

I.A. The Learning Process

References: [Aviation Instructor's Handbook \(FAA-H-8083-9\)](#)

Objectives	The student should develop knowledge of the elements related to the learning process as required in the PTS.
Elements	<ol style="list-style-type: none">1. The Learning Theory2. Characteristics of Learning3. Principles of Learning4. Levels of Learning5. Learning Physical Skills6. Memory7. Transfer of Learning
Schedule	<ol style="list-style-type: none">1. Discuss Objectives2. Review material3. Development4. Conclusion
Equipment	<ol style="list-style-type: none">1. White board and markers2. References
IP's Actions	<ol style="list-style-type: none">1. Discuss lesson objectives2. Present Lecture3. Ask and Answer Questions4. Assign homework
SP's Actions	<ol style="list-style-type: none">1. Participate in discussion2. Take notes3. Ask and respond to questions
Completion Standards	The student understands the learning process and can integrate the knowledge when instructing students.

Instructors Notes:

Introduction:

Attention

Interesting fact or attention-grabbing story

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.

How:

1. The Learning Theory

- A. Definition – A body of principles used to explain how people acquire skills, knowledge, and attitudes
- B. Learning is explained by a combination of 2 basic approaches: Behaviorism and the Cognitive Theory
- C. Behaviorism (Positive Reinforcement, rather than no reinforcement or punishment)
 - i. Stresses the importance of having a particular form of behavior reinforced by someone, other than the student, to shape or control what is learned
 - a. The instructor provides the reinforcement
 - ii. Frequent positive reinforcement and rewards accelerate learning
 - iii. The theory provides the instructor ways to manipulate students with stimuli, induce the desired behavior or response, and reinforce the behavior with appropriate rewards
- D. Cognitive Theory (Focuses on what is going on inside the student's mind)
 - i. Learning isn't just a change in behavior; it is a change in the way a student thinks/understands/feels
 - ii. Two Major Branches of the Cognitive Theory
 - a. The Information Processing Model
 - The student's brain has internal structures which select and process incoming material, store/retrieve it, use it to produce behavior, and receive/process feedback on the results
 - b. The Social Interaction Theory
 - Stress that learning and subsequent changes in behavior take place as a result of interaction between the student and the environment
 - The social environment to which the student is exposed demonstrates or models behaviors, and the student cognitively processes the observed behaviors and consequences
 - Techniques for learning include direct modeling and verbal instruction
 - Behavior, personal factors, and environmental events all work together to produce learning
 - iii. Both models have common principles
 - a. They both acknowledge the importance of reinforcing behavior and measuring changes
 - b. Some means of measuring student knowledge, performance, and behavior is necessary
- E. Behavioral + Cognitive
 - i. Plan, manage, and conduct aviation training with the best features of each theory
 - ii. Provides a way to measure the behavioral outcomes and promote cognitive learning

2. Characteristics of Learning (PRMA)

- A. To be effective, the learning situation should be purposeful, a result of experience, multifaceted, and involve an active process
- B. Purposeful
 - i. In the process of learning, the student's goals are of paramount significance
 - a. Each student has specific intentions and goals
 - b. Students learn from any activity that tends to further their goals
 - c. Individual needs and attitudes may determine what they learn as much as what the instructor is trying to get them to learn
 - ii. To be effective, instructors need to find ways to relate new learning to the student's goals
- C. Result of Experience (Learn by Doing)
 - i. Learning is an individual process and the student can learn only from personal experiences
 - a. Previous experiences condition a person to respond to some things and to ignore others
 - b. Instructors are faced with the problem of providing learning experiences that are meaningful, varied, and appropriate
 - ii. If an experience challenges the student, requires involvement with feelings, thoughts, memory of past experiences, or physical activity, it is more effective
 - iii. If students are to use sound judgment and develop decision making skills, they need learning experiences that involve knowledge of general principles and require the use of judgment in solving realistic problems
- D. Multifaceted
 - i. The learning process may include verbal elements, conceptual elements, perceptual elements, emotional elements, and problem-solving elements all taking place at once
 - ii. While learning the subject at hand, students may be learning other things as well
 - a. They may be developing attitudes about aviation, they may learn self-reliance, etc.
- E. Active Process (Constantly Engage the Student)
 - i. If learning is a process of changing behavior, that process must be an active one
 - a. For students to learn, they need to react and respond, perhaps outwardly, perhaps only inwardly, emotionally, or intellectually

3. Principles of Learning (REEPIR)

- A. Principles of learning provide additional insight into what makes people learn most effectively
- B. Readiness
 - i. Individuals learn best when they're ready to learn and don't learn well if there's no reason to learn
 - ii. If students have a strong purpose, clear objective, and a definite reason for learning, they make more progress than if they lack motivation
 - iii. Under certain circumstances, the instructor can do little, if anything, to inspire a readiness to learn
 - a. If outside responsibilities, interests, worries, etc. weigh heavily, they may have little interest
- C. Exercise
 - i. Things most often repeated are best remembered
 - ii. Students learn by applying what they have been told and shown
 - a. Every time practice occurs, learning continues
 - iii. The instructor must provide opportunities for students to practice, and at the same time make sure that this process is directed toward a goal

D. Effect

- i. Learning is strengthened when accompanied by a pleasant or satisfying feeling, and that learning is weakened when associated with an unpleasant feeling
- ii. Whatever the learning situation, it should contain elements that affect the student positively and give them a feeling of satisfaction

E. Primacy

- i. The state of being first, often creates a strong, almost unshakable impression
 - a. For the instructor, this means that what is taught must be right the first time
- ii. Every student should be started right; Un-teaching is much more difficult than teaching
- iii. The first experience should be positive, functional, and lay the foundation for all that is to follow

F. Intensity

- i. A vivid, dramatic, or exciting learning experience teaches more than a routine or boring experience
 - a. A student will learn more from the real thing than from a substitute
- ii. The instructor should use their imagination in approaching reality as closely as possible
 - a. Instruction can benefit from a wide variety of instructional aides to improve realism, motivate learning and challenge students

G. Recency

- i. Things most recently learned are best remembered
 - a. The further removed time-wise from a new fact/understanding, the more difficult to remember
- ii. Repeat, restate, or reemphasize, important points at the end of a lesson to help in remembering

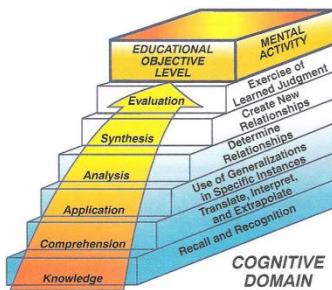
4. Levels of Learning

A. Four Basic Levels

- i. Rote Learning – The ability to repeat something which one has been taught, without understanding or being able to apply what has been learned
- ii. Understanding – Comprehension of what has been taught
 - a. The student consolidates old and new perceptions into an insight on a subject/maneuver
- iii. Application – The skill for applying what has been learned
 - a. Understands, has had demonstrations, and has practiced until consistent
 - b. Don't stop here!
- iv. Correlation – Correlation of what has been learned with things previously learned/subsequently encountered
 - a. The objective in aviation instruction
 - b. EX: Can correlate the elements of turn entries with performing lazy eights and chandelles

B. Domains of Learning (What is to be learned: Knowledge, Change in Attitude, Physical Skill, or combo)

- i. Besides the 4 basic levels of learning, several additional levels have been developed:
- ii. **Cognitive Domain (Knowledge);** often referred to as Bloom's Taxonomy of Educational Objectives
 - a. Educational objectives refer to knowledge which might be gained as the result of attending a ground school, reading about aircraft systems, listening to a preflight briefing, etc.
 - b. The highest objective level may be shown by learning to properly evaluate a maneuver

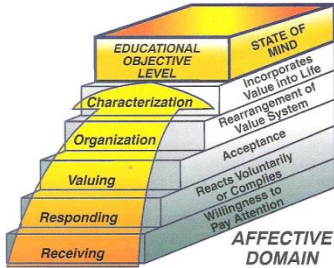


Objective Level	Action Verbs
Evaluation	Assess, evaluate, interpret, judge, rate, score, write
Synthesis	Compile, compose, design, reconstruct, formulate
Analysis	Compare, discriminate, distinguish, separate
Application	Compute, demonstrate, employ, operate, solve
Comprehension	Convert, explain, locate, report, restate, select
Knowledge	Describe, identify, name, point to, recognize, recall

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iii. Affective Domain (Attitudes, Beliefs, and Values)

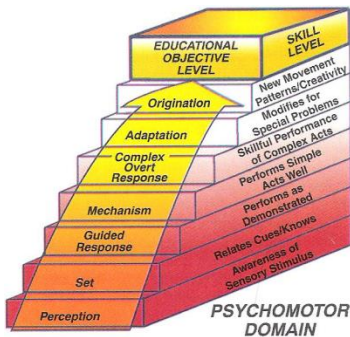
- a. This hierarchy attempts to arrange attitudinal objectives in an order of difficulty
 - Measuring educational objectives in this domain is not easy (concerned with attitudes, etc.)
- b. Most techniques for evaluation of achievement rely on indirect inferences
 - EX: Evaluating a positive attitude toward safety



Objective Level	Action Verbs
Characterization	Assess, delegate, practice, influence, revise, maintain
Organization	Accept responsibility, adhere, defend, formulate
Valuing	Appreciate, follow, join, justify, show, concern, share
Responding	Conform, greet, help, perform, recite, write
Receiving	Ask, choose, give, locate, select, rely, use

iv. Psychomotor Domain (Physical Skills)

- a. Typical activities include learning to fly a precision approach, programming a GPS receiver
- b. As physical tasks and equipment become more complex, the requirement for integration of cognitive and physical skills increases



Objective Level	Action Verbs
Origination	Combine, compose, construct, design, originate
Adaptation	Adapt, alter, change, rearrange, reorganize, revise
Complex Overt Response	Same as below except more highly coordinated
Mechanism	Same as below except with greater proficiency
Guided Response	Assemble, build, calibrate, fix, grind, mend
Set	Begin, move, react, respond, start, select
Perception	Choose, detect, identify, isolate, compare

v. All 3 domains of learning are pertinent

- a. A high level of knowledge and skill is required as well as a well-developed, positive attitude

5. Learning Physical Skills

- A. The process of learning a psychomotor skill is much the same as cognitive learning
- B. Physical Skills Involve more than Muscles
 - i. Desire to Learn
 - a. Students learn much more readily when they learn skills that appeal to their needs (Readiness)
 - b. When the desire to learn is missing, it is unlikely that any improvement will occur
 - c. To improve, one must not only recognize mistakes, but also make an effort to correct them
 - d. Objectives should be related to student’s intentions/needs, building on his natural enthusiasm
 - ii. Patterns to Follow
 - a. The best way to prepare a student to perform a task is to provide a clear, step-by-step example
 - b. Students need to have a clear impression of what they are to do
 - iii. Perform the Skill
 - a. Practice is necessary
 - The student needs coordination between muscles and visual and tactile senses
 - b. As the student gains proficiency, verbal instructions mean more
 - A long-detailed explanation is confusing before the student begins performing
 - a. Specific comments are more meaningful/useful after the skill has been partially learned
 - iv. Knowledge of Results
 - a. The instructor provides a helpful/critical function ensuring students are aware of their progress
 - It is as important for students to know when they are right as when they are wrong

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- v. Progress Follows a Pattern
 - a. Skill learning usually follows the same pattern
 - There is rapid improvement early, then the curve levels off and may stay level for a while
 - a This is a typical learning plateau
 - b Apparent lack of increasing proficiency does not necessarily mean learning has ceased
 - In learning motor skills, a plateau is normal and should be expected after a fast initial period
 - a If the student is aware of this learning plateau, frustration may be minimized
- vi. Duration and Organization of a Lesson
 - a. Beginning students reach a point where additional practice is unproductive, and may be harmful
 - When this point is reached, errors increase and motivation declines
 - As the student gains experience, longer periods of practice are profitable
 - b. Keep maneuver repetitions to 2 or 3 (landings can be practiced more)
 - c. The practice period may be divided or be one continuous integrated sequence depending on the nature of the skill being learned
- vii. Evaluation vs. Critique
 - a. Beginning students profit when their performance is critiqued constructively to eliminate errors
 - Practical suggestions are more valuable to the students than a grade
 - b. The observations can identify strengths/weaknesses, a prerequisite for constructive criticism
- viii. Application of Skill
 - a. For the student to be able to use the skill that has been learned, two conditions must be present
 - The student must learn the skill so well that it becomes easy, even habitual
 - The student must recognize the types of situations where it is appropriate to use the skill

6. Memory

- A. General
 - i. Memory includes 3 parts: Sensory, Short Term, and Long Term
 - ii. The total system operates like a computer
 - a. Accepts input, a processing apparatus is contained, storage capability, and an output function
- B. Sensory Register (Quick Scan, Precoding)
 - i. Receives input and quickly processes it according to a preconceived concept of what is important
 - a. Other factors can influence reception of info
 - If it is dramatic or impacts more than one of the senses it is more likely to make an impression
 - b. It immediately recognizes certain stimuli and sends them to the working memory for action
 - This is called precoding (EX: Fire Alarm – working memory is immediately made aware of the alarm and preset responses begin to take place)
- C. Working or Short-Term Memory (Coding, Rehearsal, Recoding)
 - i. Within seconds relevant info is passed here where it may temp remain or rapidly fade, depending on individual priorities
 - ii. Rehearsal or repetition of the information and sorting or categorization into chunks help retention
 - a. Sorting process is called Coding (Usually takes 5 - 10 seconds; if interrupted, the information is lost after 20 seconds)
 - iii. Time limited and Capacity limited (time limitation can be overcome by repetition)
 - iv. The coding process may involve recoding to adjust info to individual experiences
 - a. This is when actual learning begins to take place
 - b. Recoding: the process of relating incoming information to concepts or knowledge already in memory
 - v. Developing a logical strategy for coding information is a significant step in the learning process

D. Long-Term Memory (Process, Store, Recall)

- i. Where information is stored for future use
 - a. For it to be useful, some special effort must have been expended during the coding process
 - The more effective the coding process, the easier the recall
 - ii. One of the major responsibilities of the instructor is to help students use their memories effectively

E. Theories of Forgetting

i. Repression

- a. The submersion of ideas into the subconscious mind
- b. Material that is unpleasant or produces anxiety may be treated this way, but not intentionally
 - It is subconscious and protective

ii. Interference

- a. We forget things because an experience has overshadowed it, or the learning of similar things has intervened
- b. Two conclusions from interference:
 - Similar material seems to interfere with memory more than dissimilar material
 - Material not well learned suffers most from interference

iii. Disuse

- a. A person forgets those things which are not used
- b. But the memory is actually there locked in the recesses of the mind
 - The difficulty is summoning it up to consciousness

F. Retention of Learning

- i. The instructor needs to make certain that the student's learning is readily available for recall
 - a. Teach thoroughly and with meaning
- ii. Praise Stimulates Remembering
- iii. Recall is Promoted by Association
 - a. Each bit of information/action which is associated with something to be learned tends to be recalled
- iv. Favorable Attitudes Aid Retention
 - a. Without motivation there isn't learning; the most effective motivation is rewarding objectives
- v. Learning with all our senses is most effective
- vi. Meaningful Repetition Aids Recall (mere repetition does not guarantee retention - Rote)

7. Transfer of Learning

A. Primary Objective is to promote Positive Transfer

- i. Positive Transfer - If the learning of skill A helps to learn skill B (e.g., slow flight and short field landings)
- ii. Negative Transfer - If the learning of skill A hinders learning of skill B (landing an airplane vs a helicopter)
- iii. A degree of transfer is involved in all learning since all learning is based on prior learned experience
 - a. People interpret new things in terms of what they already know
- iv. Achieving Positive Transfer
 - a. Plan for transfer as a primary objective
 - b. Make certain the student understands that what is learned can be applied in other situations
 - c. Maintain high-order learning standards
 - d. Provide meaningful learning experiences that build confidence in the ability to transfer learning
 - e. Use material that helps form valid concepts and generalizations (make relationships clear)

B. Habit Formation

- i. It's the instructor's task to insist on correct techniques/procedures to provide proper habit patterns
- ii. Training traditionally has followed a building block concept

Conclusion:

Brief review of the main points

PTS Requirements:

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

1. Learning theories.
2. Characteristics of learning.
3. Principles of learning.
4. Levels of learning.
5. Learning physical skills.
6. Memory.
7. Transfer of learning.