# Advanced Flight Instruction
# A Teaching Guide for Aviators

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# Section I:
# The Nature of Teaching and Learning





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# An Introduction to Teaching

Teaching is not just about presenting information. It **is** about getting others to understand concepts and be able to apply them. This can be a subtle distinction, but it is the difference between a marginal instructor and a great one. Becoming an instructor demands a new level of knowledge and competence. Your technical knowledge must be first-rate, and your performance must set the example for your students. But that's only the beginning. If you take the time to understand the student's perspective, their capabilities, limitations, and concerns, you can tailor your instruction to meet their needs. You'll be able to tell when they do and do not understand, and what types of learning they respond to best. The key here is to focus on the students. It is easy to fall into the trap of "canning" and transmitting the content we think is important without any attention to whether or not the students "get it" – DON'T DO IT. Teaching must be a two-way transaction! Our knowledge isn't much good if we can't transfer it to our students.

Consider two approaches to instruction: instructor-centered and student-centered. In the instructor-centered approach, information is organized and presented using whatever methods are most comfortable for the instructor. This is a tempting approach to use because curricula are usually designed before instructors know exactly which students they will be teaching. Briefing guides are an example. They are designed to cover the most important content for a given flight. The same is true for standardized classroom academics. All of this has its place. The problem is that what makes sense to an experienced pilot or instructor may mean something completely different to a beginning student. Therefore, it is not sufficient to simply package all of the relevant material together and call it a day. Work to standardize the ***content***, but make the ***instruction*** dynamic.



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Student-centered teaching is more of a transmit-receive approach. Instructors must still prepare and organize content in advance, but they keep in mind the experience, backgrounds and learning styles of the students. They stay attuned to the responses of their students while teaching, looking for clues that indicate understanding or confusion. When they're not confident their students "get it," they try a new approach and are ready to *adjust their teaching styles to meet student needs*. This approach does not mean "spoon-feeding" or lowering standards. It simply means teaching with a focus on the methods that are most likely to work for students. Consider our guides again. A briefing or teaching guide must make sense to the instructor, but a good one is also organized to answer the questions student's will most likely ask. It will incorporate examples and visual aids a student is likely to understand.

The most obvious difference between instructor-centered and student-centered teaching is how success is measured. Good instructor-centered teaching is comfortable for the instructor. Good student-centered teaching brings students a clear understanding of the material using a variety of presentation methods. A good instructor is proficient with many teaching styles and can flex among whatever methods are best for the students.



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## Cognitive Learning Styles

The next layer underneath sensory learning style is cognitive style. This is the way people reason and remember. ***Sensory*** learning style shapes how we present information and how students perceive it. ***Cognitive*** learning style shapes how we analyze the information, and how students make sense of it. There are several ways to look at cognitive learning styles and, like sensory learning styles, no single approach works best for everyone. Instructors must understand the basics and be able to teach from any approach.

### *Inductive vs. Deductive Reasoning*

These two, opposite approaches are based on whether a person sees information as a large body, or as a collection of pieces working together. Most people can think from either approach, but tend to default to one or the other in most situations.

**Inductive reasoning** means seeing the whole first, then applying truths about the whole to its parts or to specific situations. For example, we learn in basic flight training to "aviate, navigate, and communicate," in that order. We apply this broad rule to all of aviation. Using inductive reasoning, a student accepts the truth of the rule, then applies it by looking at which tasks fit in each category for a specific situation, like handling an engine failure.

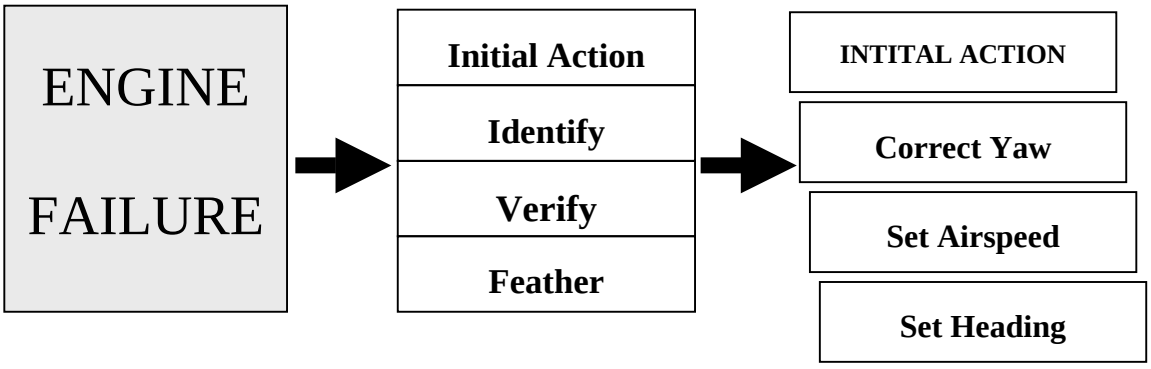


Figure 2.3 – Whole – Part Thinking

In Figure 2.3 the initial concept is the engine failure, then each step in the process (the INITIAL ACTION in this example) is studied separately. A complete academic presentation would cover each item (Initial Action, Identify, Verify, and Feather) in detail. Another name for this cognitive style is "**whole-part**" thinking, where a student understands the objective and premise of an event, then mentally takes it apart to learn the subtasks which make up the event.

**Deductive reasoning** means seeing basic components and applying information about them to generalize to a larger situation. In landings, we learn to eliminate drift by slipping and to touchdown near stall speed. We teach the smaller elements first in the practice area at higher altitude. Then we put it together in the traffic pattern. This is deductive reasoning, also called "**part-whole**" thinking: a student learns the significance of small pieces of information, then examines their relationships, and pieces them together to understand the whole.

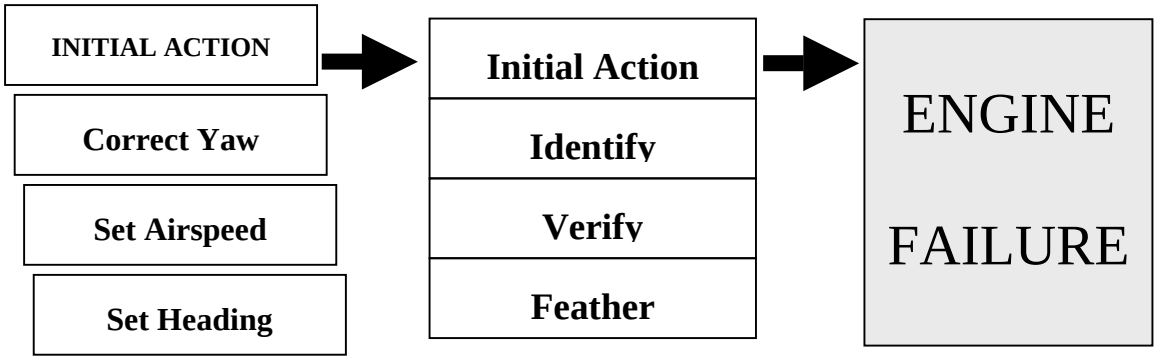


Figure 2.4 – Part – Whole Thinking

The information and relationships are the same whether you teach inductively or deductively, but some students will understand more clearly using one approach than with the other. The important thing as an instructor is that you be able to teach with either method. You will probably not know whether you're dealing with an inductive or deductive student. You can cover both bases by teaching in a way that starts with a whole, takes it apart to study the pieces, then puts it back together again in **"whole-part-whole"** fashion. Or you could reverse the order if that makes more sense for the situation. If your student does not seem to get it, ask yourself which approach you have been using and try reversing the process. Start from the other end of the problem and work your way back to where you started. That is often all it takes to make the light bulb come on.



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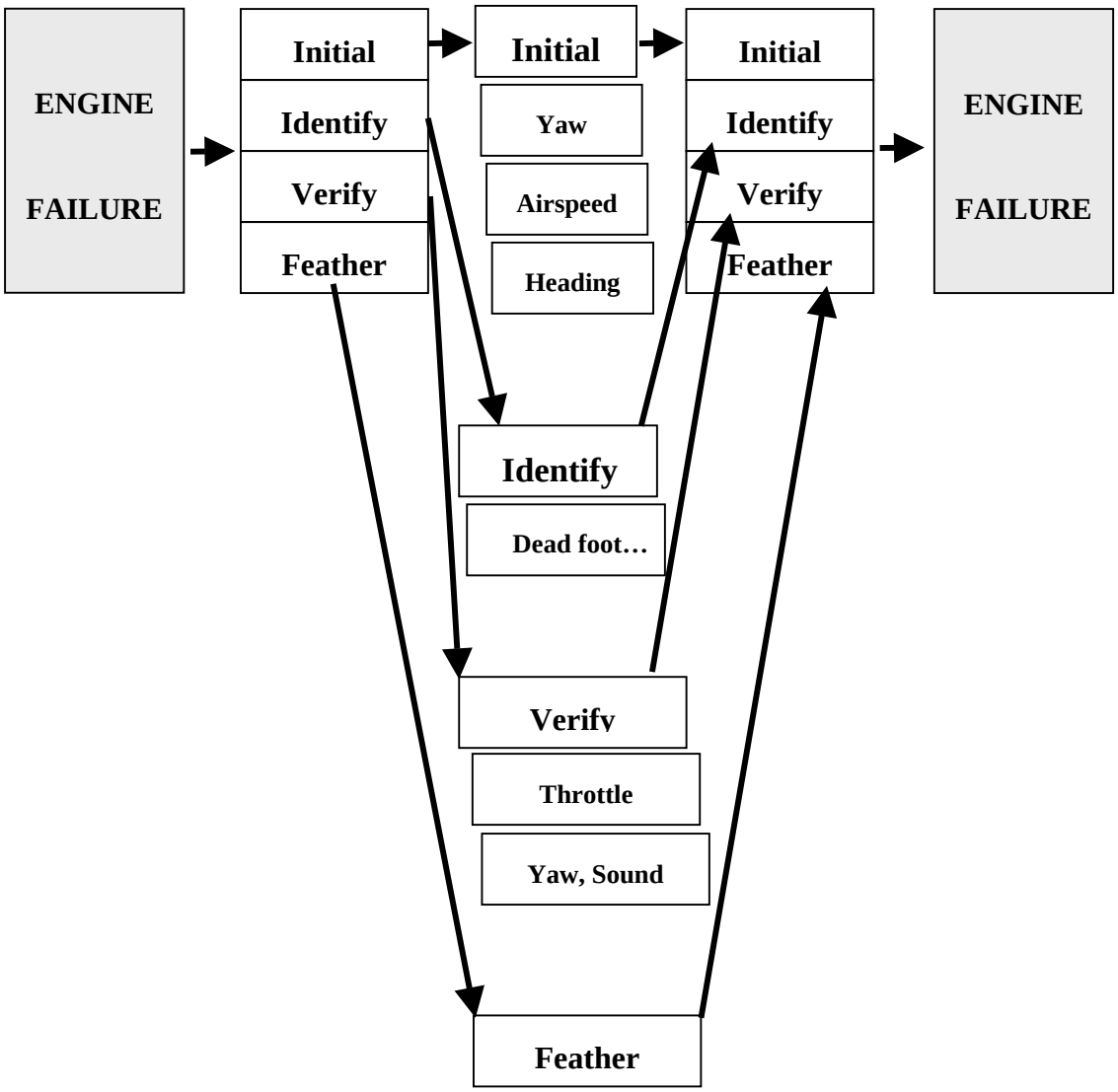


Figure 2.5 – Whole – Part – Whole



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### *Contextual Learning*

People attach meaning to things they learn based on when and in what situations they expect to see and apply those things. Context helps people prioritize what they learn and group relevant information together. In aviation, contextual learning does two things: it shows why something is important, and it shows when a piece of information will be needed. Both of these things help us remember information quickly when we need it without wasting time sorting through irrelevant information.

The key word in contextual learning is **association**. Context boils down to which things are associated with each other. These associations divide our memory into blocks, which we access and put away as we need them as though they were books. If we are teaching $V_{MC}$ Demonstrations the next day, we review only the materials in the flight manuals, FAA Handbooks, and other references that we *associate* with $V_{MC}$ Demonstrations. Your students need to be able to do the same thing, especially in the cockpit where there is little time to think. You can also think of contextual learning like the Internet. There is simply not enough time to type in web addresses at random until you find what you're looking for. By helping students associate learning and place it in context, you essentially give them a "search engine" for their brains. So how can we do this?

**Ways to Associate Information and Teach in Context**

- **Metaphor** – Use simple, familiar terms to illustrate new or complex ideas; new data is *like* something the student already knows
- **Analogy** – Compare a new relationship to one students are familiar with; "crosscheck displays like a deer drinks water: take a sip, then look up/outside for what will kill you"
- **Mnemonics** – Create an acronym or phrase to help memorize a group of information; "GUMPS Check" and "Odd men go East" are examples
- **Chunking** – Organize information into familiar patterns; "Fly heading 090, maintain 3000' until established on the localizer, cleared for the ILS 12R" is an example of chunking information in a communication format
- **Imagery** – paint a mental picture and place the student in it
- **Pattern Matching** – Teach or demonstrate a pattern of sensory cues that indicate a particular situation and prompt action; refer to these patterns in flight as students see the actual picture. Sluggish control response, stall warning horn, and buffet should trigger "Add power – Reduce AOA."
- **Stories** – let students leverage your experience by telling about situations you've faced; tell what happened to you, how you recognized it, and how you handled it, or how you should have handled it
- **Rehearsal** – simulate situations, like radio calls, and let students go through the motions step-by-step; accelerate as they improve; repeat to build strong habits

Whenever we teach new material, we should show which situations it applies to and which it does not. Simply put, we are telling students when they need to remember what we are telling them. We need to show them why the information or technique works in some situations and not in others. When possible, we should demonstrate or use a model. Most important, we need to let students tinker with it themselves. No matter how well we present and demonstrate, a student's personal experience will build the strongest, most lasting learning.

Paul Braden rehearses Boeing 737 checklist flows in a Cockpit Procedures Trainer at Higher Power Aviation®.



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