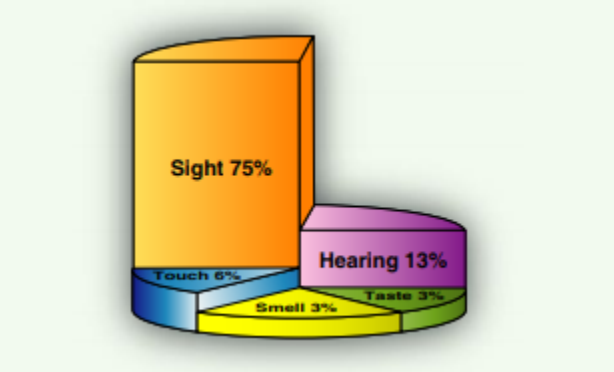
- FLY8MA.com Flight Training - “CFI ORAL EXAM: Part 1 | FOI”
    - YouTube - https://www.youtube.com/watch?v=4IxiQeh0FFI
- FAA-H-8083-9B (Aviation Instructor’s Handbook) - Chapter 3 [The Learning Process]
- FAA-S-ACS-25 (CFI ACS) - Area I Task B
- FAA-S-8081-9D (CFII PTS) - Area I Task A

Ground Lesson Outline

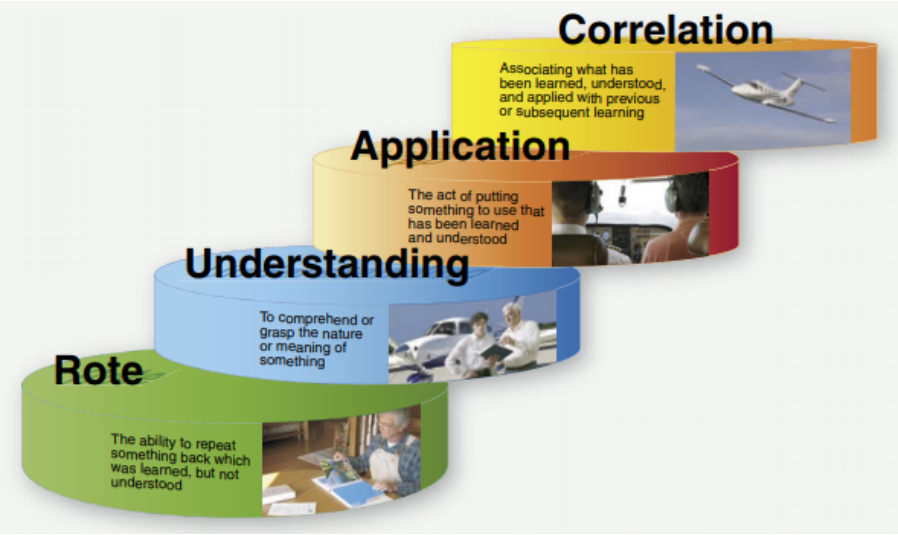
- Learning Theory - definitions of Learning
    - Behaviorism, Cognitive Theory
- Perceptions and Insight
    - Perceptions, Factors that affect Perceptions
    - Insights - Perceptions grouped into meaningful wholes
- Acquiring Knowledge
    - Memorization, Understanding, Application
- The Laws of Learning
    - Readiness, Effect, Exercise, Primacy, Intensity, Recency
- Domains of Learning - Cognitive, Affective, Psychomotor
- Characteristics of Learning
    - Purposeful, Result of Experience, Multifaceted, Active Process
    - Learning Styles - Left Brain/Right Brain, Holistic/Serialist, Visual/Auditory/Kinesthetic
- Acquiring Skill Knowledge
    - Stages - Cognitive, Associative, Automatic Response
    - Depends on practice, learning plateaus
- Types of Practice
    - Deliberate - Focus on a skill, provide feedback
    - Blocked - Practice until skill is automatic, poor for long term
    - Random - Practice a variety of skills
- Scenario-Based Training
    - Good Scenario - Clear Set of Objectives, Tailored to Student, Uses Local Environment Effectively
    - Use of realistic distractions
- Evaluation vs Critique
- Distractions, interruptions, fixation, and inattention
- Errors
    - Slips vs Mistakes - Slips are errors of execution, Mistakes are errors of planning
    - Reducing Errors - Learning and Practicing, Taking Time, Checking for Errors, Reminders, Routines, Raising Awareness
- Memory and Forgetting
    - 3 Types of Memory - Sensory (Precoding), Short-Term (30s, Coding, Recoding), Long-Term
    - Retrieval - Frequency, Recency of Use
    - Forgetting - Retrieval Failure, Fading, Interference, Repression/Suppression
- Retention of Learning
    - Usually not lost, just unavailable for recall
    - Aids to Retention
        - Praise, Association, Favorable Attitudes, Learning With All Senses, Meaningful Repetition, Mnemonics
- Transfer of Learning
    - Use knowledge from one context to another
    - Positive vs Negative Transfer
        - Ex: Negative transfer is driving a car w/ steering wheel vs. How to taxi an airplane
- Difficulties with Learning - Inadequate or incomplete instruction, lack of learner motivation

Ground Lesson Content

- **What is Learning?** - A change in behavior of the learner as the result of experience. The behavior can be physical and overt, or it can be intellectual or attitudinal. Alternatively, Learning is the process by which experience brings about a relatively permanent change in behavior.
- **Learning Theory**
  - **Behaviorism** - “Carrot vs. Stick”, Idea that behaviors are driven from past rewards and punishments, i.e. Pavlov’s dog
  - **Cognitive Theory** - Idea that learning is change to the mind of the learner, actively constructed by the learner over time
- **Perceptions and Insight**
  - **Perceptions** - Basis of all learning



    - **Factors that affect Perceptions**
      - **Physical Organism** - 5 Senses
      - **Goals and Values** - How important is the learning?
      - **Time and Opportunity** - Is there ample time and opportunity to learn?
      - **Self-Concept** - Need favorable self-esteem
      - **Element of Threat** - Not effective
  - **Insights**
    - Perceptions grouped into meaningful wholes
- **Acquiring Knowledge**

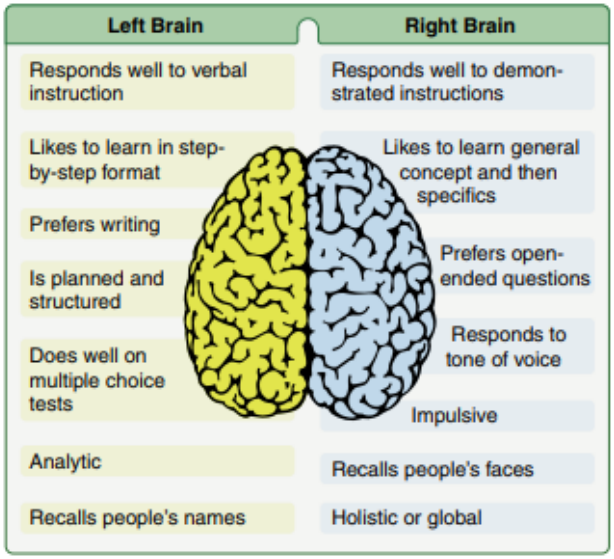


- **Memorization** - Rote learning, can recite definitions, etc.
- **Understanding** - Understanding the details, can reason about the subject, etc.
- **Application** - Can apply the knowledge to real world situations

- **The Laws of Learning**
  - **Readiness** - Students must be ready to learn (i.e. needs met, properly motivated, etc)
  - **Effect** - Success or satisfying feelings promote learning, failure or disappointment hinders it.
  - **Exercise** - Students learn more when the items to be learned are exercised.
  - **Primacy** - The first item to be learned tends to be retained even if it is incorrect, and is hard to dislodge.
  - **Intensity** - More intense experiences lead to more learning, i.e. learning an an airplane observing a maneuver versus watching a lecture on it. Learning with more senses.
  - **Recency** - Things learned most recently tend to be retained.
- **Domains of Learning**

Cognitive	Affective	Psychomotor
Knowledge	Attitude	Skills
Recall information	Awareness	Observation
Understanding	Respond	Imitation
Application	Valuing	Practice
Analyze	Organization	Habit
Synthesize	Integration	
Evaluate		

  - **Cognitive** - Knowledge, critical thinking
  - **Affective** - Belief, Values, Emotions
  - **Psychomotor** - Associated with skills
- **Characteristics of Learning**
  - **Purposeful** - Learning must be pursued deliberately
  - **Result of Experience** - Experience gives perceptions which lead to insights, and practice. Students must experience things directly.
  - **Multifaceted** - Learning simultaneously involves the verbal, conceptual, effectual, etc.
  - **Active Process** - Students must actively participate in learning, reacting and responding.
  - **Differing Styles**
    - Students may have different styles - Right Brain/Left Brain, Holistic/Serialist



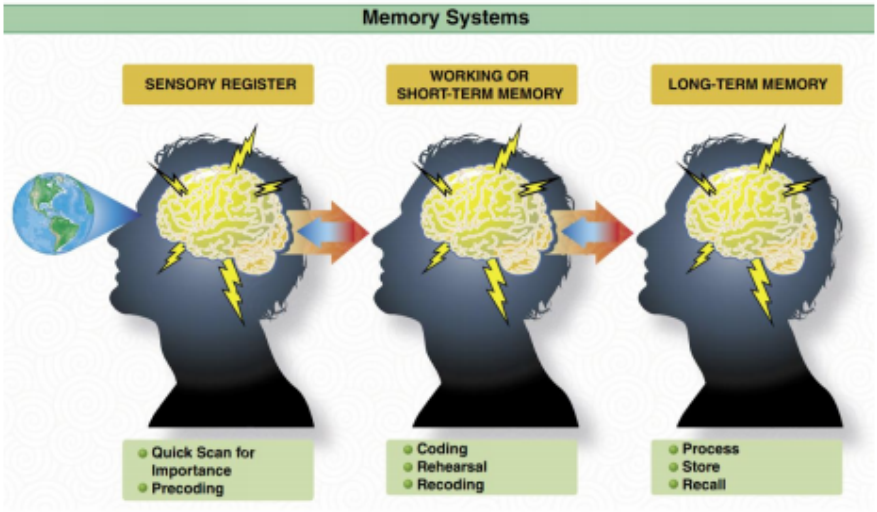
Learning Style	Traits
Active	Tends to retain and understand information by doing something with it
Reflective	Prefers to think about information quietly
Sensing	Likes learning facts
Intuitive	Prefers discovering possibilities and relationships
Visual	Remembers best what is seen
Verbal	Learns more from words–written and spoken explanations
Sequential	Learns best with step-by-step explanations
Global	Tends to learn in large jumps

    - Visual, Auditory, Kinesthetic

Learning Style	Traits	Teaching Tips
Visual	Seeing, reading	Use graphs, charts,videos.
Auditory	Hearing, speaking	Have learner verbalize questions.
Kinesthetic	Touching, doing	Use demonstrations of skills.

- **Acquiring Skill Knowledge**
  - Stages
    - **Cognitive** - Student knows how to perform the skill
    - **Associative** - Student can perform the skill with deliberate attention and correct errors
    - **Automatic Response** - Student can perform the skill without deliberate attention, allows for multitasking
  - Skill learning comes from practice
  - Learning plateaus will occur and the learning of a skill may need to be given a break
- **Types of Practice**
  - **Deliberate** - Focus on a skill, provide feedback
  - **Blocked** - Practice until skill is automatic, poor for long term
  - **Random** - Practice a variety of skills
- **Scenario-Based Training**
  - **Elements of a Good Scenario**
    - **Clear Set of Objectives** - Training objectives are stated clearly
    - **Tailored to Student** - Tailored to individual students strengths and weaknesses
    - **Uses Local Environment Effectively** - Takes advantage of unique or challenging aspects of the local airport, airplane, environment, etc. For example, training in Florida involves decision making regarding convective weather, etc.
  - **Use of Distractions** - Student pilots should be evaluated by the instructor creating deliberate distractions
    - **Ensure Ability to Multitask** - Ensures that the student can divide attention between flying and other tasks
    - **Examples**
      - Drop a pencil, Ask for a heading to an airport, Ask student to identify ground objects, etc.
- **Evaluation vs Critique** - In the initial stages of learning a skill, students will benefit more from practical suggestions than a grade. They are, after all, still developing the cognitive and motor skills necessary to perform the training task.
  - During early stages of learning, evaluation is geared towards the instructor–"Am I getting through? Are my techniques working?"
  - During later stages of training, it is important that students perform their tasks correctly, and therefore grades, as well as constructive criticism, are more appropriate.
- **Distractions** - A distraction is an unexpected event that causes the student's attention to be momentarily diverted. They must decide whether to pay attention to each distraction.
- **Interruptions** - An interruption is an unexpected event where the student voluntarily suspends performance of one task in order to complete a different one. These can be a significant source of errors, and students must be aware of this.
  - E.g. The student is performing a Before Landing checklist when an ATC instruction is received. When replying to the ATC instruction, the student may forget about, or inadvertently skip, checklist items.

- **Fixation** - When a student is totally absorbed with one task at the exclusion of all other priorities. This can often happen when trying to tune a radio, look up a frequency, etc, while the aircraft control is sacrificed.
- **Inattention** - When a student fails to pay attention to an important task. This can happen when students forget to scan their engine instruments, or neglect to pick up the ATIS when approaching a towered airfield. This can also result from fixation.
- **Dealing with Fixation and Inattention** - It is crucial for instructors to *pay attention to where the student's eyes are looking*. In general, this is good advice for instructors, as it will often tell the instructor whether the student is fixated, frustrated, stressed, or otherwise having difficulties.
- **Errors**
    - **Slips vs Mistakes**
        - **Slips** are errors of execution
        - **Mistakes** are errors of planning
    - **Reducing Errors**
        - **Learning and Practicing** - Frequent practice reduces errors
        - **Taking Time** - Taking time and working deliberately reduces errors
        - **Checking for Errors** - Checklists work
        - **Reminders** - Writing reminders, setting timers, etc.
        - **Routines** - Routines become habits and can prevent items from being missed.
        - **Raising Awareness** - Calling attention to possible areas for errors reduces errors.
- **Memory and Forgetting**
    - **3 Types of Memory**



        - **Sensory** - First filter, quick scan for importance, sends to short-term memory
            - **Precoding** - Sensory register is primed to react to certain things
        - **Short-Term** - Memory for immediate use, some data sent to long-term memory. Roughly 30 seconds only.
            - **Coding** - Grouping into chunks for storage
            - **Recoding** - Adjusting to match previous experiences
        - **Long-Term** - Memory for later use, can last indefinitely
    - **Retrieval**
        - **Frequency** - Frequently used items are easier to recall
        - **Recency of Use** - Recently used items are easier to recall
    - **Forgetting**
        - **Retrieval Failure** - Tip of the tongue
        - **Fading** - Disused items

        - **Interference** - Other memories may displace or interfere
        - **Repression/Suppression** - Memory pushed out of reach because it is uncomfortable
- **Retention of Learning**
    - Usually not lost, just unavailable for recall
    - **Aids to Retention**
        - **Praise** - Positive reactions can help students remember
        - **Association** - Items that are associated with other items can promote retention
        - **Favorable Attitudes** - Students having a positive attitude retain more
        - **Learning With All Senses** - Learning with all senses is more powerful
        - **Meaningful Repetition**
        - **Mnemonics**
- **Transfer of Learning**
    - Use knowledge from one context to another
    - **Positive vs Negative Transfer**
        - Ex: Negative transfer is driving a car w/ steering wheel vs. How to taxi an airplane
- **Difficulties with Learning**
    - **Apathy Due to Inadequate Instruction** - Students who feel their instructor is unprepared, or treats them poorly, or does not adequately explain tasks or maneuvers may become apathetic, lose motivation, and give up.
    - **Lack of learner motivation** - Remember that many students are adults with busy lives. They may not be interested in a particular task, or they may have worries about some aspect of their training, or even non-flying related issues. It is important for instructors to identify and diagnose these issues.