

Task I.B: The Learning Process

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Lesson Overview

Overview

The student should develop knowledge of the elements related to the learning process as required in the CFI PTS.

References

- [FAA-H-8083-9A] - Aviation Instructors Handbook
- [FAA-H-8083-9A](#).
- [AIH, Chapter 3: The Learning Process](#)
- [Slide Presentation](#)
- [PDF Version](#)

Elements

1. Learning Theory
2. Perceptions and Insight
3. Acquiring Knowledge
4. The Laws of Learning
5. Domains of Learning
6. Characteristics of Learning
7. Acquiring Skill Knowledge
8. Types of Practice
9. Scenario Based Training
10. Errors
11. Memory and Forgetting
12. Retention of Learning
13. Transfer of Learning
14. Levels of Learning

Schedule

1. Discuss lesson objectives
2. Present Lecture
3. Ask and Answer Questions
4. Assign homework

Equipment

1. White board and markers
2. References
3. iPad / Projection Device

IP Actions

1. Discuss lesson objectives
2. Present Lecture
3. Ask and Answer Questions
4. Assign homework

SP Actions

1. Participate in discussion
2. Take notes
3. Ask and respond to questions

Completion Standards

The student understands the learning process and can integrate the knowledge when instructing students.

Instructor Notes

Attention

This will explain why you will or will not remember this lesson. :)

Overview

- Review Objectives and Elements/Key ideas.

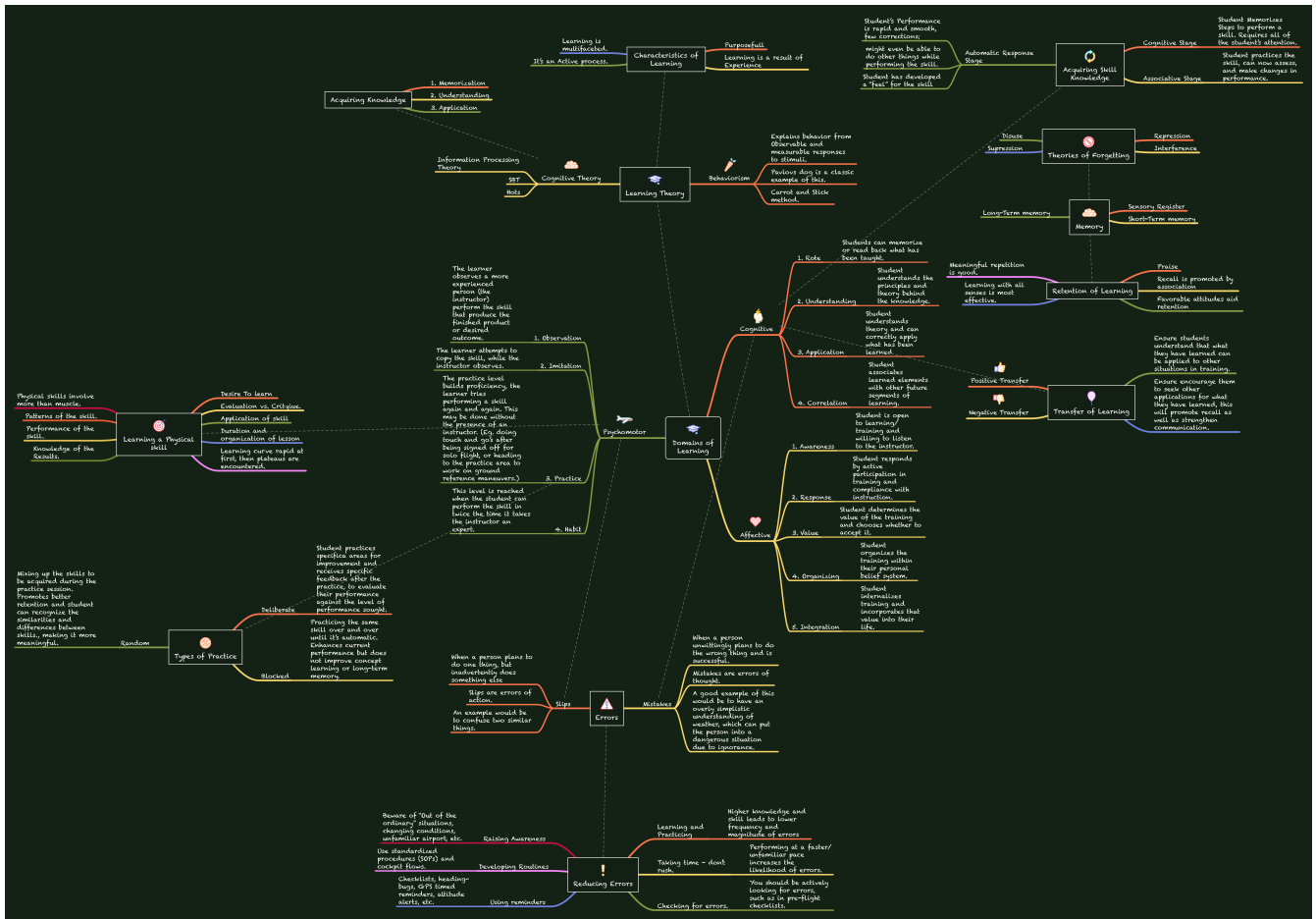
What

Understanding how people learn, and applying that knowledge to the learning environment.

Why

As a flight instructor, the ability to effectively teach students is imperative. Understanding how people learn and how to apply that knowledge is the basis for effective teaching.

Lesson Details



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Learning theory

Learning theory is the body of principles that explain how people acquire skills, knowledge, and attitudes.

The Four Learning Theories - BICC

Behaviorism

The most well known, and interesting common note about this is Pavlov's dog. The dog responds to external stimulus such as a bell, and they salivate accordingly knowing they are about to get a treat.

Information Processing Theory

Uses a computer system as a model for human learning. Information is processed, stored and later retrieved. One way a brain handles the torrent of information is to let the brain handle the routine, and let the conscious focus on issues that are not habitual.

Cognitive

Cognitive theory is what's happening inside the brain. "If you're wondering why we're studying this course", this is cognitive theory.

Constructivism

Learn off of prior experience.

Constructivism Example - Stove Analogy

1. Red hot stove, burns hands
2. Stove off, but still hot. still burn hands later.
3. toy oven, red stick , don't burn hands but scared of it and needs to be shown it's safe.

Perceptions and insight

Both internal and external factors affect an individual's ability to perceive:

Perceptions

- **Physical organism** - Provides individuals with the perceptual apparatus for sensing the world around them: the ability to see, hear, feel, and respond.
- **Goals and values** - Every experience and sensation that is funneled into a person's central nervous system is colored by the individual's own beliefs and value structures.
- **Self-concept** - a student's self-image, described in such terms as "confident" or "insecure," has a great influence on the total perceptual process.
- **Time and opportunity** - Learning some things depends on other perceptions that have preceded that learning, and on the availability of time to sense and relate those new things to the earlier perceptions.
- **Element of threat** - Confronted with a threat, students tend to limit their attention to the threatening object or condition. Fear adversely affects perception by narrowing the perceptual field.

Insight

Insight involves the grouping of perceptions into meaningful wholes. It is the mental relating and grouping of associated perceptions. Creating insight is one of the instructor's major responsibilities.

Acquiring knowledge

1. **Memorization**
2. **Understanding**
3. **Concept Learning / Application** - Concept learning is based on the assumption that humans tend to group objects, events, ideas, people, etc., that share one or more major attributes that set them apart

The principles of learning

They are rules and principles that apply generally to the learning process. The first three are the basic laws; the last three are the result of experimental studies:

- **R eadiness** — Individuals learn best when they are ready to learn, and they do not learn well if they see no reason for it or lack motivation. If students have a strong purpose, a clear objective, and a true reason for learning something, they make more progress.
- **E xercise** — Memory and connections between concepts are strengthened with practice and weakened when practice is discontinued, which reflects the adage “use it or lose it.” The student needs to practice what has been learned in order to understand and remember it.
- **E ffect** — Learning is strengthened when accompanied by a pleasant or satisfying feeling, but weakened when associated with an unpleasant feeling.
- **P rimacy** — The state of being first often creates a strong, almost unshakable impression and underlies the reason that an instructor must teach correctly the first time and the student’s initial learning must be right.
- **I ntensity** — A vivid, dramatic, or exciting learning experience teaches more than a routine or boring experience.
- **R ecency** — The things most recently learned are best remembered.

Domains of learning

- **Cognitive (thinking)** - a grouping of levels of learning associated with mental activity. The six major levels, in order of increasing complexity, are: knowledge, comprehension, application, analysis, synthesis, and evaluation.
 - **R ote** — the ability to repeat something back that was learned but not necessarily understood.
 - **U nderstanding** — to comprehend or grasp the nature or meaning of something.
 - **A pplication** — the act of putting something to use that has been learned and understood.
 - **C orrelation** — associating what has been learned, understood, and applied with previous or subsequent learning; this level is the overall objective of aviation instruction.
- **Affective (feeling)** - a grouping of levels of learning associated with a person’s attitudes, personal beliefs, and values. The levels (in order of increasing complexity) include: receiving, responding, valuing, organization, and characterization.
- **Psychomotor (doing)** - a grouping of levels of learning associated with physical skill levels, which include (in order of increasing complexity): perception, set, guided response, mechanism, complex overt response, adaptation, and origination.

Characteristics of learning

PRMA

- **Purposeful** - Each student is a unique individual whose past experience affects readiness to

learn and understanding of the requirements involved. Students have fairly definite ideas about what they want to do and achieve.

- **Result of Experience** - Learning is an individual process from personal experiences. Previous experience conditions a person to respond to some things and ignore others. Knowledge cannot be poured into the student's head.
- **Multifaceted** - Learning may include verbal elements, conceptual elements, perceptual elements, emotional elements, and problem-solving elements all taking place at once.
- **Active Process**—Students do not soak up knowledge like a sponge absorbs water. For students to learn, they must react and respond—perhaps outwardly, or perhaps only inwardly, emotionally, or intellectually.

Acquiring skill knowledge

- **Cognitive**—Cognitive learning has a basis in factual knowledge; since the student has no prior knowledge of flying, the instructor first introduces him or her to a basic skill. The student then memorizes the steps required to perform the skill.
- **Associative**—As the storage of skill knowledge through practice continues, the student learns to associate individual steps in performance with likely outcomes. They no longer perform a series of memorized steps, but are able to assess their progress along the way and make adjustments in performance.
- **Automatic Response Stage**—As procedures become automatic, less attention is required to carry them out, so it is possible to do other things simultaneously, or at least do other things more comfortably.

Types of practice

- *Deliberate*—practice aimed at a particular goal; the student practices specific areas for improvement and receives specific feedback after practice; the feedback points out discrepancies and the student focuses on eliminating those discrepancies.
- *Blocked*—practicing the same drill until the movement becomes automatic; doing the same task over and over leads to better short-term performance, but poorer long-term learning; it tends to fool not only the student but the instructor into thinking the skills have been well learned.
- *Random*—mixing up the skills to be acquired throughout the practice session, which results in better retention. By performing a series of separate skills in a random order, the student begins to recognize the similarities and differences of each skill, which makes it more meaningful.

Scenario-based training

A Good Scenario Has:

- Clear set of objectives
- Is tailored to the needs of the student. Practice solving problems they want solved.
- Capitalizes on the nuances of the local environment.

Errors

- Slip — Occurs when a person plans to do one thing but then inadvertently does something else. For example, planning to land Runway 21 and instead lands on 3.
- Mistake — Is when a person plans to do the wrong thing and is successful. *Mistakes are errors of thought* and are sometimes the result of gaps or misconceptions in the student's understanding.

Reduce Errors By

1. Learning and practicing
2. Taking time
3. Checking for errors
4. Using reminders - Avionics bugs, kneeboard notes.
5. Developing routines - Checklists, but practice with flows as well.
6. Raising awareness - Take note of areas where problems often occur.

Memory and forgetting

- Sensory Memory - Immediate processing, brain decides what is important.
- **STM**: 30 Seconds (IFR/Taxi Clearance for example)
- **LTM**: Lifetime.

Threats to Memory

- Lack of Frequent Usage
- Lack of Understanding

Forgetting

- **Retrieval Failure** - Simply unable to recall.
- **Fading** - a person forgets information that is not used for an extended period of time.
- **Interference** - (*Trauma*) people forget because a certain experience has overshadowed it or the learning of similar things has intervened.
- **Repression** - a memory is pushed out of reach because the individual does not want to remember feelings associated with it.

Retention of learning

- **Praise** — stimulates remembering; absence of praise or recognition discourages remembering.
- **Association** — recall is promoted by association.
- **Attitudes** — favorable attitudes aid retention; people learn and remember only what they wish to know.

- **Senses** — learning with all senses is most effective.
- **Repetition** — meaningful repetition aids recall, but mere repetition does not guarantee retention.

Transfer of learning

Transfer of learning is defined as the ability to apply knowledge or procedures learned in one context to new contexts.

- Positive transfer — occurs if the learning of skill A helps to learn skill B.
- Negative transfer — occurs if the learning of skill A hinders the learning of skill B
- Example: The practice of slow flight helps the student learn short-field landings (positive transfer).
- Practice in making a landing approach in an airplane may hinder learning to make an approach in a helicopter (negative transfer).

Levels of Learning (Not in PTS)

Learning is divided into four different levels. They are, in increasing order of depth/complexity :

Rote Learning

The ability to repeat something that has been taught without deep understanding or being able to apply it to general situations.

Understanding

Insight into what has been taught where the student consolidates old and new perceptions into an insight.

Application

The student understands the material/technique, can apply it to situations, and has practiced it until they can do so consistently. But don't stop here!

Correlation

The student can correlate what has been learned with things previously learned, and can apply those insights to broader categories of activities (i.e. correlate the elements of a turn with performing lazy eights and chandelles).

The Learning Process - Memory Aids

Conclusion

The learning process is complex and involves cognitive, psychological, and psychological elements. Understanding the relationships between all these elements and their relationship with the learning process can inform how an instructor approaches the teaching challenge.

ACS Requirements

To determine that the applicant exhibits instructional knowledge of the learning process by describing:

1. Learning theory.
2. Perceptions and insight.
3. Acquiring knowledge.
4. The laws of learning.
5. Domains of learning.
6. Characteristics of learning.
7. Acquiring skill knowledge.
8. Types of practice.
9. Scenario-based training.
10. Errors.
11. Memory and forgetting.
12. Retention of learning.
13. Transfer of learning.

Memory Sheet

1. **Human Behavior** - The attempt to explain how and why humans function the way they do.
 - a. Behaviorism and Cognitive Theory (To explain how)
 - i. Behaviorism - Pavlov / Carrot & Stick
 - ii. Cognitive Theory - what's going on inside the mind
 - A. Information Processing Theory
 - B. Constructivism
 - I. Learning is the result of the learner matching new information against preexisting information and integrating it into meaningful connections
 - II. High Order Thinking Skills (HOTS) - also referred to as aeronautical decision making (ADM). This also includes (SBT)
 - iii. Behavioral + Cognitive - Plan, manage, and conduct aviation training with the best features of each theory
2. **Perceptions and Insight**
 - a. Initially all learning comes from perceptions which come from the senses; the learner then gives meaning to the senses
 - b. Factors affecting perceptions
 - i. Physical Organism
 - ii. Goals and Values - more highly valued and therefore sought after than other less important ideas
 - iii. Self-Concept - Self-image (confident or insecure) has influence on perception
 - iv. Time and Opportunity - Proper sequence and time are necessary for learning
 - v. Element of Threat - Threat does not promote effective learning. Stay cool.
 - c. Insight - An insight is the 'aha!' moment. (when the information (perceptions) 'clicks' and the learner gains a more complete understanding of the concept or subject)
3. **Acquiring Knowledge**
 - a. Memorization
 - b. Understanding
 - c. Concept Learning
4. **The Laws of Learning (REEPIR)** - Laws of learning provide additional insight into what makes people learn most effectively
 - a. Readiness
 - i. The basic needs of the learner need to be met before they're ready or capable of learning. Learners best acquire new knowledge when they see a clear reason for doing so.
 - b. Exercise - Use it or lose it.

- c. Effect - Behaviors that lead to satisfying outcomes are likely to be repeated
- d. Primacy - What is learned first, often creates a strong, almost unshakable impression.
 - i. Un-teaching is much more difficult than teaching. **Teach it right the first time.**
- e. Intensity - A vivid, dramatic, or exciting learning experience teaches more than a routine or boring experience.
- f. Recency - Things most recently learned are best remembered.
 - i. Repeat, restate, or reemphasize important points at the end of a lesson to help in remembering

5. Domains of Learning (CAP)

- a. Cognitive - (Knowledge); often referred to as Bloom's Taxonomy of Educational Objectives
- b. Affective - (Attitudes, Beliefs, and Values)
 - i. Includes: feelings, values, enthusiasms, motivations, and attitudes
 - ii. Difficult to measure, so best attained through indirect inference such as attitude on safety.
- c. Psychomotor - Skill based and includes physical movement, coordination, and use of the motor-skill areas.
- d. **Levels of Learning** (RUAC) (Not In PTS) - Least to Most
 - i. Rote
 - ii. Understanding
 - iii. Application
 - iv. Correlation

6. Characteristics of Learning (PRMA)

- a. Purposeful - In the process of learning, the learner's goals are the most important factor.
- b. Result of experience - (Learn by Doing) Learning is an individual process and the learner can learn only from personal experiences
- c. Multifaceted - Learning may include verbal elements, conceptual elements, perceptual elements, emotional elements, and problem-solving elements all taking place at once.
- d. Active process - (Constantly Engage the Learner) - For effective knowledge transfer, learners need to react/respond, perhaps outwardly, perhaps only inwardly, emotionally, or intellectually

7. Acquiring Skill Knowledge

- a. Stages of Acquiring Skill Knowledge
 - i. Cognitive — Cognitive learning has a basis in factual knowledge; since the student has no prior knowledge of flying, the instructor first introduces him or her to a basic skill. The student then memorizes the steps required to perform the skill.
 - ii. Associative — As the storage of skill knowledge through practice continues, the student learns to associate individual steps in performance with likely outcomes. They no longer perform a series of memorized steps, but are able to assess their progress along the way

and make adjustments in performance.

iii. Automatic Response Stage — As procedures become automatic, less attention is required to carry them out, so it is possible to do other things simultaneously, or at least do other things more comfortably.

b. It's as important for students to know when they are right as when they are wrong. They should be told as soon after the performance as possible, and should not be allowed to practice mistakes. It's more difficult to unlearn a mistake, and then learn the skill correctly, than to learn it correctly in the first place.

c. How to Develop Skills - Consistent Practice !

d. Learning Plateaus

i. They're normal and temporary, ensure the learner understands this and is prepared for them

ii. Over-practice can bring on a learning plateau

8. Types of Practice

a. Deliberate Practice - Learner practices specific areas for improvement and receives specific feedback

b. Blocked Practice - Practicing the same drill until it becomes automatic

c. Random Practice - Mixes up the skills to be acquired throughout the practice session.

i. Performing a series of separate skills in a random order leads to better retention

9. **Scenario Based Training** - Scenarios that resemble the environment in which knowledge and skills are used are helpful to learning.

a. A good SBT Contains

i. Clear set of objectives

ii. Tailored to the needs of the learner

iii. Capitalizes on the nuances of the local environment

10. **Errors** - To believe people can eliminate errors from their performance is to commit the biggest error of all.

a. Types

i. Slip

ii. Mistake

b. Reducing Error

i. Learning and practicing - Mention chair flying when away from the aircraft

ii. Taking Time - Slow is steady, steady is fast

iii. Checking for Errors - Actively look for evidence of errors

iv. Using Reminders - Checklists, bugs, notebook, GPS timer Alerts

v. Developing Routines - Standardized procedures are widely known to reduce errors (SOPs)

- vi. Raising Awareness - awareness when operating in conditions under which errors are known to happen

11. Memory and Forgetting

- a. Memory includes 3 parts: Sensory, Short-Term, and Long-Term Memory
 - i. Sensory Memory (Quick Scan, Precoding)
 - ii. Short-Term Memory (Coding, Rehearsal, Recoding)
 - iii. Long-Term Memory (Process, Store, Recall)
- b. Memory and Usage - The ability to retrieve knowledge or skills is primarily related to two things:
 - i. How often the knowledge has been used
 - ii. How recently the knowledge has been used
 - iii. The more frequent and recent knowledge is used, the more likely it is retained
- c. Forgetting - theories regarding why people forget (FIIRS)
 - i. **F**ading: Suggests that information that is not used for a period of time is forgotten
 - ii. **I**nterference: We forget things because an experience has overshadowed it, or the learning of
 - iii. **R**etrieval Failure: Inability to retrieve the information
 - iv. **R**epression or **S**uppression: A memory is pushed out because the individual does not want to remember the feelings associated with it

12. Retention of Learning

- a. Praise Stimulates Remembering
- b. Recall is Promoted by Association
- c. Favorable Attitudes Aid Retention
- d. Learning with all our Senses is most Effective
- e. Meaningful Repetition Aids Recall (mere repetition does not guarantee retention)
 - i. 3-4 repetitions provide the maximum effect

13. Transfer of Learning

- a. Primary Objective is to promote Positive Transfer
 - i. Positive Transfer - Learning skill A helps to learn skill B (slow flight and short field landings)
 - A. Achieving Positive Transfer
 - I. Plan for transfer as a primary objective
 - II. Ensure that learners understand that information can be applied in other situations
 - III. Maintain high-order learning standards
 - IV. Avoid unnecessary rote learning, since it does not foster transfer

- V. Provide meaningful learning experiences that build confidence in their ability to transfer knowledge
- VI. Use material that helps form valid concepts and generalizations (make relationships clear)
 - ii. Negative Transfer - Learning skill A hinders learning of skill B (landing an airplane vs a helicopter)
- b. Habit Formation - It's the instructor's task to insist on correct techniques/procedures to provide proper habit patterns
- c. Training traditionally has followed a building block concept - start with basics and go from there.