



TM 10 - Flight Instructor Guide



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Instructional theory introduction

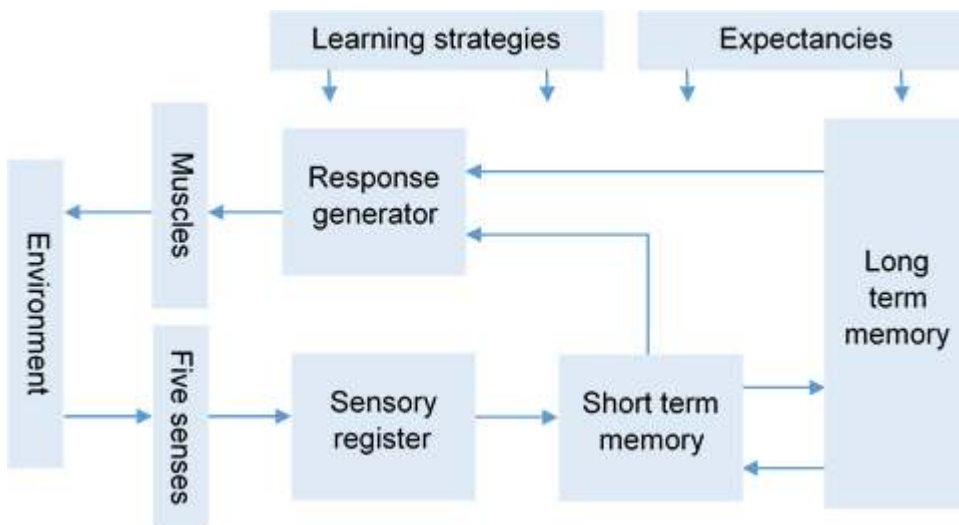
This section of the Flight Instructor Guide supports the [Instructional Techniques Course](#) required for an instructor rating.

The expert flight instructor is master of many skills and fields of knowledge. What is taught demands technical competence in these areas, but how the teaching is accomplished depends on your understanding of how people learn and the ability to apply that understanding. The following gives some insights into the learning process and is meant to guide you into areas of further study. Teaching is a rewarding experience, but those rewards are not easily achieved. It is doubtful that anyone has a natural ability to teach or understand how others learn, therefore the professional instructor continues the life-long process of learning not only flying skills but also teaching skills.

It is intended that this section be reviewed regularly so that you gain the most benefit from it. As your experience widens, you will need to draw on a wider and wider variety of teaching methods so that you can maximise your student's learning. Refreshing this section should help you remember those teaching methods that you may not use very often.

Information processing

To understand how a person learns, we first need to consider a basic model of information processing: (see diagram below).



Information processing

The five senses are acted on by the environment (the cockpit, classroom or instructor) and the information is passed by the nervous system to the sensory register. The information remains in its original form for only a fraction of a second while pattern recognition takes place, giving form and shape to the information.

The information passed to the short-term or working memory, is coded as a concept. For example, the word aeroplane takes on meaning, but information received from long-term memory may modify that concept, say to a jet aeroplane. This re-coded information is passed to long-term memory for storage or is acted on.

Information from either short-term or long-term memory is passed to the response generator, or decision-maker, and this information is passed through the nervous system to the body's muscles, which act on the environment.

This whole process is affected by expectancies. For example, you will probably have had an experience of seeing what you wanted to see, rather than what was actually there. Expectancies affect the way information is perceived, the way it is coded, and the generated response.

The process is further affected by the strategies used to encode the information - learning strategies³. For example, the use of mnemonics or mind-mapping to store information can greatly affect later retrieval.

Definition of learning

To define learning, it is necessary to analyse what happens to the individual. As a result of a learning experience, an individual's way of perceiving, thinking, feeling and doing may change. Therefore, learning can be defined as "a change in behaviour as a result of experience that persists"¹. The behaviour can be physical and overt, or it can be intellectual or attitudinal, and therefore not easily seen. Learning occurs continuously throughout a person's lifetime.

Characteristics of learning

Learning comes from experience

The student can only learn from individual experience. A person's knowledge is a result of experience, and no two people have had identical experiences. Even when observing the same event, two people react differently; they learn different things from it, according to the manner in which the situation affects their individual needs. Previous experience conditions a person to respond to some things and ignore others.

All learning is by experience³, but it takes place in different forms and in varying degrees. Some experiences involve the whole person, while others only the ears and memory. You are faced with the problem of providing experiences that are meaningful, varied and appropriate; for example, by repeated drill, students can learn to say a list of words, or by rote they can learn to recite certain principles of flight. However, they can only make them meaningful if they understand them well enough to apply them correctly to real situations. If an experience challenges the learner, requires involvement with feelings, thoughts, memory of past experiences, and physical activity, it is more effective than an experience in which all the learner has to do is commit something to memory².

It seems clear enough that the learning of a physical piloting skill requires experience in performing that skill. However, mental habits are also learned through practice. If students are to use sound judgement and solve problems well, they must have had learning experiences in which they have exercised judgement and applied their knowledge of general principles in the solving of realistic problems⁴.

Learning must have relevance

Each student sees a learning situation from a different viewpoint. Each student's past experience affects readiness to learn. Most people have fairly definite ideas about what they want to achieve. Therefore, each student has specific goals and their needs and attitudes may determine what they learn as much as what you are trying to get them to learn. Students learn from any activity that tends to further their goals. The effective instructor must discover the student's goals and seek ways to relate new learning to those goals¹.

Learning outcomes are multiple

If instructors see their objective as being only to train their student's memory and muscles, they underestimate the potential of the teaching situation. Students may learn much that you did not intend, for they did not leave their thinking minds or feelings at home, just because these were not included in your lesson plan. Learning can be classified by type as: verbal, conceptual, perceptual, motor, problem solving and emotional. These divisions are artificial, however. For example, a class learning problem solving may learn by trying to solve real problems. In doing so it is also engaged in verbal learning and sensory perception. Each student approaches the task with preconceived ideas and feelings, and for many students these ideas change as a result of the experience. The learning process, therefore, may include many types of learning, all taking place at the same time.

In another sense, while learning the subject at hand, students may be learning other things as well. They may be developing attitudes about aviation, good or bad, depending on what they experience. You must always display a professional attitude, regardless of whether or not instruction is actually taking place. This learning is sometimes called incidental⁵, but it may have a great impact on the total development of the student.

Learning is an active process

You cannot assume that students remember something just because they were present in the classroom, briefing or aircraft when you taught it. Neither can you assume that the students can apply what they know because they can quote the correct answer from the book. For the students to learn, they must attend to instruction, react and respond by relating information to their knowledge and experience, construct meaning from that interaction, and attribute results to their own effort². If learning is a process of changing behaviour, that process must be inter-active and observable.

Learning theory

Learning components

Psychologists over the years have proposed various theories on learning, and from these we can gain an insight into the learning process. Listed below are some of the most widely accepted learning components, sometimes referred to as 'Laws of learning'.

Primacy

What is taught first, often creates a strong, almost unshakeable impression. Therefore what is taught, and what is learnt, must be right the first time. Un-teaching is more difficult than teaching.

Readiness

The student learns best when they are ready to learn, motivated, and understand clearly the objectives for the lesson. Being ready to learn also entails consideration of Maslow's hierarchy of human needs (see [Human behaviour](#)). A student distracted by fatigue, stress, home or relationship issues, etc, will not be ready to learn.

Relevance / Belonging

Individuals learn best when they see a reason for learning. If students have a clear objective, and a well defined reason for learning, they make rapid progress. You must explain the relevance of each lesson. For example, why must the student recognise the symptoms of the approaching stall? Where does this lesson fit with those covered previously, and those lessons ahead?

Repetition

Those things most often repeated are best remembered⁴. Every time practice occurs, learning continues. Students do not learn crosswind landings from one instructional flight. You must provide opportunities for practice and must see that this process is directed toward a goal.

Rewards, reinforcement, or conditioning

"One of the most powerful forms of reward available to the instructor is praise"². Learning is strengthened when accompanied by a pleasant or satisfying feeling and weakened when associated with an unpleasant one. Termed the 'Law of effect', it is based on the emotional reaction of the learner. An experience that produces feelings of defeat, frustration, anger, confusion or futility is unpleasant for the student. If, for example, an instructor attempts to teach landings during the first flight, the student is likely to feel overwhelmed. Impressing the student with a difficult manoeuvre can make the later teaching task difficult. It is better to tell students that a manoeuvre or problem, although difficult, is within their capabilities to perform or understand. Whatever the learning situation, it should affect the student positively and give them a feeling of satisfaction.

Intensity or arousal

A vivid, dramatic or exciting learning experience teaches more than does a routine or boring experience. This implies that the student will learn more from the real thing. In contrast to in-flight instruction, the classroom limits the amount of realism that can be brought into the teaching. Instructors should use imagination in the briefing. Photographs, mock-ups, and audio-visual aids can add vividness to classroom instruction.

Recency

The things most recently learned are best remembered. Instructors recognise recency when they carefully plan a summary of their pre-flight briefing or post-flight critique. You must repeat, restate or re-emphasise important points at the end of the lesson.

Feedback

Feedback on knowledge, skills and attitudes as learning takes place is important guidance for assessment on performance and progress. This feedback should be linked to the objectives of the lesson and focused on steps to take for next lesson or for improvement. It should guide the student in developing their own 'self-reflection' skills for assessing their own performance when flying solo.

How adults learn

One view of learning that is of particular importance to the flight instructor, is that proposed by MS Knowles³⁶ on how adults should be treated differently from children, based on their psychological differences.

- Children need to know what the teacher teaches if they want to pass.
- The child's self-concept is one of dependence on the teacher.
- The child's past experience is of little worth; it is the teacher's experience that matters
- The child is ready to learn when the teacher tells them to learn.
- The child is orientated toward subject matter.
- The child is motivated to learn by external forces, eg, grades, parents.

As flight instructors deal with adult or early adult education, how these differences affect adult learning is of some importance.

- Adults need to know why ; they need to see a use for their learning.
- Adults have a self-concept of being responsible for their own lives. They resent and resist situations in which they feel others are imposing their wills on them.
- Adults have a greater quantity and quality of experience , therefore more emphasis is placed on techniques which use that experience, such as group discussion and simulation exercises.
- Adults become ready to learn when they see a need for learning in order to deal with real-life situations.
- Adults learn most effectively when the context is orientated so they can see that the learning will help them deal with tasks or problems.
- Adults are affected by external motivation , but they possess a far more powerful internal motivation through job satisfaction or self-esteem.

Recommended reading

For a fuller explanation of how these factors affect the adult learner, flight instructors are encouraged to read *The Adult Learner: A Neglected Species*³⁶ by MS Knowles (1988), Chapter 3.

Perception

Initially, all learning comes from perceptions that are directed to the brain by one or more of the five senses. Psychologists have determined that normal individuals acquire about 75 percent of their knowledge through the sense of sight, 13 percent through hearing, 6 percent through touch, 3 percent through smell and 3 percent through taste. They have found that learning occurs most rapidly when information is received through more than one sense.

Perception involves more than receiving stimuli from the five senses. Perceptions result when a person gives meaning to sensations. People base their actions on the way they believe things to be, and this will depend on many factors within each person⁸. The experienced flight instructor, for example, will interpret site conditions quite differently to an inexperienced student. Because perceptions are the basis of all learning, some of the factors that affect the perceptual process are discussed below.

Goals and values

Every experience and sensation that is funnelled into the brain is coloured by the individual's own beliefs and value structure. Spectators at a rugby game may 'see' an infraction or foul differently depending on which team they support. The precise kinds of commitments and philosophical outlooks that the student holds are important for you to know, since this knowledge will assist in predicting how the student will interpret experiences and instructions. For example, the student with an interest in speed flying will perceive instruction differently from those interested in cross country or Vol Biv. Motivation is also a product of a person's value structure; those things most highly valued are pursued while those of less importance are not.

Self-concept

A student's self-image, described as 'confident' or 'insecure' has a great influence on the perception process. How a person sees themselves is a powerful factor in learning. The student who attributes success to hard work, and failure to lack of effort, will perform better than a student who attributes success to luck and failure to lack of ability⁹.

Time and opportunity

Learning depends on previous perceptions (experience) and the availability of time to relate new perceptions to the old. Therefore sequence and time available affect learning¹. A student could probably thermal an aircraft on their first flight, regardless of previous experience. But thermaling cannot be really learned unless some experience in normal flight has been acquired. Even with such previous experience, time and practice is needed to relate the new sensations and experiences associated with thermaling in order to develop a perception of thermaling. The length and frequency of an experience affect the learning rate. The training syllabus must provide time and opportunity. As a general guide for ab initio flight instruction little and often is best¹⁰.

The element of threat

Fear adversely affects a student's perception by narrowing their perceptual field. The field of vision is reduced, for example, when an individual is frightened, and all perceptual faculties are focused on the thing that has generated fear. Anxiety or worry (milder forms of fear) take up processing space in the working memory and may produce a "deficit in memory"¹¹, for example, during the initial practice of steeper turns, a student may focus attention on the inputs and completely disregard the gliders response. Anything an instructor does that is interpreted as threatening makes the student less able to accept the experience you are trying to provide. It adversely affects all the student's physical, emotional and mental faculties. Hence the extensive use, in flight instruction, of the follow-me-through exercise.

The student gains perception from the feel of control inputs but more importantly in the early stages, the student gains from the elimination of fear. You need to build a climate of confidence in which the student realises that you will not allow them to put the glider into a dangerous situation, and so the student's confidence in performing the manoeuvre grows. Learning is primarily a psychological process. As long as the student feels capable of coping with a situation, each new experience is viewed as a challenge.

Teaching is consistently effective only when those factors that influence perceptions are recognised and taken into account.

Insights

Insights involve the grouping of perceptions into meaningful wholes. To ensure that these occur, it is essential to help the student realise the way each piece relates to all the other pieces of the total pattern of the task to be learned⁴.

As an example, Glide ratio can be changed in many ways, A glider at its trim speed in straight and level flight has a measurable glide ratio. But this can be changed by wind speed and direction, speeding up or slowing the airspeed of the glider, inducing a turn or using big ears on a paraglider.

Therefore speed to fly, Glider airspeed, wind speed/direction and pilot inputs are all inter-related. Understanding the way in which each of these factors may affect all of the others, and understanding the way in which a change in any one of them may affect changes in all of the others, is imperative to true learning. This mental relating and grouping of associated perceptions is called insight.

Insights will almost always occur eventually, whether or not instruction is provided. Instruction, however, speeds this learning process by teaching the relationship of perceptions as they occur, thus promoting the development of insights by the student.

It is a major responsibility of the instructor to organise demonstrations, explanations and student practice so that the learner has the opportunity to understand the inter-relationship of experiences.

Pointing out the relationships as they occur, providing a secure and non-threatening environment in which to learn, and helping the student acquire and maintain a favourable self-concept are most important in the learning process.

Motivation

Motivation is the dominant force that governs the student's progress and ability to learn⁴. Motivations may be negative or positive, tangible or intangible, or subtle or obvious.

Negative motivations are those which engender fear. They are not characteristically effective in promoting efficient learning.

Positive motivations are provided by the promise or achievement of rewards. These rewards may be personal or social; they may involve financial gain, satisfaction of the self-concept, or public recognition. Some motivations that can be used to advantage by you include the desire for personal gain, the desire for personal security, the gaining of a sense of achievement, the desire for group approval, and the achievement of a favourable self-image.

The desire for personal gain, either the acquisition of things or position, is a basic motivation for all human endeavours. An individual may be motivated to dig a ditch or to design an aircraft solely by the desire for financial gain.

Students are like all other workers in wanting a tangible return for their efforts. If such motivation is to be effective, they must believe that their efforts will be suitably rewarded. These rewards must be constantly apparent to the student during instruction, whether they are to be financial, self interest or public recognition.

The student may not appreciate why they are learning a particular lesson. If motivation is to be maintained it is important that you ensure the student is aware of the applications of the lesson. This is usually achieved through the verbal introduction to the pre-flight brief. The attractive features of the activity to be learned can provide a powerful motivation. Students are anxious to learn skills that may be used, and if they can be made to understand how each learning task relates to their goals, they will be eager to pursue it.

The desire for personal comfort and security is a motivation that is often inadequately appreciated by instructors. All students want secure, pleasant conditions and states of being. If they recognise that what

they are learning may promote this objective, their interest is easier to attract and hold. Insecure and unpleasant training situations retard learning.

Everyone wants to avoid pain and injury. Students are likely to learn actions and operations that they realise may prevent injury. This is especially true when the student knows that the ability to act correctly in an emergency results from adequate learning.

Group approval is a strong motivating force. Every person wants approval of friends and superiors¹³. Interest can be stimulated and maintained by building on this natural force. Most students enjoy the feeling of belonging to a group and are interested in attaining prestige among their fellow students.

Every person seeks to establish a favourable self-image. This motivation can best be fostered by you through the introduction of perceptions which are based on facts previously learned and which are easily recognised by the student as achievements in learning. This process builds confidence, and motivation is strengthened as a result.

Slumps in learning are often due to slumps in motivation. Motivation does not remain at a uniform level and may be affected by outside influences, such as physical fitness or inadequate instruction. You must tailor instruction to maintain the highest possible level of motivation and should be alert to detect and counter lapses in motivation.

While the flight instructor must consider the motivation of students, it is also essential for the professional flight instructor to consider their own motivation.

Levels of learning

Learning may be accomplished at any of several levels. From the lowest to progressively higher levels of learning, these are:

- rote learning, the ability to repeat back something one has been taught without understanding or being able to apply it,
- understanding what has been taught,
- application of what has been learnt, and
- correlating what has been learnt with other things previously learned.

For example, a flight instructor may tell a beginning paraglider student pilot to enter a turn using rear risers. A student who can repeat these instructions has learned by rote. This will not be very useful to the student if there is no opportunity to make a turn in flight (application) or if the student has no knowledge of the function of the rear riser control (correlation).

Through instruction on the effect and use of the flight controls and experience in their use in flight, the student can develop these old and new perceptions into an insight on how it's possible to control the glider. At this point the student has developed an understanding of the procedure for turning using rear risers. This understanding is basic to effective learning but may not necessarily enable the student to make a correct turn on the first attempt or in an emergency situation.

When the student understands the procedure for using rear risers and has practised their use until an acceptable level of performance can be consistently demonstrated, the student has developed the skill to apply what has been taught.

Further understanding of the associated concepts are covered in the instructional techniques course syllabus when considering Bloom's Taxonomy for Cognitive (head), Psycho-motor (hands), and Affective (heart) Domains.

Learning a skill

Even though the process of learning has many aspects, the purpose of instruction is usually to learn a concept or skill. The process of learning a skill appears to be much the same whether it is a motor (physical) or mental skill. To provide an illustration of motor learning, follow the directions below:

- Write the word learning 15 times with your left hand (or right hand if you are left-handed). Try to improve the speed and quality of your writing.

In the learning task just completed, several principles of motor learning are involved and are discussed below.

Physical skills involve more than muscles

The above exercise contains a practical example of the multifaceted character of learning. It should be obvious that, while a muscular sequence was being learned, other things were happening as well. The perception changed as the sequence became easier. Concepts of how to perform the skill were developed and attitudes were changed.

Motivation

Where there is a desire to learn, rapid progress in improving the skill will normally occur. Conversely, where the desire to learn or improve is missing, little progress is made. In the exercise above, it is unlikely that any improvement occurred unless there was a clear intention to improve. To improve, one must not only recognise mistakes, but also make an effort to correct them. The person who lacks the desire to improve is not likely to make the effort and consequently will continue to practise errors.

Patterns to follow

The best way to prepare the student to perform a task is to provide a clear, step-by-step example. Therefore all exercises start with a demonstration. The demonstration is another way of stating the lesson objective – here is what you (the student) will be able to do at the end of this lesson. The demonstration is followed with a step-by-step follow-me-through example.

Perform the skill

Since you have now experienced writing a word with the wrong hand, consider how difficult it would be to tell someone else how to do it. Demonstrating how to do it will not result in a person learning the skill. Obviously practice is necessary. As the student gains proficiency in a skill, verbal instructions mean more. Whereas a long detailed explanation is confusing to the student during early practice, comments are more meaningful and useful after the skill has been partially mastered.

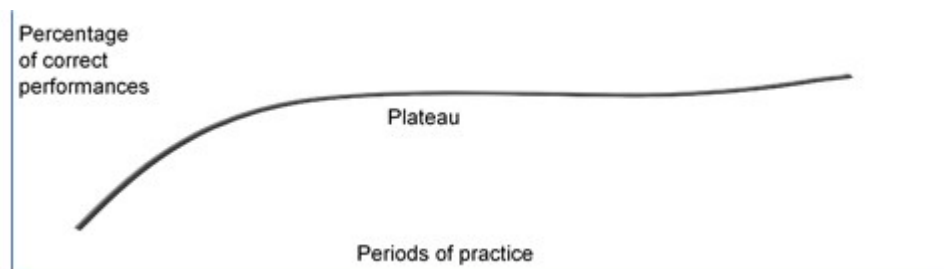
Knowledge of results

In learning some simple skills, students can discover their own errors quite easily. In learning others, such as complex flight manoeuvres, mistakes are not always apparent. Or the learner may know something is wrong but not know how to correct it. In either case, you provide a helpful and often critical function in making certain that the student is aware of their progress. They should be told as soon after the performance as possible, for they should not be allowed to practise mistakes. It is more difficult to un-learn a mistake and then learn it correctly, than it is to learn correctly in the first place. It is also important for students to know when they are right.

Progress follows a pattern

The experience of learning to write with the wrong hand probably confirmed what has been consistently demonstrated in laboratory experiments on skill learning. The first trials are slow and coordination is

lacking. Mistakes are frequent, but each trial provides clues for improvement in subsequent trials. The learner modifies different aspects of the skill, how to hold the pencil, how to execute finger and hand movements. Skill learning usually follows the same pattern⁴⁵.



Typical progress pattern

The graph above shows a typical progress pattern. There is rapid improvement in the early trials, then the curve levels off and may stay level for significant periods of effort. Further improvement may seem unlikely. Such a development is a learning plateau, and it may signify any of a number of conditions. The learner may have reached capability limits, may be consolidating a level of skill, may have their interest wane, or may need a more efficient method for increasing progress. Keep in mind that the apparent lack of increasing proficiency does not necessarily mean that learning has ceased⁴⁶. In learning motor skills, a levelling off process or plateau is normal and should be expected after an initial period of rapid improvement. This situation may cause impatience in the student. To avert discouragement, you should prepare them for this situation.

Duration and organisation of lessons

In planning for student performance, a primary consideration is the length of time devoted to practice. A beginning student reaches a point where additional practice is not only unproductive but may be harmful. When this point is reached, errors increase and motivation declines. The skilful instructor ends the learning experience before this point is reached. As a guide, when the basics of the manoeuvre have been achieved, it's time to end the lesson. It is for future lessons to build on this success. As a student gains experience, longer periods of practice are profitable.

Evaluation versus critique

If an instructor were to evaluate the fifteenth writing of the word learning, only limited help could be given toward further improvement. You could judge whether the written word was legible, evaluate it against some standard, or perhaps assign it a grade. None of these would be very useful to a beginning student. The student could profit, however, by having someone watch the performance and critique it constructively to help eliminate errors. In the initial stages, practical suggestions are more valuable to the student than a grade.

As the instructor will not always be there to give a judgement, self-critique should be encouraged as a learning goal for the student.

Visualisation or imagery

"Research on motor skill learning has provided evidence for using mental practice"⁴⁷. If you were to visualise yourself raising an arm out to the side, it would be possible to monitor activity in the deltoid muscles even though no physical movement had occurred. Imagery therefore has the effect of priming the appropriate muscles for subsequent physical action. The messages passed to the brain by the muscular system during visualisation are also retained in the memory. This means that physical skills can be improved even when they are only practised in the mind. The use of handouts and questionnaires on completion of the lesson can aid the student in reliving the experience in their mind.

Application of skill

The final and critical problem is use. Can the student use what has been learned? Two conditions must be present:

1. The student must learn the skill so well that it becomes easy, even habitual, to perform.
2. The student must recognise the types of situations where it is appropriate to use the skill. This second condition involves transfer of learning.

Transfer of learning

Transfer of learning is concerned with how well the learned material is applied in actual situations. For example, the student may have learned how to read a forecast. But how do they apply their knowledge of the forecast to their decision making on the hill and or during their flight, does the student apply their knowledge of the forecast in their flying decisions?

Transfer cannot occur if the knowledge itself has not been initially mastered.

This points to a need to know a student's past experience and what has already been learned. In lesson planning, instructors should plan for transfer by organising lesson material to build on what the student already knows. Also, each lesson should prepare the student to learn what is to follow.

Recommended reading

Flight instructors are encouraged to read *Essentials of Learning for Instruction*¹ by RM Gagne and MP Driscoll (2nd ed) (1988).

Forgetting and retention – theories of forgetting

Why people forget may point the way to helping them remember.

Disuse

A person forgets those things that are not used. But the explanation is not that simple. Experimental studies show, for example, that a hypnotised person can describe specific details of an event that would normally be beyond recall. Apparently the memory is there, locked in the recesses of the mind. The difficulty is summoning it up to consciousness².

Interference

From experiments, two conclusions about interference can be drawn:

- Closely similar material seems to interfere with memory more than dissimilar material.
- Material not well learned suffers most from interference³.

Repression

Repression is the submersion of ideas into the unconscious mind. Material that is unpleasant or produces anxiety may be treated this way, but not intentionally. It is subconscious and protective. This type of forgetting is rare in aviation instruction.

Retention of learning

When a person forgets something it is not lost; rather it is unavailable for recall. Hunt and Poltrock offer the analogy of books in a library that are never removed from the shelves, whereas the index cards may be lost. Your problem then, is how to make certain that the student's learning is always available for recall. The following suggestions can help.

Teach thoroughly and with relevance. Material thoroughly learned is highly resistant to forgetting. Meaningful learning builds patterns of relationships in the student's consciousness. Whereas rote learning is superficial and is not easily retained, meaningful learning goes deep because it involves principles and concepts anchored in the student's own experience.

Long-term memory is enhanced if information is well encoded, put into several different files by being explained in different ways and thus well cross-indexed (association). Retention can be assisted by stimulation of interest.

Principles

The following are five significant principles that are generally accepted as having a direct application to remembering:

Praise

Responses that give a pleasurable return tend to be repeated. Absence of praise or recognition makes recall less likely.

Association

Each bit of information or action, which is associated with something already known by the student, tends to facilitate later recall.

Favourable attitudes

People learn and remember only what they wish to know. Without motivation there is little chance for recall. The most effective motivations are internal, based on positive or rewarding objectives.

Multiple senses

Although we generally receive what we learn through the eyes and ears, other senses also contribute to most perceptions. When several senses respond together, fuller understanding and a greater chance of recall is achieved.

Repetition

Each repetition gives the student an opportunity to gain a clearer and more accurate perception of the subject to be learned, but mere repetition does not guarantee retention. Practice gives an opportunity for learning but does not cause it. Three or four repetitions provide the maximum effect, after which the rate of learning and probability of retention fall off rapidly.

Human behaviour

By definition, learning is - a change of behaviour resulting from experience that persists. To successfully accomplish the task of helping to bring about this change, you must know why human beings act the way they do. Knowledge of basic human needs and defence mechanisms will aid you in organising student activities and in promoting a climate conducive to learning.

The relationship between you and the student has a profound impact on how much, and what, the student learns. Consider your own experiences with your first flight instructor. You probably thought your instructor was the best, and you probably strove to emulate and please your instructor. The power and impact of role modelling must not be underestimated. The instructor directs and controls the student's behaviour, guiding them toward their goals, by creating an environment that enables the student to help themselves.

To students, the instructor is a role model, a symbol of authority. Students expect you to exercise certain controls, and they recognise and submit to authority as a valid means of control. The controls the instructor exercises – how much – how far – to what degree – should be based on generalisations of motivated human nature.

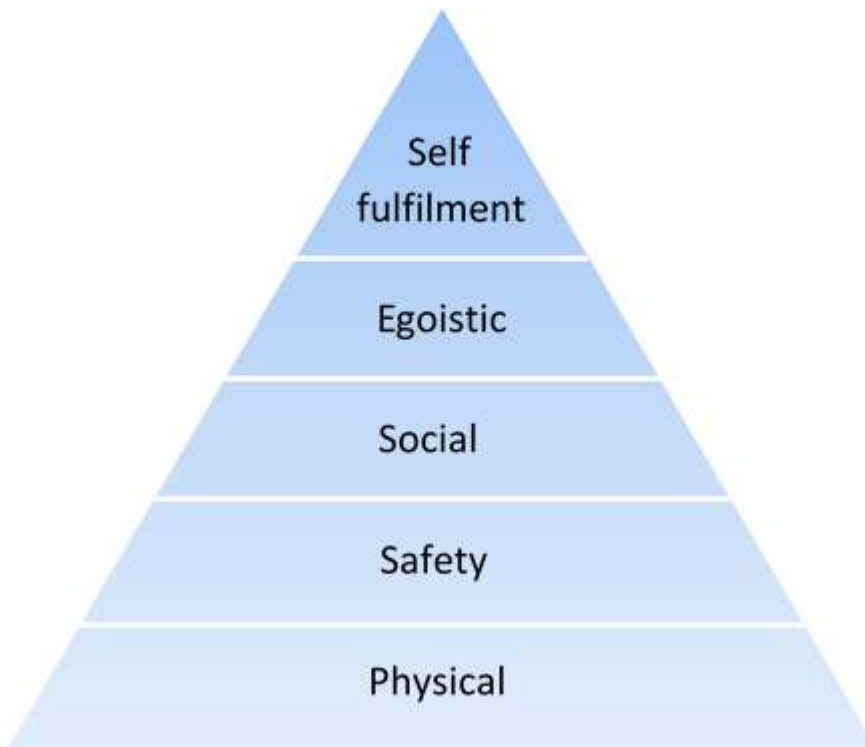
- Physical and mental effort in work is as natural as play. Work may be a source of satisfaction and, if so, will be performed voluntarily.
- A human being will exercise self-direction and self-control in the pursuit of goals to which they have committed themselves.
- Commitment to a goal relates directly to the perceived reward for achievement, the most significant of which is satisfaction of ego.
- Shirking responsibility and lack of ambition are not inherent in human nature. They are usually the consequence of experience.
- The capacity to exercise a relatively high degree of imagination, ingenuity and creativity in the solution of common problems is widely, not narrowly, distributed in the population.
- Under the conditions of modern life, the intellectual potential of the average human being is only partially used.

Your ingenuity must be used in discovering how to realise the potential of the student. The responsibility rests squarely on you. If the student is perceived as lazy, indifferent, unresponsive, uncooperative or antagonistic, the cause may lie in your methods of control. The raw material is there, and the shaping and directing of it lies in the hands of those who have the responsibility of controlling it.

A productive relationship with the student depends on your knowledge of students, as human beings and of the needs, drives and desires they continually try to satisfy in one way or another.

Human needs

The needs of students, and of all humans, are given labels by psychologists and are generally organised in a series of levels. The 'pyramid of human needs' has been suggested by Abraham Maslow.



Maslow's hierarchy of needs

Physical needs

Individuals are first concerned with their need for food, rest, exercise and protection from the elements. Until these needs are satisfied to a reasonable degree, they cannot concentrate on learning or self-expression.

Once a need is satisfied, it no longer provides motivation. Therefore each individual strives to satisfy the needs of the next higher level.

Safety needs

Protection from danger, threat or deprivation are called safety or security needs. These needs, as perceived by the student, are real and will affect student behaviour.

Social needs

If individuals are physically comfortable and have no fear for their safety, their social needs then become the prime influence on their behaviour. These needs are to belong, to associate, and to give and receive friendship and love. Many studies have demonstrated that a tightly knit, cohesive group, under proper conditions, will be more effective than an equal number of separate individuals. As students are usually separated from normal surroundings, their need for association and for belonging will be more pronounced.

Egoistic needs

The egoistic needs will usually have a direct influence on the student-instructor relationship. These needs are two kinds:

- Those that relate to self-esteem through self-confidence, independence, achievement, competence and knowledge.
- Those that relate to reputation through status, recognition, appreciation and the deserved respect of peers.

Self-fulfilment needs

At the apex of the hierarchy of human needs are those for self-fulfilment, for realising your own potential, for continued development, and for being creative in the broadest sense. This need of a student should offer the greatest challenge to you. Aiding another in realising self-fulfilment is probably the most worthwhile accomplishment an instructor can achieve.

Defence mechanisms

Certain behaviour patterns are called defence mechanisms because they are subconscious defences against unpleasant situations. People use defences to soften feelings of failure, to alleviate feelings of guilt, and to protect feelings of personal worth and adequacy.

Although defence mechanisms can serve a useful purpose, they can also be hindrances. Because they involve some self-deception and distortion of reality, defence mechanisms do not solve problems. They alleviate symptoms, not causes. Common defence mechanisms are rationalisation, flight, aggression and resignation.

Rationalisation

If students cannot accept the real reasons for their behaviour, they may rationalise. This device permits them to substitute excuses for reasons. In addition, they can make those excuses plausible and acceptable to themselves. Rationalisation is a subconscious technique for justifying actions that otherwise would be unacceptable.

Flight

Students often escape from frustrating situations by fleeing, either physically or mentally. To flee physically, students may develop ailments that give them satisfactory excuses for removing themselves from frustration. More frequent is mental fleeing through daydreaming. Mental fleeing provides a simple and satisfying escape from problems. If students get sufficient satisfaction from daydreaming they may stop trying to achieve their goals.

Aggression

Everyone gets angry. Anger is a normal, universal human emotion. In a briefing room, classroom or aircraft, extreme anger is relatively infrequent. Because of social strictures, student aggression is usually subtle. Students may ask irrelevant questions or refuse to participate in class activities.

Resignation

Students may become so frustrated that they lose interest and give up. The most common cause of this takes place when, after completing the early phase of a course without grasping the fundamentals, a student becomes bewildered and lost in the advanced phase. From that point learning is negligible, although the student may go through the motions of participating.

The instructor's role in human relations

To minimise student frustration and achieve good human relations are basic instructor responsibilities.

Keep students motivated

Students gain most from wanting to learn rather than being forced to learn. Often students do not realise how a particular lesson or course can help them reach an important goal. Each lesson must have relevance. When they can see the benefits or purpose of a lesson or course, their enjoyment and their efforts will increase.

Keep students informed

Students feel insecure when they do not know what is expected of them or what is going to happen to them. For example, consider your own feelings before your first flight.

Instructors can minimise such feelings of insecurity by telling students what is expected of them and what they can expect, not just the control inputs to use.

Approach students as individuals

When instructors limit their thinking to a group without considering the individuals who make up that group, their effort is directed at an average personality which really fits no one¹⁸. After giving the same lesson several times, it is easy for you to overlook this aspect.

Each individual has a personality which is unique and which should be constantly considered.

Give credit when due

When students do well, they wish their abilities and efforts to be noticed. Otherwise they become frustrated. Praise from you is usually ample reward and provides incentive to do even better. Praise given too freely, however, becomes valueless.

Constructive feedback

Although it's important to give praise and credit when deserved, it's equally (not more) important to identify mistakes and failures. However, to tell students that they have made errors and not provide explanations does not help them. Errors cannot be corrected if they are not identified, and if they are not identified they will probably be perpetuated through faulty practice. If the student is briefed on the errors made, and is told and shown how to correct them, progress and accomplishment can be made.

Be consistent

Students want to please their instructor. Therefore, students have a keen interest in knowing what is required to please you. If the same thing is acceptable one day and not the next, the student becomes confused. Your philosophy and actions must be consistent. This often leads to a desire by the student to fly with only one instructor.

Admit errors

No one, including the students, expects an instructor to be perfect. You can win the respect of students by honestly acknowledging mistakes. If you try to cover up or bluff, the students will often sense it. Such behaviour destroys student confidence in you. If in doubt about some point, you should admit it. You should report back to the student after seeking advice from another instructor, or recognised texts.

Good human relations promote effective learning.

Effective communication

Communicating, for an instructor, is an essential skill. Improving communication skills depends on an understanding of the process. In this chapter we look at the elements of the communication process and the barriers to successful communication.

Basic elements of the communication process

Communication takes place when one person transmits ideas or feelings to another person or group. Its effectiveness is measured by the similarity between the idea transmitted and the idea received¹⁸.

The basic process of communication is composed of three elements:

- The source – sender, speaker, writer, instructor, transmitter, etc.
- The symbols – words, signs, actions, music, etc.
- The receiver – listener, reader, student, etc.

These elements are interrelated, and that which affects one influences the others. If a listener has difficulty in understanding the symbols a speaker is using and indicates confusion, the speaker may become puzzled and uncertain, losing control of ideas. Communication effectiveness is diminished. On the other hand, when a listener reacts favourably, a speaker is encouraged, and force is added to communication. Communication is a complicated two-way process.

The source

The effectiveness of a person acting in the role of communicator is related to at least three basic factors.

First, their ability to select and use language influences their ability to select meaningful symbols for the listener or reader. For example, if you want to teach Greek it's useful to know the Greek alphabet.

Second, communicators consciously or unconsciously reveal attitudes about themselves, about the ideas they are trying to transmit, and about their receivers. These attitudes must be positive if they are to communicate effectively. They must indicate that they believe their message is important. Communicators must make it clear to their listeners or readers that they believe there is a need to know the ideas presented.

Third, successful communicators speak or write from a broad background. Communicators must exercise great care to make certain they communicate ideas and feelings that are meaningful to their receivers. Often a speaker or writer will depend on a narrow, highly technical or professional background, with its associated vocabulary, which is meaningful only to others of a similar background.

Reliance on technical language to express ideas often impedes effective communication.

Symbols

At its basic level, communication is achieved through the use of simple oral and visual codes. The letters of our alphabet when translated into words are a basic code. Common gestures and facial expressions and body language form another²⁰. Words and gestures may be projected in isolation, but ideas are communicated only when symbols are combined into meaningful wholes as sentences, paragraphs and chapters. Each part is important for effective communication.

Communicators must carefully select ideas if they are to convey messages which receivers can react to and understand. They must determine which ideas are best suited to starting and concluding the communication, and which ideas clarify, emphasise, define, limit and explain – all of which form the basis for the effective transmission of ideas from source to receiver.

The development of ideas culminates in the choice of medium best suited for transmission. Most frequently, communicators select the channels of hearing and seeing. Occasionally, the channel of feeling, by touching or manipulating, can be used effectively. The most successful communicator, however, uses a variety of channels.

Receiver

Communication succeeds only in relation to the reaction of the receiver.

When the receivers react with understanding and change their behaviour accordingly, then – and only then – has communication been effective²¹. To understand effective communication, at least three characteristics of receivers must be understood²².

First, the receiver's ability to question and comprehend the ideas that have been transmitted. Communicators can capitalise on this by providing an atmosphere which encourages questioning. Communication is most effective when the feedback loop is available to obtain further clarity to ensure the message is correctly received.

Second, the receiver's attitude, which may be one of resistance, willingness or passive neutrality. Whatever the attitude, communicators must gain the receiver's attention and then retain it. Generally, the more varied the communicative approach the more successful they will be in this respect.

Third, the receiver's background, experience and education define the target at which communication must be aimed. Communicators must assess their receiver's knowledge and use that assessment as a guide for selecting techniques for transmission. The major barriers to effective communication are usually found in this particular area.

Barriers to effective communication

The nature of language and the way it is used often lead to misunderstandings. These misunderstandings stem primarily from three barriers to effective communication:

- Lack of a common core of experience
- Confusion between the symbol and the thing symbolised
- Use of abstractions.

Lack of a common core of experience

Probably the greatest single barrier to effective communication is the lack of common experience between communicator and receiver. Communication can be effective only to the extent that the experiences – physical, mental or emotional – of the people concerned are similar²². Words do not transport meanings from speaker to listener in the same manner as a truck carries bricks from one location to another. Words never carry precisely the same meaning from the mind of the communicator to that of the receiver.

Consider your own experience as a communicator. Recall telling someone of your experiences on holiday. Although you tried to describe the experience vividly, you may have felt that the receiver didn't get the full picture of your holiday. Words, spoken or written, do not transfer meanings; they are merely stimuli that a communicator uses to arouse a response in the receiver. The nature of the response is determined by the receiver's past experience with the words and the things to which they refer²⁰. These experiences give the words their meaning – which is in the mind of the receiver, not in the words themselves.

Words cannot communicate meaning unless the listener or reader has had some experience with the concepts or objects to which the words refer²³. Consider the effect of your communication if your listener had never been on a holiday.

Confusion between the symbol and the thing symbolised

Words are simply representations. They represent anything that exists or that is experienced. Consider language as a map. A useful map accurately represents some specified territory; language should correspond to the objects or concepts that it represents. Like a map that contains errors, a statement that contains inaccuracies implies a relationship that does not exist.

Use of abstractions

Concrete words refer to objects that we can experience directly. Abstract words, on the other hand, stand for ideas that cannot be directly experienced, for things that do not call forth mental images in the mind of the receiver.

For example, assuming a similar core of experience, if a communicator is discussing a particular glider and refers to it as a hang glider, the listeners immediately get a mental image of this aircraft (clearly the accuracy of that image will be affected by experience). The name hang glider represents a concrete reality that can be seen, heard and touched. If, however, the communicator uses just the word glider the listeners do not necessarily form a specific mental image of the hang glider because there are several aircraft that fit that description. If the communicator uses just the word aircraft, the term is so abstract that the listeners cannot form a mental image of the hang glider at all.

Abstract words do not bring forth specific items of experience in the minds of receivers. Although abstractions are convenient and useful, they can lead to misunderstandings. When abstractions are used in communication, they should be linked with specific experiences through examples and illustrations. The level of abstraction should be reduced wherever possible by using concrete and specific words²⁴. In this way the communicator narrows and gains better control of the image produced in the mind of the listener or reader.

The teaching process

Effective teaching must be based on the principles of learning discussed in [Learning theory](#). The learning process does not seem to be naturally divisible into a definite number of steps.

Sometimes it occurs almost instantaneously, as when a child learns about heat from touching a hot stove. In other cases, learning is acquired only through long, patient study and diligent practice.

A close examination of the teaching process reveals that different recognised authorities specify a varying number of steps. Here we will concern ourselves only with the four basic steps²⁵ that can be applied either to ground lectures or flight instruction. They are:

- Preparation
- Presentation
- Application
- Review and evaluation.

Preparation

For each lesson or instructional period, you must refer to the syllabus and determine what can reasonably be covered in the time available. From this information, the objective of the lesson is set. The objective is a statement of what the student will be able to do on completion of the lesson²⁶.

For an objective to result in the desired learning outcome it must:

- Be achievable. The objective must be something the student could reasonably be expected to be able to do, given their past experience.

If the student cannot achieve the objective, motivation may be adversely affected.

- Be observable. The objective must be observable by both student and instructor. For example, "The student will know the symptoms of approaching a stall" is not an observable objective, whereas "The student will state the symptoms of approaching a stall" is observable.

The observed performance is what evaluation should be based on.

- Be measurable. The objective must have some limits by which both you and student can measure acceptable performance²⁷. For example, "State the symptoms of approaching a stall in the correct order without error".

The parameters stated need not be perfection or final test parameters. They should relate directly to what it is you expect the student to be able to do at the end of this lesson.

In addition a statement may be made as to the conditions under which the student must perform, for example, whether by using a briefing handout or from memory.

In summary, in the objectives you spell out what the student is expected to do, how well, and under what conditions²⁸. In your instructional techniques course, this will be described as Performance, Standard, and Conditions.

Care must be taken in preparing an objective to ensure that it accurately describes the desired learning outcome. The objective "to state the symptoms" is aimed at the knowledge level and could be achieved without the student ever having experienced a stall. Therefore, assuming the student achieved the above objective under the conditions stated, the following learning outcomes would result:

- the student can read a list from top to bottom; or
- the student has memorised a list from top to bottom.

To write a lesson objective, ask yourself these questions:

- What is it I expect the student to be able to do at the end of this lesson?
- How will I know that they are doing it?
- How well should they do it? and, if applicable,
- Under what conditions?

Preparing objectives in this way not only gives the student a clear idea of what is expected of them at the end of the lesson, but, more importantly, also focuses your attention directly on what it is you want your student to achieve as a result of your instruction.

To achieve a desired learning outcome, multiple objectives may be required. If you find you have more than three objectives for a lesson, serious consideration should be given to breaking the lesson down into smaller units.

Preparation must involve the development of a detailed written lesson plan if the instructional period is to be effective. The lesson plan is your statement of lesson objectives, the procedures and facilities to be used in presenting it, and the specific goals to be attained. The development of lesson plans by instructors signifies, in effect, that they have taught the lessons to themselves before teaching the lesson to students. The use of a lesson plan should:

- Assure a wise selection of material and eliminate unimportant details.
- Ensure due consideration is given to each part of the lesson.
- Aid the presentation of material in a suitable sequence.
- Give the inexperienced instructor confidence.

Preparation should also include pre-lesson handouts²⁹ or assigned reading to be completed by the student before the lesson.

As part of the preparation, you should make certain that all necessary supplies, materials and equipment are readily available and that the equipment is operating properly before the student arrives.

Presentation

It is your presentation of the knowledge and skills that make up the lesson. The choice of the method of presentation is determined by the nature of the subject matter and the objective.

The lecture method is suitable for presenting new material, for summarising ideas and for showing relationships between theory and practice. For example, it is suitable for the presentation of a ground school lesson on glider loading. This method may be most effective if accompanied by instructional aids and training devices. In the case of a lecture on glider loading, a whiteboard could be used effectively or a PowerPoint.

The demonstration-performance method is desirable for presenting a skill, such as use of a preflight check. Great care must be taken in using this method, to ensure that the demonstration follows the correct steps in the proper order, so the student gets a clear picture of each separate part of the preflight check.

Application

Application is the student's use of the ideas presented by you. This is where you discover if the images transmitted are similar to those received by the student, and if transfer of learning has occurred. In a classroom situation, the student may be asked to explain the new material, or to perform an operation.

In classroom and flight instructing situations, portions of your explanation and demonstration are alternated with student practice. It is rare that you complete an explanation and demonstration and then expect the student to complete the performance.

It is very important that the student perform the manoeuvre or operation the right way the first few times, for this is when habits are established. Faulty habits are difficult to correct.

The emphasis is on the correct sequence – not the speed at which it is performed. Speed of performance may be an important goal, but it should not take precedence in the early stages of instruction.

After reasonable competence has been attained, the manoeuvre or operation should be practised until correct performance becomes almost automatic.

Review and evaluation

Review and evaluation is an integral part of each classroom or flight lesson. Before the end of the instructional period, you should review what has been covered and require students to demonstrate the extent to which the lesson objectives have been met.

Evaluation may be informal and noted only for use in planning the next lesson, or it may be recorded to certify the student's progress. In either case, the student should be aware of their progress.

In flight training, you must remember that it is difficult for students to obtain a clear picture of their progress, since they have little opportunity for a direct comparison with others, especially in the early phases of training. The students recognise that they are in a competitive situation unlike any previously experienced. The unseen competitor is that intangible competency which must be achieved. The student's own evaluation can only be subjective. Direct comparisons for them are only possible with the performance of the instructor. Only you can provide a realistic evaluation of performance and progress.

In addition to knowledge and skills learned during the period just completed, each lesson should review things previously learned. If faults not associated with the present lesson are revealed, they should be pointed out. Such corrective action as is practical within the limitations of the situation should be taken immediately; more thorough remedial action must be included in future lesson plans.

The evaluation of student performance and accomplishment during a lesson should be based on the stated objective³⁰.

Teaching methods

The instructor's skill is determined to a large degree by the ability to organise material and to select and utilise a teaching method appropriate to a particular lesson. Of the various teaching methods in common use, only the lecture method, the guided discussion and the demonstration-performance method will be covered here. The pre-flight briefing will be discussed at length in the Briefings section.

There is no definite line of division between these methods; some material requires the use of more than one method or a combination of methods²⁵. For example, a demonstration of how to launch a glider, followed by a thorough explanation, is essentially a lecture.

The use of programmed instruction will also be discussed, as many organisations employ the principles of this type of instruction, primarily through computers when it is known as Computer-Based Training (CBT).

Organising material

Regardless of the teaching method used, you must organise the material in a logical sequence³¹. One effective way to organise the lesson, and the simplest, is:

- Introduction
- Development
- Conclusion²⁵

Introduction

The introduction serves several purposes:

- To establish common ground between you and the students
- To capture and hold the attention of the student or group
- To establish the objectives of the lesson
- To indicate what material is to be covered and how this relates to the entire course
- To point out why the student should learn the material and what benefits the student can expect
- To establish a receptive attitude toward the lesson
- To lead into the lesson development.

The introduction should be free of stories or incidents that do not help the students focus their attention on the lesson objective. Also, a long or apologetic introduction should be avoided, as it will dampen student interest in the lesson. The introduction sets the stage for learning by gaining the student's attention, providing motivation and giving an overview of the material to be covered and its relevance to the course goals.

Attention

For information to be perceived, it first must be attended to³². Gaining and maintaining the student's attention, therefore, is of prime importance to you. One of the most effective methods is novelty²⁴.

For example, a lesson on parachute landing falls might start with you asking the group if you had to jump off a 4m high roof how would you do it? Or you might make an unexpected or surprising statement, eg, "it's possible that a pilot will break their back when landing under a reserve parachute" and then inviting debate by asking why. Or you might begin by telling a true story of an incident that relates to the subject and thereby establishes a background or reason for learning. No matter how you introduce the lesson, the main concern should be to gain the student's attention and focus it on the subject³³.

Motivation

The introduction should offer the students specific reasons for needing to be familiar with, to know, to understand, to apply or to be able to perform whatever they are about to learn. This motivation should appeal to each student personally.

Overview

Every lesson introduction should contain an overview that tells the student or group what is to be covered during the lesson. A clear, concise presentation of the objective and the key ideas is absolutely critical, for it gives the student a road map of the route to be followed.

Development

The development of the lesson is the main part. Here you develop the subject matter in a manner that helps the students achieve the desired outcome or objective.

You must organise the material logically to show the relationships of the main points³⁴. Usually these primary relationships are shown by developing the main points in one of the following ways²⁵:

- from past to present
- from simple to complex
- from known to unknown
- from most to least frequently used.

From past to present

In development from past to present, the subject matter is arranged chronologically. This is most suitable when history is an important consideration, eg, when tracing the development of gliders in the past 30 years.

From simple to complex

The simple to complex pattern helps you lead the student from simple facts or ideas to an understanding of complex concepts. In studying lift, for example, the student might begin by considering the action of a river as it enters and leaves a narrow gorge – and finish with the lift formula.

From known to unknown

By using something the student already knows you can develop concepts.

From most to least frequently used

Some information or concepts are common to all who use the material. This pattern starts with the most common use before progressing to rarer ones.

Under each main point in a lesson the subordinate points should lead naturally from one to another. With this arrangement, each point leads logically into, and serves as a reminder of, the next. Meaningful transitions keep the students oriented, aware of what they have covered and what is to come²⁵.

Organising a lesson so that the students will grasp the logical relationships of ideas is not an easy task. The use of a lesson plan provides guidance on how to link ideas in a logical sequence. This type of organisation is necessary if the students are to learn. Poorly organised information is of little or no value to the student.

Conclusion

An effective conclusion retraces the important elements of the lesson and relates them to the objective. This review and wrap-up of ideas reinforces the student's learning and improves retention. It will generally include some assessment of whether or not the learning has been achieved.

No new ideas should be introduced in the conclusion.

Lecture method

You should know how to prepare and present a lecture and should understand the advantages and limitations of this teaching method.

The lecture is used primarily to introduce students to a new subject, but it is also a valuable method for summarising ideas, showing relationships between theory and practice, and re-emphasising main points³⁵. The lecture method is adaptable and has several advantages.

Lectures may be given to either small or large groups, they may be used to introduce a complete training program or a single unit of instruction, and they may be combined with other teaching methods to give added meaning and direction.

The success of a lecture depends on your ability to communicate effectively as well as the ability to plan, develop and review the lesson.

In other methods of teaching (demonstration-performance, guided discussion) the instructor receives direct reaction from the students in the form of verbal or motor activity. During a lecture, however, feedback is not as direct and is therefore harder to interpret. You must develop a keen perception for subtle responses from the class (facial expressions, apparent interest or disinterest) and be able to interpret the meaning of these reactions and adjust the lesson accordingly.

Planning the lecture

The competent instructor knows that careful preparation is a major factor in the successful presentation of a lecture. Preparation should start well in advance of the presentation.

Four steps should be followed in the planning phase of preparation:

- Establish the desired outcome and therefore the objective
- Research the subject
- Organise the material
- Plan interactive classroom activities.

Developing the lecture

In supporting key points or ideas in the lesson, you must work on the assumption that the student may neither believe nor understand the points to be covered. In developing the lesson you should use the recommended text for the subject as well as statistics, comparisons and meaningful examples.

After completing the preliminary planning and writing the lesson plan, you should rehearse the lecture to build self-confidence. During rehearsal the mechanics of using notes, visual aids and other instructional techniques can be smoothed out. You should have your supervisor attend the practice sessions and observe the presentation critically. This critique will help you judge the adequacy of supporting materials and visual aids.

Suitable language

During the lecture, simple rather than complex words should be used whenever possible. Errors in grammar and vulgarisms detract from an instructor's dignity and reflect upon the intelligence of the students.

If the subject includes technical terms, you should clearly define each one so that no student is in doubt about its meaning¹². Whenever possible, you should use specific rather than general words. For example, the specific words "overdeveloped cumulonimbus clouds" tell more than the general term "blown out".

Another way you can enliven the lecture is to use sentences of varying length. Too many short sentences result in a choppy style; long sentences, unless carefully constructed, are difficult to follow. To ensure clarity and variety, you should use a mixture of short and medium length sentences²⁵.

Whatever the style adopted by you, a display of enthusiasm will greatly affect the success of any presentation. "Probably the best teachers of adults are people who are enthusiastic amateurs in their subject – at least, amateurs at teaching it"³⁶.

Delivery methods

You can deliver a lecture in one of four ways, by:

- reading written notes
- reciting memorised material
- speaking without notes from an outline
- speaking impromptu without preparation.

The lecture is probably best delivered by speaking without notes from an outline. You speak from a mental or written outline but do not read or memorise the material to be presented. Because the exact words with which to express an idea are left to the moment, the lecture is more personalised and provides more opportunity for enthusiasm, than one which is read or spoken from memory. Since you talk directly to the students, rather than head down reading from notes, the reactions of the students can be readily observed, and adjustments can be made to their responses.

You have better control of the situation, can change the approach to deal with any situation as it arises, and can tailor each idea to suit the individual responses of the students. For example, if you realise from their puzzled expressions that a number of students fail to grasp an idea, that point can be elaborated upon until the reactions of the students indicate that they understand.

Overall, this method reflects your personal enthusiasm and is more flexible than other methods. For these reasons it is likely to hold the interest of the students.

Use of notes

An instructor who is thoroughly prepared can usually speak effectively without notes. If the lecture and outline have been carefully prepared and rehearsed there should be no real difficulty. However, if your preparation has been limited, you may find it necessary to use notes.

Notes do have certain advantages. They assure accuracy, jog the memory, and dispel the fear of forgetting. An instructor should not, however, be overly dependent on notes. Use them sparingly and unobtrusively, but make no effort to hide them from the students. Notes should be written legibly or typed, and they should be placed on the lectern where they can be consulted easily, or held if you walk about the platform.

Formal versus informal lectures

The lecture may be conducted in either a formal or informal manner.

Learning is best achieved if students participate actively in a friendly, relaxed atmosphere. Therefore, use of the informal lecture, which includes active student participation, is encouraged. A formal lecture, however, is still to be preferred on some occasions, such as introducing new subject matter.

You can achieve active student participation in the informal lecture through the use of questions²⁷. In this way, the students are encouraged to make contributions that supplement the lecture. You can use questions for one or more of the following purposes:

- to determine the experience and background of the students
- in order to tailor the lecture to them,
- to add variety and stimulate interest, or
- to check student understanding.

It remains your responsibility to plan, develop and present the lesson. The students should not be relied on for any significant portion of the lesson development.

Advantages of the lecture

In a lecture, you can present many ideas in a relatively short time. Facts and ideas that have been logically organised can be concisely presented in rapid sequence. Lecturing is the most economical teaching method in terms of the time required to present a given amount of material. It is also a convenient method for large groups.

The lecture can be used to ensure that all students have the necessary basic information background to learn a new subject²⁸. You can offer students with varied backgrounds a common understanding of principles and facts.

If students do not have the time required for research or access to reference material, information they need can be presented in a lecture. The lecture can usefully and effectively supplement other teaching methods. A brief introductory lecture can give direction and purpose to a demonstration.

Disadvantages of the lecture

As a teaching method the lecture cannot provide for all desired learning outcomes. Motor skills can not be learned by listening to a lecture.

Too often the lecture does not provide for student participation and, as a consequence, many students willingly let you do all the work.

Learning is an active process, and the lecture tends to foster passiveness and teacher- dependence on the part of the students²⁹.

The lecture does not enable you to estimate the student's progress before additional material is introduced. Within a single period, you may unwittingly present more information than students can absorb. The lecture method provides no accurate means of checking student learning.

Instructors find it difficult to hold the attention of all the students throughout a lecture³⁰. The successful lecture relies heavily on your skill in speaking.

Recommended reading

*53 Interesting Things to do in Your Lectures*³³ by G Gibbs et al (1991)
*Planning an Instructional Sequence*²⁷ by WJ Popham et al (1970)

Guided discussion method

In contrast to the lecture, where you provide information, the guided discussion relies on the students to provide ideas, experiences, opinions and information. An instructor may use this method after the students have gained some knowledge and experience, during classroom periods or pre-flight and post-flight briefings.

Fundamentally, the guided discussion is the reverse of the lecture method. You should aim to draw out what the students know, rather than telling them. You must remember that the more intense the discussion and the greater the participation, the more effective the learning will be. You must be sure that all members of the group follow the discussion, and that all are treated impartially. You must encourage questions, exercise patience and tact, redirect questions to other members of the group where possible, and comment on all responses.

Use of questions

In the guided discussion, learning is produced through the skilful use of questions³⁸. The instructor often uses a question to open up an area for discussion, which may be directed at the entire group to stimulate thought or a response from each group member. Its purpose is to get discussion started. For example, "What can you tell me about lift?"

The rhetorical question is similar in nature because it also spurs group thought. For example, "What is lift?" you answer the rhetorical question, however, and it is more commonly used in the lecture. After the discussion develops, you may ask a follow-up question to guide the discussion. For example, "What is the relationship between true airspeed and lift?" The reasons for using a follow-up question may vary. You may want a student to explain something more thoroughly, or may need to bring the discussion back to a point from which it has strayed. If, however, a response is desired from a specific individual, perhaps to encourage participation, a direct question may be asked of that student. Be certain to acknowledge the response.

Rather than give a direct answer to a student's question, you may elicit the answer by redirecting the original question (or a modified version of it) back to the individual, to another student, or to the entire group.

Questions used to evaluate or measure student learning should require a specific answer relating to the material covered.

Questions should:

- Have a specific purpose
- Have a clear meaning
- Contain a single idea
- Stimulate thought
- Require definite answers
- Relate to previously taught information.

Planning a guided discussion

Planning a guided discussion is similar to planning a lecture. In addition the following suggestions²² may help:

Select a topic the students can profitably discuss

Unless the students have some knowledge to exchange with each other, they cannot reach the desired learning outcomes by the discussion method. If necessary, set assignments that will give the students an adequate background for discussing the lesson topic.

Establish a lesson objective and desired learning outcomes

Through discussion, the students develop an understanding of the subject by sharing knowledge, experiences and backgrounds. Consequently, the objective is normally stated at the understanding level of learning. The learning outcomes should stem from and be related to the objective.

Conduct adequate research to become familiar with the topic

While researching, you should always be alert for ideas on the best way to tailor a lesson for a particular group of students. For example, a lecture or discussion on deploying a reserve parachute could profitably be combined with a reserve parachute repack. During the research process, you should collect (or set an assignment for the students to collect) appropriate background reading material. Such material should be well organised and based on the fundamentals.

Organise the main points of the lesson in a logical sequence

The guided discussion has three main parts – introduction, discussion and conclusion. The introduction consists of gaining attention, motivation and overview. During the discussion, you should ensure that the main points build logically to the objective, minimising the possibility of a rambling presentation. The conclusion consists of the summary and re- motivation.

Plan at least one question for each desired learning outcome

In preparing questions, you should remember that the purpose is to bring about discussion, not merely to get answers. Questions that require only short answers such as "yes" or "four" should be avoided²⁵. Questions framed to encourage discussion usually start with "how" or "why". For example, "Why does altitude affect take-off performance?" rather than "Does altitude affect take-off performance?" The first question invites discussion, the second, an answer of "yes".

Student preparation

"Involving the student so that learning becomes co-operative produces superior results to those achieved by competitive or individual approaches."¹⁴ It is your responsibility to encourage students to accept responsibility for their learning, by contributing to and profiting from, the discussion. Students should be made aware of the lesson objective and be given pre-lesson research or study to complete.

If you have no opportunity to assign preliminary work, it is advisable to give the students a brief general overview of the topic during the introduction. Under no circumstances should students without some background in a subject be asked to discuss that subject.

Guiding a discussion

Introduction

A guided discussion is introduced in the same manner as a lecture. The introduction should include an attention step, a motivation step and an overview of key points. To encourage enthusiasm and stimulate discussion, you should show enthusiasm, "it's infectious"¹⁴, and create a relaxed, informal atmosphere. Each student should be given the opportunity and encouragement to discuss aspects of the subject. You must make the student feel a personal responsibility to contribute, and that their ideas and active participation are wanted and needed. "The instructor's job is not as simple as ensuring that the syllabus is presented to the student."¹⁴

Discussion

You open the discussion by asking one of the prepared questions. After asking a question you should give the students a chance to react²⁵. You have the answer in mind before asking the question, but the student has to think about the question before answering. You must be patient while the students figure out the answer. It takes time to recall data, word an answer or think of an example. The more difficult the question, the more time the student will need to produce an answer.

Sometimes students may not understand the question. Whenever you detect this, the question should be restated in a slightly different form.

Once the discussion is under way, you should listen attentively to the ideas, experiences and examples contributed by the students during the discussion. During preparation, you will have anticipated the responses that indicate the students have a firm grasp of the subject. As the discussion proceeds, you may find it necessary to stimulate the students to explore the subject in greater depth or guide the direction of the discussion and encourage them to discuss the topic in more detail. By using how and why follow-up questions, you should be able to guide the discussion toward the objective of understanding the subject.

Once the students have discussed the ideas that support the objective, you should summarise what the students have accomplished.

In a discussion lesson, an interim summary is one of the most effective tools available to you to bring ideas together. In addition, the interim summary may be used to keep the group on the subject or divert the discussion to another member.

Throughout the discussion it is desirable to record ideas, facts and agreements so that the group can see relationships and the progress that has been made. A whiteboard is suitable for this purpose. Brainstorming is a special version of this process, where all ideas on a subject - no matter how weird - are recorded without criticism and then discussed by the group. This method is useful for creating an informal, relaxed atmosphere.

Conclusion

A guided discussion is closed by summarising the material covered. In the conclusion, you should tie together the various points or topics discussed and show the relationships between the facts brought forth and the practical application of these facts²⁵.

The summary should be brief but not to the point of incompleteness. If the discussion revealed that certain areas are not understood by one or more members of the group, you should clarify this material.

Demonstration-performance method

The demonstration-performance method is used extensively in flight instruction during the air exercise and is based on the principle that we learn by doing. Students learn physical or mental skills by performing those skills under supervision. An individual learns to write by writing, to weld by welding, and to fly by flying.

Great care must be taken in using this method, to ensure that the demonstration follows the correct steps, in the proper order, so that the student gets a clear picture of each part of the operation. The demonstration-performance method has five essential phases:

- Explanation
- Demonstration
- Instructor supervision
- Student performance
- Evaluation.

Explanation

"If telling was the same as teaching we would all be so smart we could hardly stand it."³⁹

In flight training, the explanation phase is served by the pre-flight briefing. Explanations must be clear, pertinent to the objectives of the lesson, and based on the known experience and knowledge of the students.

You must convey to the student the precise actions they are to perform, the expected result of those actions, and the possible effects of those actions on the student.

Before leaving this phase, you should ask questions so as to determine if there is understanding of the procedure to be followed.

Demonstration

Before the demonstration, you direct the attention of the student to no more than two items to be closely observed during the demonstration. These are the one or two items you consider vital for the execution of the skill. Then you must show the student the actions necessary to perform the skill.

As little unrelated activity as possible should be included in the demonstration if the student is to clearly understand that you are accurately performing the actions previously explained. Therefore, there is no verbal patter during this phase. The demonstration serves as a physical restatement of the objective, "here is what you will be able to do at the end of this lesson".

If, because of unanticipated circumstances, the demonstration does not closely conform to the explanation, the discrepancy should be immediately acknowledged and explained.

Instructor supervision, student performance

Instructor supervision and student performance involve separate actions, but they are performed concurrently, so they are discussed here under a single heading.

During the first phase of instructor supervision, you guide the student through the various components required to perform the skill through the use of patter and follow-me-through. Immediately thereafter you should give the student an opportunity to perform the skill, coaching as necessary.

The second phase of student performance requires the student to practise in order to learn the skills. Therefore, adequate time must be allocated for this student activity. During this phase, feedback should be gradually reduced and finally eliminated⁴⁰.

Evaluation

In this phase you judge student performance. The student displays whatever competence has been attained, and you discover how well the skill has been learned. From this measurement you determine the effectiveness of the instruction provided.

To measure each student's ability to perform, you require the students to work independently. Therefore, throughout this phase, you must not ride the controls nor offer verbal or body language cues. Any comment as to how well any individual performed the skill must be in relation to the stated objective for the lesson, not necessarily on perfection of the skill or flight test parameters.

Programmed instruction

Programmed instruction is a method of developing self-instructional materials in textbook form or for computers⁴².

As student's progress through programmed instructional material, they make a response to each increment of instruction. The material offers them immediate feedback by informing them of the correctness of their responses. The successful completion of each of these increments takes the student one step closer to the intended learning outcome.

The major characteristics of programmed instruction are:

- A clear statement of what the student will be able to do after training
- Careful sequencing of material
- Presentation of material in steps which challenge students but do not exceed their ability
- Active student responses
- Immediate confirmation of answers
- Test and revision of material until the desired learning outcome is achieved.

This approach carries students, step by step, to the learning objectives. In this respect, programmed instruction is generally more tutorial than typical classroom instruction. It gives the student not only what they are to learn, but also guides them in how they are to learn.

Types of programmed instruction

Programmed instruction may be branched or linear.

Branched

Typically, branched instruction gives more information than linear and then requires an answer to be chosen from the multiple-choice type. Each answer has a reference page to turn to. If the correct answer is chosen, new material will be presented. If an incorrect answer is chosen, remedial material will explain where the student went wrong.

For an example of this type of instruction, read *Preparing Instructional Objectives*²⁶ by RF Mager This type of programmed instruction is well suited to use with computers⁴¹.

Linear

In linear programmed instruction, the material is itemised and presented in very small steps. A student is prompted so that invariably the correct response is given. Materials are carefully designed to offer as much review as needed to assure the degree of retention appropriate to the subject matter, the learning situation and the needs of the student⁴².

The student responds by writing words into spaces provided for that purpose. Linear programming may also be designed to elicit other types of responses. Answers may be given mentally or orally and simple tasks may be performed. Sequences of more complicated tasks that make up a complete procedure may be required.

After completing the response, the student immediately confirms the correctness of the response by comparing it to the programme answer before continuing. Thus, the student progresses smoothly, with a continuous awareness of being correct giving a sense of satisfaction. If the programme is properly constructed, the student will, at a comfortable rate and almost effortlessly, learn the material presented⁴³.

Proponents of this system⁴⁴ attribute its success to the reinforcement it provides and the repetition it uses. If a student encounters the same fact, idea or concept in a number of ways, and if reinforcement or reward occurs each time a correct answer is made, learning takes place.

Each block of new subject matter contains obvious cues to the correct response. Thus, a student finds it virtually impossible to make errors. As a student approaches the learning objective, cues are gradually withdrawn until the student supplies complete answers without being cued.

Evaluation

Evaluation is an integral part of the learning process. Whenever learning takes place, the result is a change in behaviour. Evaluation is concerned with defining, observing and measuring the new behaviour. Once instruction has begun, some sort of evaluation is essential to determine both what and how well the student is learning, as well as how effective the course of instruction has been⁴⁶. Evaluation for these purposes may be formative, ie, it is used during a course of instruction, or summative, when it is used at the completion of a course of instruction⁴⁶.

Your evaluation may consist simply of observations of the student's performance, or it may be accomplished by more comprehensive, systematic and objective means, by oral questioning, administering written tests, or performance testing⁴⁷.

Observations

Flight instructors have a moral obligation to provide guidance and restraint with respect to the operations of their students. This applies to instructor's observations of unsafe or inept operations by pilots who are not aware they are being observed, as well as pilots who have requested an instructor's evaluation or guidance. In the case of an observed unsatisfactory performance, it is your responsibility to try to correct it by the most reasonable and effective means. If unable to correct the situation by personal contact and good advice, you should report the matter to the club safety officer and or the national safety officer.

Recording observations

Subjective written records of observed student performances are known as anecdotal records. Generally, a system is used to record student behaviour that cannot be evaluated by other means, for example, respect for laws, reaction to authority, persistence or physical skill. The main advantage of these records is that they depict behaviour in natural situations. For example, a student may show good piloting skills but have little respect for site rules and VFR. These records often form the basis of a written debrief, and they can be of considerable help to the instructor who is to fly with a previously unknown student.

You should record sufficient information about the situations to make the behaviour understood, for example, "took off into cloud". Just enough detail should be included to make the description meaningful and accurate. The description should be as objective as possible and it should record positive as well as constructive occurrences.

A more structured form of anecdotal record is the rating scale. Rating scales provide a systematic procedure for reporting your observations. Its value depends on careful preparation and appropriate use. For example, it should measure the desired learning outcome, and it should be used when sufficient opportunity exists to make the necessary observations.

Oral questioning

Oral questioning has a wide range of uses in flight instruction. Questions that require the recall from memory of a fact usually start with who, what, when or where. Questions that require the student to combine knowledge of facts with the ability to analyse a situation, solve problems or arrive at conclusions usually start with why or how.

Your use of oral questioning can have a number of desirable results:

- It reveals the effectiveness of your instruction.
- It checks the student's retention of what has been learned.
- It reviews material already covered by the student.
- It can be used to retain the student's interest and stimulate thinking.
- It can be used to emphasise important points.
- It checks student comprehension.
- It may identify points that need more emphasis.
- It promotes active student participation, which is essential to learning.

Characteristics of effective questions

Preparation

Effective oral questioning requires preparation. You, therefore, should write pertinent questions in advance. The recommended method is to place them in the lesson plan. These prepared questions serve as a framework and, as the lesson progresses, should be supplemented by any impromptu questions you consider appropriate. To be effective, these questions must be adapted to the past experience and present ability level of the student.

One idea

Effective questions centre on only one idea. One idea – one question. A single question should be limited to using who, what, when, where, how or why – not a combination.

Brief

An effective question should be brief and concise. Enough concrete words must be used to establish the conditions or situation exactly, so that instructor and student have similar mental pictures. The student's response should be determined by their knowledge of the subject – not by their ability to understand the question.

Relevant

To be effective, questions must apply to the subject of instruction⁴⁸. Unless the question pertains strictly to the particular training being conducted, it serves only to confuse the student and divert their thoughts to an unrelated subject. Any part of a question that the student could disregard and still respond correctly should probably be removed.

Only one answer

Usually an effective question has only one correct answer, although in a problem solving question it may be expressed in a variety of ways.

Challenging

Effective questions present a challenge to the student. Questions of suitable difficulty serve to stimulate learning. The difficulty of the question should be appropriate to the student's level of training.

Questions to avoid

Asking "Do you understand?" or "Have you any questions?" have no place in effective questioning. Assurance by the student that they do understand, or that they have no questions, provides no evidence of their comprehension.

Catch-em-out questions should be avoided, as the student will soon develop the feeling that they are engaged in a battle of wits with you. Other types of questions to avoid are:

The puzzle

"What is the first action you should take if your glider is pulling right, in a westerly wind off a southerly launch at 2000m AMSL?"

The oversize

"What do you do before take-off?"

The toss-up

"In an emergency, should you throw your reserve or manage the glider?"

Bewilderment

"In reading the altimeter – you know you set a sensitive altimeter for the nearest station pressure – if you take temperature into account, as when flying from a cold air mass through a warm front, what precaution should you take when in a mountainous area?"

Irrelevant

The teaching process is an orderly procedure of building one block of learning on another, and the introduction of unrelated facts and thoughts will only obscure this process and retard the student's progress.

Answering a student's questions

The answering of a student's questions must conform to certain considerations if it is to be an effective teaching method.

The question must be clearly understood by you before an answer is attempted. You should display interest in the student's question and frame an answer as direct and accurate as possible. For example, if the student asks "What is drag?" an appropriate answer would be, "Drag is the resistance experienced by a body in motion through a fluid".

After you complete a response, it should be determined whether or not the student is completely satisfied with the answer. In the example given, this may lead to a discussion on the factors that affect drag. Organising the answers in this way conforms with the recommended teaching method for the development of a subject, in this case from simple to complex.

Sometimes it may be unwise to introduce the more complicated or advanced considerations necessary to completely answer a student's question, for example, the drag formula. In this case, you should carefully explain to the student that the question was good and pertinent but that the answer would, at this time, unnecessarily complicate the learning task at hand. This is particularly true of the pre-flight brief where time does not permit irrelevant or in-depth discussions. If it will not be answered later in the normal course of instruction, you should advise the student to ask the question again later.

On rare occasions, a student asks a question which you cannot answer; you should freely admit not knowing the answer, but should get the answer. If practicable, you could help the student look it up.

Instructors should avoid using the one-word answers "Yes" or "No" if the greatest instructional benefit is to be gained from the student's question.

Written tests

As evaluation devices, written tests are only as good as the knowledge and proficiency of the test writer. The following are some of the basic concepts of written test design.

Many publications are available on test administration, test scoring and test analysis, so these topics are not covered in this chapter⁴⁷.

Characteristics of a good written test

If a test is to be effective, it must have certain characteristics; the most important of these are validity, reliability and useability⁴⁷.

Validity

Validity is the most important feature of any written test; it is the ability of a test to measure what it is supposed to measure. The results of a written test are said to be valid only when they are interpreted in relation to what the test was supposed to measure. For example, if instruction has centred on the term stalling angle, and the test question refers to the critical angle, the test result would be invalid in relation to the stalling angle, but it may have validity if interpreted in relation to a broader knowledge of stalling.

Reliability

Reliability refers to the consistency of results obtained from a test or any other measuring device. A metal rule that expands and contracts with temperature changes will not give reliable results. By the same token using a device that is highly reliable does not necessarily mean the results will be valid. For example, an altimeter incorrectly calibrated will consistently measure altitude above the wrong datum; the result is reliable, but wrong (not valid).

Useability

Useability is a measure of the test's practicality irrespective of other qualities. Tests should be easily administered and scored, produce results that can be accurately interpreted, and be economical in time and cost.

Written test questions

In flight instruction the essay-type question is rarely used and will not be discussed here. Those most commonly used are:

- The short-answer type, which for the purposes of this discussion includes the true/false type.
- The multiple-choice type, which for the purposes of this discussion includes the matching type.

Short-answer type

The short-answer question requires the student to supply their own answer. The shortest possible answer will be in response to the true/false question, and the longest answer extending to perhaps half a page. Other than the true/false type, these questions can be difficult to mark. For example, in the simplest one-word answer type, "The glider stalls at the _____ angle" the answer could be stalling, critical or same, and you are sure to get someone who answers with 15-degree.

The correctness of the answer is subjective (decreasing reliability as well as validity depending on how the answer is interpreted). Therefore, the same test graded by different instructors may result in

different scores. The more latitude the student has in the answer the more difficult it becomes to assess their answer. While the true/false question eliminates this problem, it also provides the highest probability of guessing the answer. For these reasons the multiple-choice or matching type question is generally favoured.

Multiple-choice type

When properly devised and constructed, the multiple-choice type offers several unique advantages that make it more widely used and versatile than either the matching or true/false question.

Multiple-choice questions are highly objective; that is, the results of such a test would be graded the same regardless of the student taking the test or the person marking it (reliability). This makes it possible to directly compare the performance of students within the same class or in different classes, students under one instructor with those under another, and student accomplishment at one stage of instruction with that at later stages (validity). This type of test question permits easy marking and allows you to examine more areas of knowledge, over the same period, than could be done by requiring the student to supply written responses (useability).

Three major difficulties are encountered in the construction of multiple-choice test questions:

- development of a question stem which can be expressed clearly and without ambiguity;
- an answer which cannot be refuted; and
- the invention of distracters which will be attractive to those students who do not possess the knowledge or understanding necessary to recognise the correct answer.

The stem

The stem may take several forms:

- it may be a direct question followed by several possible answers;
- it may be an incomplete sentence followed by several possible completions to the sentence; or
- it may refer to a graph or diagram followed by several correct or incorrect statements about the graph or diagram.

The student may be asked to select the one choice that is the correct answer, the one choice that is the incorrect answer, or the one choice that is the most correct answer.

These three methods of answering, combined with the three question forms, give you flexibility in preparing multiple-choice questions. However, experience has shown that the direct question form is the most successful for instructors inexperienced in the writing of multiple-choice questions.

Examples:

Stem presented as a direct question

This form is generally better than the incomplete stem in that it is simpler and more natural.

Which gas forms the largest part of the atmosphere?

- a. oxygen
- b. nitrogen
- c. helium
- d. hydrogen
- e. neon

Stem as an incomplete statement

When using this form, care must be taken to avoid ambiguity, giving clues and using unnecessarily complex or unrelated alternatives.

The atmosphere is a mixture of gases, the largest part being:

- a. oxygen
- b. nitrogen
- c. helium
- d. hydrogen
- e. neon

Stem supplemented by a diagram

Useful for measuring ability to read instruments or identify objects.

Name and label the four forces acting on the glider in straight-and-level flight.

“None of the above” or “all of the above” as alternatives

These are very poor alternatives and should not be used. This is why no example is given here.

The negative variety

These should be avoided as the negative raises the difficulty of the question. If they must be used, the negative should be emphasised.

What method should NOT be used to check that your radio is set to the correct frequency?

- a. Check the frequency display on the radio
- b. Call "any stations are you there" on the radio
- c. Listen for traffic on the radio
- d. Complete a formal radio check call

Association type

This type is useful if a limited number of associations are to be made. Matching questions serve better if a large number of related associations are to be made.

Which manoeuvre does NOT belong with the others?

- a. chandelle
- b. autorotation
- c. lazy eight
- d. loop
- e. steep turn

Definition type

These are useful for determining knowledge of basic rules or facts.

The difference between magnetic north and true north is known as:

- a. turning error
- b. variation
- c. deviation
- d. compass error
- e. dip

When multiple-choice questions are used, four or five alternatives are generally provided. It is usually difficult to construct more than five plausible responses. If there are less than four alternatives, the probability of guessing the correct response is considerably increased. Recent studies suggest three responses carefully constructed are sufficient to determine knowledge.

Principles of multiple-choice type question construction

Make each question independent of every other question in the test. The wording of a question in the test should not provide the correct answer to any other question.

Design questions that call for essential knowledge rather than abstract background knowledge or unimportant facts.

State the question in the working language of the student. A common criticism of written tests is the emphasis on the reading ability of the student. If language comprehension is not the objective of the test, failing to use appropriate language will decrease validity.

Include sketches, diagrams or pictures when they can present a situation more vividly than words. They add interest and avoid reading difficulties with technical language.

Avoid the negative word or phrase. A student who is pressed for time may identify the wrong response simply because the negative form was overlooked.

Double negatives should be avoided because invariably they cause confusion. If a word such as "not" or "false" appears in the stem, avoid using another negative in the alternatives.

Catch questions, unimportant details and leading questions should be avoided as they do not contribute to effective evaluation. Moreover, they tend to antagonise the student.

Research the question stems and appropriate verbs to use to frame questions at the varying levels of Bloom's Taxonomy.

Principles of stem construction

The stem should clearly present the problem or idea. The function of the stem is to set the stage for the alternatives that follow.

The stem should be worded in such a way that it does not give away the correct response.

Put everything that pertains to all alternatives in the stem. This helps to avoid repetitious alternatives.

Generally avoid using "a" or "an" at the end of the stem. These may give away the correct choice. Every alternative should fit grammatically with the stem.

Principles of alternatives construction

Incorrectness should not be the only criterion for the distracting alternatives. A common misconception or a statement that is itself true, but does not satisfy the requirements of the problem, may also be used.

Keep all alternatives of approximately equal length.

When alternatives consist of numbers they should be listed in ascending order

Matching type

The matching type question is particularly good for measuring the student's ability to recognise relationships. As this question type is a collection of multiple-choice questions it samples more student abilities in a given period of time. Samples of two different forms of this type follow.

Equal columns: When using this form, always provide for some questions in the response column to be used more than once, or not at all, to preclude guessing by elimination.

Unequal columns: Generally these are preferable to equal columns.

Principles of matching-type question construction

Unlike the examples above, give specific and complete instructions. Do not make the student guess what is required.

Also unlike the questions above, test only essential information.

Use closely related material throughout the question.

Where possible, make all responses plausible.

Use the working language of the student.

Arrange the alternatives in a sensible, easily read order.

If alternatives are not to be used more than once, provide extra alternatives to avoid guessing by elimination.

Effective question writing

Question writing is one of your most difficult tasks. Besides requiring considerable time and effort, the task demands a mastery of the subject, an ability to write clearly, and an ability to visualise realistic situations for developing relevant questions. Because of the time and effort required in the writing of effective questions, it is desirable to establish a question bank or pool.

As long as precautions are taken to safeguard the questions in a pool, the burden of continually preparing new questions will be lightened (but not eliminated). The most convenient and secure method is to record questions on a computer. These can be added to or amended as required, and using the cut and paste feature, different examination papers can quickly be compiled and printed.

Principles of effective question writing

Regardless of the question type or form, the following principles should be followed in writing or reviewing questions⁴⁹.

Each question should test a concept or idea that it is important for the student to know, understand or be able to apply.

The question must be stated so that everyone who is competent in the subject would agree on the correct response.

The question should be stated in the student's working language.

The wording should be simple, direct and free of ambiguity.

Sketches, diagrams or pictures should be included if they add realism or aid the student in visualising the problem.

The question should present a problem that demands knowledge of the subject. A question that can be responded to on the basis of general knowledge does not test achievement.

Performance tests

If a student demonstrates the ability to perform selected parts of a skill for which they are being trained, it is assumed that they will be able to perform the entire skill. Performance testing is a sampling process. It should be a carefully selected part of an action process typical of the skill for which training is being given. For example, successful completion of a spot landing test would assume the student is able to land accurately every time.

This method of evaluation is particularly suited to the measurement of student abilities in either mental or physical tasks. Performance testing is desirable for evaluating training that involves an operation, a procedure or a process, and it is used extensively in flight instruction.

Evaluation of demonstrated ability during flight instruction must be based upon established standards of performance, suitably modified to apply to the student's experience, stage of development as a pilot and the conditions under which the demonstration was performed. For the evaluation to be meaningful to you, the student's mastery of the elements involved in the manoeuvre must be considered, rather than merely the overall performance.

In evaluating student demonstrations of piloting ability, as in questioning and other instructional processes, it is important to keep the student informed of progress. This may be done as each procedure or manoeuvre is completed or during the debriefing.

Instructional aids

An instructional aid is any device that assists an instructor in the student's learning process. They may be sight or sound devices, or a combination of both. Instructors use them to improve communication between themselves and their students, but the aids do not substitute for instruction⁵⁰; they are used to support, supplement or reinforce teaching.

Reasons for using them

Gaining and holding student attention is essential to learning. Visual aids which support the topic with some degree of novelty draw attention to the information and cause both the seeing and hearing channels of the mind to process the same or similar information⁵¹.

An important goal of all instruction is for the student to retain as much of the instruction as possible and a significant improvement in student retention occurs when instruction is supported with meaningful aids⁵².

It is difficult for instructors to use words that have the same meaning for the student as they do for you. For example, try describing level attitude, using words only, to a student that has not flown before. The good instructor makes learning easier and more accurate for the student by providing visual images⁵³.

It is often difficult for a student to understand relationships, for example, C_L to Angle of Attack. If the relationships are presented visually, they are much easier to deal with. Symbols, graphs and diagrams can show relationships of location, size, time, frequency or value⁵⁴.

Instructors are frequently asked to teach more and more in less and less time. Instructional aids can help them do this.

Guidelines for their use

The decision to use any instructional aid should be based on its ability to support a specific point in a lesson⁵⁵.

Aids should be simple and compatible with the learning outcomes to be achieved. Since aids are used in conjunction with a verbal presentation, words on the aid should be kept to a minimum and distracting artwork avoided⁵⁶. You should avoid the temptation of using the aid as a crutch. For example, the introduction of PowerPoint saw many instructors fall into this trap, believing that a slide or series of slides, with everything on them, could substitute for the lesson or briefing. A six-by-six rule of thumb can be applied to the preparation of slides – 6 words across and 6 lines down, maximum.

Aids have no value in the learning process if they cannot be heard or seen. Recordings of sounds and speeches should be tested for adequate volume and quality. Visual aids must be visible to the entire class, with lettering large enough to be seen by the students farthest from the aid. Colours, when used, should contrast and be easily visible. The surest and most successful rule is, before the student arrives, test visual and aural aids in the environment in which they will be used.

The effectiveness of aids can be improved by proper sequencing⁵⁷. Sequencing can be emphasised and made clearer by the use of contrasting colours.

The effectiveness of aids and the ease of preparation can be increased by planning them in rough draft form. The rough draft should be carefully checked for accuracy, clarity and simplicity. Revisions and alterations to a draft are easier to make than changes to a final product.

The purpose of all instructional aids is to improve the student's understanding so care must be taken to present information from the student's perspective. For example, when using an attitude window, point out what the attitude looks like from the student's (left-seat) perspective.

Types

Some of the most common aids are whiteboards, models, illustrations, handouts, projected materials and computers.

Whiteboard or blackboard

The whiteboard is one of the most widely used aids to learning. Its versatility and effectiveness make it a valuable aid to most types of instruction. The following practices are fundamental in the use of a whiteboard or blackboard:

- Keep the board clean.
- Erase all irrelevant material.
- Keep chalk or pens, erasers, rulers and other equipment readily available to avoid interruption of the presentation.
- Organise the board and practise the presentation in advance.
- Write or draw large enough for everyone in the group to see.
- Do not overcrowd. Leave a margin around the material and space between lines.
- Present material simply and briefly.
- Use lower case for presentation of material to be learned as the easier interpretation facilitates learning and leave upper case for titles.
- If necessary, use the ruler or other devices in making drawings.
- Use colour for emphasis.
- Stand to the side of the material being presented, so that the entire class will have an unobstructed view.
- Do not talk to the board – when speaking, face the student or group; when writing, write!

Models

A model is a realistic copy or simulation of a real piece of equipment. Models are not necessarily the same size as the equipment they represent, nor are they necessarily workable. As instructional aids, models are usually more practical than originals because they are lightweight and easily moved.

The most used model in paraglider flight training is a pair of sunglasses. In accordance with the above general principles the model aircraft should at least bear some resemblance to the aircraft being used for training.

Illustrations

Material should be displayed in a clear, easily understood format. Images printed or on a screen can help a lot to keep the student engaged and help them visualise what you are talking about.

Safety posters are also a good example.

Handouts

Handouts comprise any written material distributed in relation to the lesson. They can include copies of your notes, illustrations, articles or overhead projection material. They may be distributed during, or at the completion of the lesson, depending on your preference.

For the pre-flight briefing, handouts are best utilised in a systematic manner, linking the exercises being taught.

Projected material

Projected material includes motion pictures, video, slides, and PowerPoint. The essential factor governing their use, as with all instructional aids, is that the content supports the lesson.

Video appeals to students, while packaged lessons appeal to instructors; care should be exercised to ensure that the lesson is being supported – not supplanted.

Video should be previewed and summarised by you before use.

Films and video are good for gaining and maintaining attention, but they do not lend themselves well to the interactive learning process. Slides combined with your presentation provide greater opportunity for interaction.

Use of projected materials requires careful planning and rehearsal by you to adjust equipment, lighting and timing.

Computer-based instruction

At this time, the computer is by far the most versatile kind of aid available to instruction⁵⁸.

Computers combine the features of film or audio in gaining and maintaining attention and can provide simulation and interactive feedback. With the development of touch-screen technology, exciting possibilities for interactive instruction and feedback have become possible⁵⁹.

At first glance, the computer appears to incorporate all the considerations of effective instruction. However, the computer still lacks the ability to provide for an individual's social and egoistic needs. For example, belonging, appreciation and recognition. For this reason it is worth stating again that instructional aids are used in support of your delivery; they should not substitute for instruction itself.

Future developments

Recent years have seen an explosion of new materials and techniques in the field of instructional aids. The effective instructor strives to keep abreast of new devices, new materials, and their potential uses. In choosing an appropriate instructional aid, you must be receptive to new possibilities and keep in mind the learning goal to be achieved, as well as the role of the instructor in human relations⁶⁰.

Role modelling

The influence of a flight instructor is so great that it merits a career path and status of its own⁴. In this chapter we discuss the influence of your behaviour on that of your students.

Professionalism

Professionalism in flight instruction demands a code of conduct that is in no way related to the monetary gains. Flight instructors must strive for the highest levels of professionalism as attempts to operate otherwise as a flight instructor can result only in poor performance and deficient students. Anything less than a sincere effort will quickly be detected by the student, destroying your effectiveness.

Professionalism also includes a flight instructor's public image. In the past, flight instructors have all too often been willing to accept a less than professional status in the public view by relaxing their demeanour, appearance and approach to their profession.

If the status of the flight instructor in the general aviation industry is to be upgraded, it must be done through the efforts of flight instructors themselves.

The professional flight instructor commands the respect of associates and, most importantly, delivers more effective instruction.

Sincerity

The student pilot accepts the flight instructor as a competent qualified teacher and expert pilot. Attempting to hide inadequacy behind a smoke screen of unrelated instruction will make it impossible to command the respect and attention of the student; the professional flight instructor should be straightforward and honest.

In addition, instruction that emphasises safety will be negated if you appear to ignore your own instruction, eg, taxiing quickly, or descending below minimum altitudes.

The same applies to your insistence on precision, accuracy and smoothness of handling. The professional instructor is constantly under scrutiny and is expected to excel in aircraft handling.

Personal appearance and habits

Personal habits have a significant effect on the professional image. The exercise of common courtesy is perhaps the most important of these. A flight instructor who is rude, thoughtless, impatient or inattentive cannot hold the respect of the students, regardless of piloting ability. Young, confident flight instructors need to give careful consideration to these points when dealing with students older than themselves.

The professional instructor maintains a genuine interest in the student's learning. Under no circumstances should you do or say anything that is derogatory to the student. Acceptance rather than ridicule, and support rather than reproof will encourage learning, regardless of whether the student is quick to learn or is slow and apprehensive. Criticising the student for not learning is not unlike a doctor criticising a patient for not getting well, and is totally unacceptable from a professional.

The professional image requires a calm, thoughtful and disciplined demeanour. Frequently countermanding directions, reacting differently to identical errors, and demanding unreasonable performance or progress should be avoided.

On rare occasions a personality conflict may arise between instructor and student. If, for any reason you suspect this, you should discuss the problem with your supervisor who has the experience to confirm your suspicions or offer alternative teaching methods to overcome conflict.

Safety and accident prevention

The flying habits of the flight instructor, both during instruction and as observed by students, have a direct effect on safety. Students consider their flight instructor to be a paragon of flying proficiency whose flying habits they, consciously or unconsciously, attempt to imitate. For this reason, a flight instructor must meticulously observe the safety practices taught to the students.

A flight instructor must carefully observe all regulations if a professional image is to be maintained. An instructor, who is observed to fly with apparent disregard for safety margins or weather minima creates an image of irresponsibility that many hours of diligent flight instruction cannot correct.

Self improvement

"The input of aviation instruction is for as long as a pilot flies."¹⁴ Professional flight instructors must never become complacent or satisfied with their own qualifications and ability. They should be constantly active and alert for ways to improve their qualifications, teaching effectiveness and the service they provide to students. Flight instructors are considered authorities on aeronautical matters and are the experts to whom many pilots refer questions concerning regulations, requirements and operating techniques.

It is essential that you maintain access to current copies of the NZHGPA OPM and NZHGPA Rating Forms as well as Relevant technical manuals and advisory circulars. A flight instructor who is not completely familiar with current pilot issue and rating requirements cannot do a competent job of flight instruction.

Flight instructors have a tremendous influence on their student's perception of aviation in general and piloting in particular. The level of professionalism shown by flight instructors in the way they conduct themselves and the attitudes they display directly affect their student's flying.