

PMI

Principles and Methods of Instruction: Techniques to improve training

The following RAAus approved Principles and Methods of Instruction (PMI) material is provided as the preferred content to be used for approved instructor training packages as outlined in the RAAus Operations Manual. The information referenced below has been provided by CASA as an extract of APPENDIX D To CAAP 5.14-2(0) March 2012 and approved for internal purposes for RAAus instructor training. Following completion of this training module a knowledge based assessment can be found in appendix 1 and this should be completed by the candidate and result noted in the instructor training record.





INTRODUCTION

The trainer

What is a trainer?

The Macquarie Dictionary definition of the word **train** is: 'to make proficient by instruction and practice'.

Flight instructors are trainers. If you are a flight instructor, your aim is to give students good instruction and sufficient practice so that they can fly an aircraft proficiently and safely.

These sample course notes are designed to describe some basic instructional techniques that apply to:

- Ground school training
- Preparatory ground instruction
- Pre-flight briefing
- In-flight instruction
- Post-flight briefing (debriefing)

By using these techniques you will make learning easier for your students as you help them to meet the required flight test standards.

Learning

No one ever learns except through their own activity, and strictly speaking there is no such art as teaching only the art of helping people to learn.

The instructional techniques described in these notes suggest actions that can be performed to stimulate student activity. These activities may be mental or physical, and it is through this process of directed activity that students learn the skills and knowledge required to become good, safe pilots.

Learning factors

Learning is made easier when the following factors are used:

- **READINESS:** Ensure students are mentally, physically and emotionally ready to learn.
- **PRIMACY:** Present new knowledge or skills correctly the first time. (Teach it right the first time)
- **RELATIONSHIP:** Present lessons in the logical sequence of known to unknown, simple to complex, easy to difficult and concrete to abstract.
- **EXERCISE:** Ensure students are engaged in meaningful activity.
- **INTENSITY:** Use dramatic, realistic or unexpected things, as they are long remembered.
- **EFFECT:** Ensure students gain a feeling of satisfaction from having taken part in a lesson.
- **RECENCY:** Summarise and practice the important points at the end of each lesson, as the last things learned and practiced will be remembered the longest.

The learning factors listed above are useful 'tools' when they are applied correctly. The question, of course, is: How do these learning factors apply to flight instruction? This question will be answered by reviewing and discussing each of the learning factors and offering specific suggestions on what you can do to utilise these 'tools' in your instruction.

Readiness

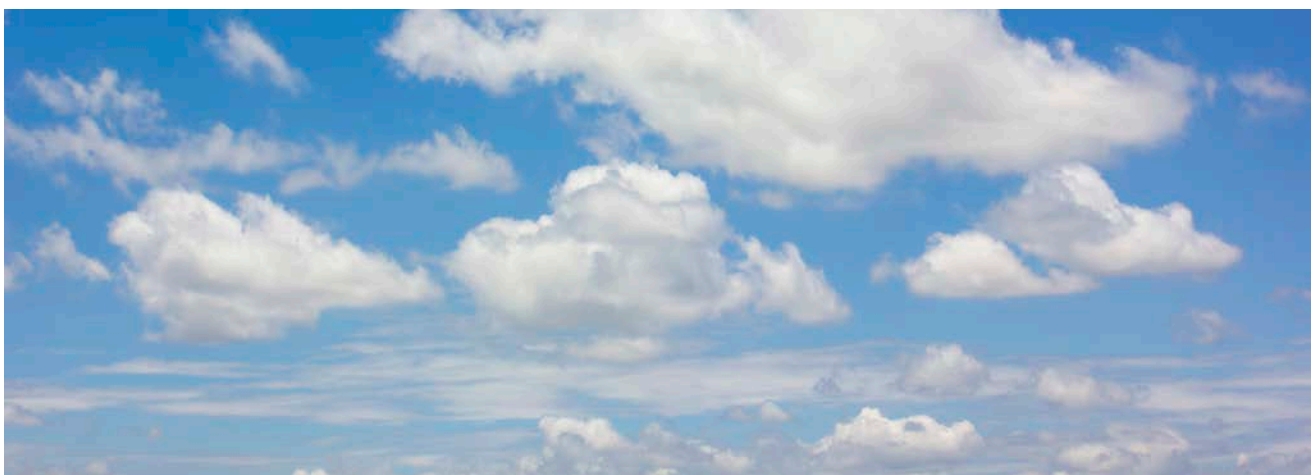
Ensure students are mentally, physically and emotionally ready to learn.

To learn, a person must be ready to do so. An effective instructor understands this necessity and does the utmost to provide well-conceived motivation. If a student has a strong purpose, a clear objective and a sound reason for learning something, progress will be much better than if motivation were lacking.

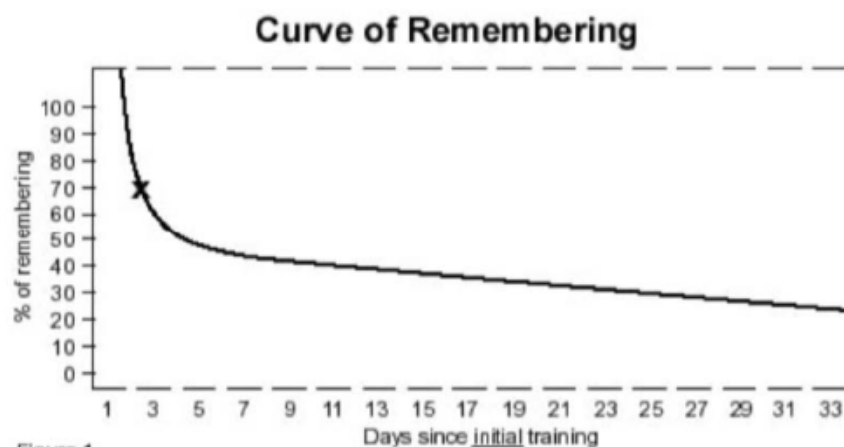
Under certain circumstances you can do little, if anything, to inspire a student to learn. If outside responsibilities, interests or worries are weighing heavily, if schedules are overcrowded, or if personal problems seem insoluble, then the student will be unable to develop the interest to learn.

Here are some suggestions you can follow to arouse interest and assist the student to prepare for learning:

- Start lessons with an **attention -getting** opening. For examples of opening sentences that are effective, listen carefully to the start of documentary films or interviews on television. Writers spend a great deal of time developing the exact words to tune you in.
- State **specifically what** is required during the lesson and how you intend to prove that the student has the knowledge or can master the skill at the end of the lesson. Make all your statements student-centred.
- State the **PURPOSE** of the lesson and stress the **BENEFIT** from the new knowledge or skill. Try to give more than one reason for learning, just in case the student doesn't fully accept the first reason.



- Describe WHERE the lesson fits into the overall picture, and relate the lessons to past experiences that the students may have had. This statement provides a link with something students have learned before and allows them to build on that knowledge or skill. As an example, if you were giving instruction on how to recover from a stall to a student with gliding experience, you could point out that the sequence of aerodynamic control movements is the same as in a glider. This concept is closely related to the RELATIONSHIP learning factor.
- If the new material is dependent on students having mastered previous lessons, confirm that the required level has been attained before proceeding with the new material. Conduct a review and, if necessary, clear up any misunderstandings by briefly re-teaching the major points.
- Plan for reviews of lesson material. Students start to forget the moment they leave the instructional environment. The greatest rate of forgetting occurs during the first 24 to 48 hours after the material has been learned. Ohio State University has carried out extensive research in this area and has designed a recommended schedule of when reviews should be done.



NOTES:

1. Statistics are based on an average cross-section of students.
2. The curve is very steep initially: within 2 days students will remember less than 70% of what they learned.
3. At the end of the month, without reviews, students will remember only approximately 40 % of the lesson material.

Refer to Figures 1 and 2 and the notes below each diagram.

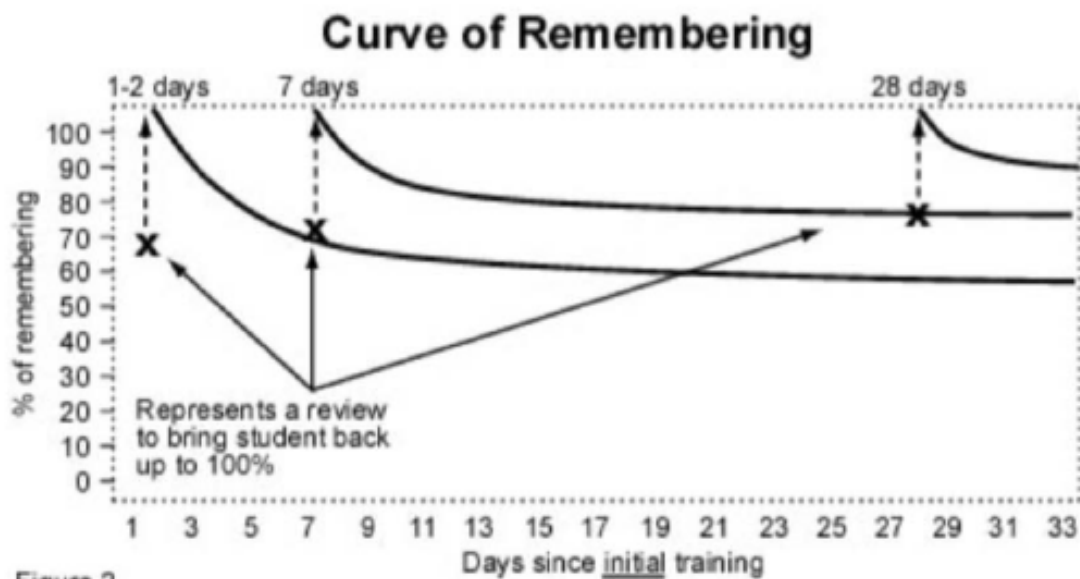


Figure 2

NOTES:

1. To maintain at least a 70% level, a review should be conducted within 2 days.
2. After the material is learned a second time the curve flattens out somewhat, but after 7 days the student is back down to the 70% level.
3. Another review at 7 days and the curve really flattens. The student will be above 70% retention until approximately day 28.
4. A review at this time will generally cause long-lasting retention of lesson material.
5. The amount of time required for reviews reduces each time a review is conducted.

Example:

Initial training: 50 minutes

1st review (at 2 days): 30 minutes

2nd review (at 7 days): 10 minutes

3rd review (at 28 days): 5 minutes

Primacy

Present new knowledge or skills correctly the first time (teach it right the first time).

When students are presented with new knowledge or skills, the first impression they receive is almost unshakeable. This means that what you teach must be correct the first time. Students may forget the details of lessons, but they will retain an overall image of the skill or knowledge for a long time. Frequently you will be required to perform manoeuvres in the aircraft before a student has had the necessary background training. You must perform those manoeuvres correctly or the student may imitate any errors you make. For example, before the exercise on cross wind circuits, you and your student may be required to take-off/land with a significant cross wind component. Any poor example shown at this time would have to be 'unlearned' when the exercise came up in a subsequent lesson.

Suggestions:

- Rehearse lessons to become thoroughly proficient at the skill or in answering questions related to the subject.
- Attempt to give a perfect demonstration of the manoeuvres to be learned in the next lesson. If students read or study exercise material without experiencing the actual exercise, they may form an incorrect mental image.
- If practicable, start each lesson with a perfect demonstration. Sometimes it may be better to avoid talking during this demonstration to allow maximum concentration on doing the skill perfectly.
- While the student is performing an exercise, supervise the actions very closely. Stop the student as soon as any performance error is noticed, and teach the correct method. Close supervision means that you NEVER allow a student to make an error during the initial stages of training. Think of how you would go about training a student to defuse a live bomb.

Relationship

Present lessons in the logical sequence of known to unknown, simple to complex, easy to difficult and concrete to abstract.

This particular learning factor emphasises the necessity for your student to understand relationships between new and old facts, or between ideas and skills, if learning is to take place. During flight training, students must understand not only why they are learning a particular exercise, but how that exercise combines with previous ones and where it fits into the overall syllabus. Giving students the relationship at the start of the lesson provides preparation for learning. Continuing the process throughout the lesson, helps to maintain the desire to learn.

Example: Compare or relate advanced take-offs and landings to normal take-offs and landings; show how a steep approach uses the same techniques.

Suggestions:

Present lessons in a logical sequence:

- Known to unknown.
- Easy to difficult.
- Concrete to abstract.
- Simple to complex.
- Familiar to unfamiliar.

*“Explore
Dream
Discover”*

- Always review basic knowledge before proceeding to the unknown. For example, when teaching students to multiply with a circular slide rule, the first example should be as simple as 2×2 . The reason is that students already know the answer and are able to follow the manipulation of the slide rule. In the next problem or example, a change of one factor (2×4) allows students to build on knowledge already gained. The process is continued until students have mastered all the required knowledge and skills necessary to solve real problems.
- Present new material in stages, confirming that students have mastered one stage before proceeding to the next. The length of time for each stage would depend on the complexity of the material covered.
- Reinforce students' learning of new facts or ideas by frequently summarising the major points of your lesson.
- Use examples and comparisons to show how the new material being learned is really not much different from that already known by your students. The examples you use may be real or imaginary, as the main purpose of an example is to paint a verbal picture so students can visualise relationships between the new material and things that have happened before. This is called using 'verbal aids' for your instruction.



Exercise

Ensure students are engaged in meaningful activity.

Meaningful mental or physical activity is essential if learning is to occur. During flight training this is achieved through correct practice or repetition. Students learn by applying what they have been told or what has been demonstrated.

As learning continues or is strengthened by additional practice, your training syllabus should make provision for this practice time. You must ensure that the practice is directed towards a specific goal. Oral questions, hypothetical problems, dual review, or solo practice are all methods of providing mental or physical activity.

Instructor and student activities for each level of learning

LEVEL OF LEARNING	INSTRUCTOR ACTIVITY	STUDENT ACTIVITY	KINDS OF QUESTIONS
Evaluation	Provides items to be tested	Records and draws conclusions	All
Synthesis	Provides exercise situations	Combines information into concepts	All
Analysis	Provides exercise situations	Breaks items into smaller components	All
Application	Demonstrates and explains	Imitates and practises	All
Comprehension (understanding)	Develops lesson by questioning	Answers and asks questions	Why? & How?
Knowledge (information)	Presents lectures	Listens	What?
Familiarisation	Gives briefings	Listens	Where? & When?

Table 1.

If students are able to answer questions involving the words 'how' and 'why', it usually means that they have a good understanding of the subject. For you as a flight instructor, these two words are probably the most important in your vocabulary.

Study Table 1 (page 55) and note both the instructor and student activities for each level of learning. Should you attempt to employ the application level of learning without having covered the understanding level, students will probably encounter much more difficulty than if they had mastered previous levels.

Suggestions:

- Unless you are testing to see what students have learned, avoid questions that are prefixed by the word 'what'. Give students the facts, figures and necessary knowledge, then ask 'how' and 'why' questions to develop their understanding of the new knowledge.
- Once you have told students a fact, avoid repeating yourself. Instead, have them relate the facts back to you. This strengthens their learning and confirms their knowledge of the required material.
- Give students challenging problems that fit the level of learning, and provide only enough assistance to keep them on track. When students are able to solve the problems alone, they have demonstrated adequate knowledge and ability.
- Test students knowledge and abilities frequently. This reinforces learning and builds confidence. However, before testing you must be reasonably certain that students can answer the questions or perform the skills; otherwise they may become frustrated. Testing will also identify areas in which students have weaknesses, thus allowing you to re-teach these subjects to the required standard.



Intensity

Use dramatic, realistic or unexpected things, as they are long remembered.

Students learn more from dramatic or exciting experiences than from boring ones. It is a well known fact that a student's 'look-out' while flying will improve considerably after a first experience with a near miss. There is no suggestion here that you provide your student with a near miss, but you should attempt to make your students' learning experiences realistic, relevant and impactful as possible whilst ensuring you display enthusiasm and engagement during the exercise and taking opportunities to introduce them to the need to plan for the unexpected. The INTENSITY learning factor implies that students will learn more from real experiences than from substitutes. You will have to use your imagination to develop vivid experiences for dramatic or realistic effects.

Suggestions:

- Show enthusiasm and sincerity for the subject you are teaching.
- Attempt to employ a wide range of speech variation in rate, volume and pitch to keep students attentive.
- Use appropriate and effective gestures while explaining major points. The lesson will seem to 'come alive', and the points made will make a greater impression on your student.
- Use a variety of training aids to appeal to as many senses as possible. Each aid must relate directly to the subject matter being taught.



Effect

Ensure that students gain a feeling of satisfaction from having taken part in the lesson.

Learning is strengthened when accompanied by a pleasant or satisfying feeling. Students will learn and remember more under these conditions than when feelings of defeat, frustration, anger or futility are developed. If you were to demonstrate a 'wingover' type manoeuvre during the first air exercise, students would likely feel some inferiority, if not actual fear. The experience would be negative. They might even give up flying at that stage. This example is rather obvious, but you need to consider how your actions could produce feelings of frustration or anger. For example, you ask a student to perform a manoeuvre and then you immediately emphasise all the errors the student made. Your identification of each error may be very accurate, but how would the student feel about it? If the objective were to make the student feel defeated, then you would probably succeed. It is better to point out the positive aspects of a student's performance first and then discuss the major errors that were committed and finish with suggestions for improvement.

Whatever the learning situation, it should contain elements that affect your student positively and give feelings of satisfaction. Each learning experience does not have to be entirely successful, nor do students have to master each lesson completely; however a student's chance of success will be increased with a sense of accomplishment and a pleasant learning experience.

Suggestions:

- Involve students in the lesson by developing some of the new material from them. This can be done by asking students questions related to the subject and allowing students to contribute knowledge and ideas.
- Throughout your lessons, obtain feedback from students by asking questions, observing the performance of a skill, and watching for facial expressions that show a lack of understanding. You must respond to any feedback by answering questions and providing help and correction where needed.
- Show students how to improve, and offer praise when improvement occurs.

- Back up all of your statements with reasons. Whenever you tell students something, give the reason behind it. For example, you say to a student, 'This aircraft has two static vents, one on each side of the fuselage.' This is a fact, but if students do not know the reason for the two vents, they will probably pass it off as unimportant and forget. Remember, if a student understands the concept or theory, details may be forgotten but the overall concept will remain, and when an aircraft with only one vent is encountered more attention may be given to instrument readings while making a cross-wind approach.
- When a student encounters difficulty in mastering an objective, find a means of allowing some degree of success. For example, the lesson is steep turns. Rather than having students attempt the entire manoeuvre, try having them practice the entry. When no difficulty is experienced with the entry, add the next stage, then continue until the entire manoeuvre is completed. Should difficulty still occur, back up a step and attempt medium turns rather than causing too much frustration. Sometimes instructors make the mistake of continuing to have students attempt a manoeuvre when performance is deteriorating. It is better to quit at that point and go back to something the student can do well.
- Avoid ridicule or sarcasm. You may feel that it might take the place of humour; however students seldom have the same feeling, especially if they are the butt of the remark.
- Arrange each lesson so that when a student does something correctly there is a reward. This reward can be in the form of sincere, honest praise. You ask a student to complete a walk-around on a specific aircraft for which you have arranged to have a component such as a nut placed on the ground under the engine. Your student notices the offending part and brings this to your attention and is praised for this. If a thorough inspection is not completed, you have an excellent teaching point to emphasise why careful inspections must be done.



Recency

Summarise and practice the important points at the end of each lesson, as things learned and practiced last will be remembered longest.

Other things being equal, the things learned last are best remembered. Conversely, the longer students are removed from a new fact or even an understanding, the more difficulty they will have remembering it. The need for reviews was stated earlier, and a full circle has been completed: review - learn new material - review, etc.

Suggestions:

- Plan for a pre-flight briefing immediately before air exercise, and review the main points by questioning. This may sound like the **readiness and exercise** learning factors; however, recency deals with the timing of the practice.
- Ensure that students receive a thorough summary of the important points towards the end of each lesson.
- After each sequence within a flight or ground lesson, ask questions on the material or summarise the 'need to know' material.
- Conduct a test as the final part of your lesson.
- At intervals throughout the course, conduct review sessions in which no new material is taught, but reinforcement is obtained.
- Attempt to finish each lesson with a practice of the most important parts of the lesson. This applies to solo lessons as well as dual exercises. Remember, students practice knowledge by answering questions and they practice skills by doing.
- An important skill for a flight instructor is the ability to ask good questions. Good questions satisfy all the identified learning factors. The next section of this guide will deal exclusively with oral questions.

Oral Questions

When you present a lesson you have many techniques and aids at your disposal. One aid that can be used to stimulate learning and can be effectively applied to satisfy all seven learning factors is oral questioning.

The actual technique of questioning is a difficult one and is normally one of the most neglected areas of instruction. Good oral questioning requires the ability to think quickly and easily while facing a class or individual student, to shift and change as thoughts progress, and to phrase questions in clear and simple terms. You must always be mindful of the technique to follow when handling student questions and answers.

Purpose of oral questions

First, questions can be used to PROMOTE MENTAL ACTIVITY. You can state a fact and provide visual or verbal support to back it up, but the surest way for students to remember is to work it out for themselves. Whenever you can use an oral question to make your students think and reason out the fact, you should take advantage of the situation. For example: As students work towards an objective it is often necessary for them to recall pertinent data or knowledge learned previously.

A well-worded oral question could provide the required information, thus promoting mental activity. A second purpose of oral questions is to AROUSE AND MAINTAIN STUDENT INTEREST. Merely making a statement will often result in a 'so what' attitude, but asking questions makes students feel they are participating and contributing to the lesson and thereby arouses interest. You can maintain this interest throughout the lesson by the continuous development of facts and ideas.

Remember: Telling is NOT teaching.

Another purpose of oral questions is to GUIDE THOUGHT. By using questions you can lead students to think through to a logical solution. Questions can direct students' thinking through a definite sequence or to particular objectives. During discussions you can use questions to guide your students' thoughts back to the objective if they seem to be far afield. An experienced instructor can guide students through an entire lesson by asking the right questions at the right time.

A final purpose of oral questions is to EVALUATE LEARNING for the benefit of both instructor and student. Oral questions may be used after each stage of a lesson to ensure that students are following before you proceed to the next stage. At the end of the lesson, such questions confirm that students have attained the objectives for that particular lesson.

NOTE:

A drawback of using oral questions to evaluate learning in a class environment is that only random sampling of a class is obtained, since only one student answers each question. This drawback can be overcome by the use of some sort of student response system by the instructor. On a one-to-one basis, and during pre-flight and post-flight briefings, the above is not a problem.

Desired qualities of good oral questions

If oral questions are to serve the stated purpose, you must be mindful of the following desirable qualities of good questions when composing or preparing to use them.

EASILY UNDERSTOOD. Questions should be stated in simple straight forward language; they should be brief, yet complete enough that students have no doubt as to the meaning of the question. Examples include **open questions** which provoke open dialogue with no specific outcome or **closed questions** which seek a specific response. **Probing questions** are used to drill down to confirm the students understanding, while **leading questions** are used to get the discussion back on track. **Provocative questions** are used to test engagement and confirm students attention while **rhetorical questions** are not particularly valuable as the answer is often embedded in the question. **Double barreled questions** are also to be avoided as usually more than one question is asked at once causing confusion.

COMPOSED OF COMMON WORDS. Questions should be designed to measure knowledge of a subject, not use of language. The use of high-sounding words may give you a chance to display your vocabulary but adds nothing to instruction. Remember, if students do not know the meaning of the words they will not be able to answer the question. Always keep your vocabulary within the grasp of your student.

THOUGHT-PROVOKING. Questions should not be so easy that the answer is obvious to all students. Students should be challenged to apply their knowledge. You should avoid using questions where your student has a 50/50 chance of being correct. Examples of these are the YES/NO and TRUE/FALSE type, unless these questions immediately are followed by a 'why' or 'how' type question.

ABOUT THE MAJOR TEACHING POINTS OF THE LESSON. Questions must be built around the main teaching points of the lessons. They must be asked at the proper time so that these points are emphasised.

Your students may be confused if questions are asked in a haphazard fashion. The purpose for which a question is intended may be lost. To ensure mental participation by all students, the following procedure is used:

ASK THE QUESTION. You should state the question, applying the qualities of a good question. To do this you must have the question in mind before asking it. If questions are being used to evaluate learning or to confirm attainment of objectives, you should prepare them beforehand and write them in your lesson plan. It is often a good idea for beginning instructors to write out questions until they are accustomed to thinking on their feet.

PAUSE. After asking the question, you should pause for approximately 1 to 5 seconds (depending on the complexity of the question) to allow all the students to think it over and formulate an answer.

In a class environment, during the pause you should look over the class, being careful not to 'telegraph' who you are going to call upon to provide the answer.

NAME THE STUDENT. Class environment only. A problem you continuously have to face is selecting the student to answer the question. Some effort should be made to fit the question to the individual, because students will vary in ability and you have to recognise and provide for these differences. Therefore, you should consider giving the more difficult questions to the most advanced students. You also have to ensure that everyone in the class is called upon to provide answers with reasonable frequency. A number of systems commonly used to ensure this have serious drawbacks.

For example, if members of a class are called on according to seating arrangement or alphabetical order, it becomes quite easy for students to determine when they will be named to answer; thus the lazy students will not give serious thought to any question until it is getting close to their turn to answer. Possibly the most practical approach is to call upon students in a random order, then indicate by a check mark on a seating plan card each time a student is asked a question. To get a broader sampling of learning and to maintain interest, you should periodically call upon other class members to confirm the answer made by the first student asked.

LISTEN TO THE ANSWER. Often an instructor, after naming a student to answer a question, will immediately begin to think about phrasing the next question and will not be listening to the answer; and the instructor may say 'that's right' to an incorrect answer. This could lead to student confusion. You should always listen to the answer.

CONFIRM THE CORRECT RESPONSE. Student answers must be evaluated carefully so as to leave no doubt as to what is the correct answer.

Handling student answers

Aside from always confirming correct answers, there are certain techniques you must be aware of when handling student answers.

DISCOURAGE GROUP ANSWERS. Class environment only. When students answer as a group it is difficult to determine who supplied correct or incorrect answers; this may lead to student confusion. When you are given a new class, establish early that you do not want group answers but will call upon a student by name to answer. You may, however, want to use group answers at times to increase class enthusiasm.

DO NOT MAKE A HABIT OF REPEATING ANSWERS. This becomes monotonous to students when you always repeat the answer. If the answer provided is not correct or needs clarification, pass the question on to another student. If the student does not answer loudly enough for all the class to hear, have them speak more loudly and repeat the answer.

GIVE CREDIT FOR GOOD ANSWERS. This is especially true for the weak or shy student. When you are using oral questions to develop points from the class, do not reject answers that pertain to the subject although they may not be exactly what you are after. Give praise and try using a newly phrased question to bring out your point. If you receive a completely incorrect answer, don't embarrass your student by saying 'Wrong!' Diplomatically state that the answer is not what you wanted, and ask a supplemental question or refer the question to another student.

HANDLING STUDENT QUESTIONS. Never discourage a genuine question pertaining to the lesson. There is an old saying: 'For every student who asks a question there are six others who wanted to ask it'. Usually students ask questions because you have not given a clear explanation of the point or fact being queried. Some techniques to follow regarding student questions are:

ENCOURAGE QUESTIONS. Let the class know early in the lesson that you encourage questions at any time the students are not clear on points being taught. If it will not interfere with the presentation of the lesson, it is usually best to answer questions immediately if any point arises rather than waiting for a break in the lesson to solicit questions. If you wait for questions, the point of concern may have slipped their minds.

PASS QUESTIONS TO OTHER STUDENTS. Class environment only. Occasionally pass a student question to other members of the class; this will create interest and get class participation. Do not over-use this technique, as the students may get the impression that you don't know the answer and are fishing for help. Above all, never use this technique for any question to which you do not know the answer.

REJECT QUESTIONS NOT RELATED TO THE LESSON. Quite often students will ask a question totally unrelated to the lesson. Politely reject the question, being careful not to offend the student, and then say that it is a question you would prefer to discuss after class.

DO NOT BLUFF. No matter how knowledgeable you are of your subject, there will be times when you will be asked a legitimate question and will not have an answer. If you do not know the answer, say so - don't bluff. Tell the class you will find the answer. Ensure you do, and then inform the individual who asked, as well as the rest of the class.

ENSURE THAT THE ENTIRE CLASS HEARS THE QUESTION. Class environment only. When a question is asked, check that all the class has heard it. When you answer the question, answer to the class and not only to the individual asking it. If a long, detailed answer is necessary, the remainder of the class may lose interest and 'tune out' if you get into a conversation with one student.





The Demonstration-Performance Method of Teaching

General

A trainee-instructor once asked, 'If I had time to learn only one method of lesson presentation, which one should I learn?' The answer is the demonstration-performance method. Why? Well, the primary concern of an instructor is training. Training, in large part, is devoted to the development of physical and mental skills, procedures, and techniques. For example, flying aircraft, interpreting blueprints, driving vehicles, welding, building, shooting, repairing, solving problems, filling out forms-all of these, and many more, can be best taught by using the demonstration-performance method.

The demonstration–performance method can be broken down into five basic procedures:

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

Explanation and demonstration

The explanation and demonstration may be done at the same time, or the demonstration given first followed by an explanation, or vice versa. The type of skill you are required to teach might determine the best approach.

Consider the following: You are teaching a student how to do a forced landing. Here are some options:

- Demonstrate a forced landing and simultaneously give an explanation of what you are doing and why you are doing it; or
- Complete the demonstration with no explanation and then give a detailed explanation of what you have done; or
- Give an explanation of what you intend to do and then do it. You will find that different instructors will approach the teaching of this skill differently. The following represents a suggested approach that appears to work best for most instructors.
- On the flight before the exercise on forced landings, give a perfect demonstration of a forced landing. It may be better not to explain during this demonstration, since you want it to be as perfect as possible to set the standard for the future performance. There is another advantage of giving a perfect demonstration before the forced landing exercise. Your students will be able to form a clearer mental picture when studying the flight manual, because they have seen the actual manoeuvre.
- The next step would be for you to give a full detailed explanation of a forced landing. During this explanation you would use all the instructional techniques described previously. You must give reasons for what is expected, draw comparisons with things already known and give examples to clarify points. This explanation should be given on the ground and use visual aids to assist student learning.
- When in the air, give a demonstration, but also include important parts of the explanation. Usually asking students questions about what you are doing or should do will give them an opportunity to prove that they know the procedure, although they have not yet flown it.

- After completing the demonstration, practice a forced landing and while climbing for altitude, clear up any misunderstandings the students may have and ask questions.
- The demonstration and explanation portion of the demonstration-performance method is now complete, and you should proceed to the next part, which is the student performance and instructor supervision.

Student performance and Instructor supervision

Student performance and instructor supervision are always carried out concurrently during the initial stages of training. A student should not be allowed to make a major error at this time. Your supervision must be close enough to detect the start of an error, and you must correct the student at that point.

The student should be allowed to perform the task in small segments, with you providing close supervision of each segment.

Referring to our example of the forced landing, consider the following suggestion of how to divide the task into segments.

On the student's first attempt following an initial demonstration by the instructor. You, the instructor:

- Select the field, making sure that it is within easy gliding range; and
- Perform all in-flight checks, including look-out.

The student flies the aircraft and concentrates on making the field.

If the student makes a major error, you take control and place the aircraft in the correct position, then give the student control and continue the approach. (Try to ensure that the student makes the field on the first attempt, even if you have to help all the way through). On subsequent attempts, depending on the degree of success of the previous attempt, add more items for the student to carry out.

Continue the process until you feel the student can fly the complete manoeuvre alone. You have now completed the student performance and instructor supervision portion of this method, and you should now proceed to the evaluation.

Evaluation

The evaluation portion of the demonstration-performance method is where students get an opportunity to prove that they can do the manoeuvre without assistance.

For the practice forced landing you should explain to your student that you will be simulating an engine failure and that they are to carry out the entire procedure, including all checks and look-out.

While the student is performing this manoeuvre you must refrain from making any comments. Offer no assistance whatsoever*-not even grunts or head nods. You must, however, observe the entire manoeuvre very carefully, so that you can analyse any errors that the student may make and debrief accordingly.

NOTE:

You must interrupt the student's performance if safety is a factor. Success or failure during the evaluation stage of the lesson will determine whether you carry on with the next exercise or repeat the lesson.

Rules for using the demonstration-performance method

Give a perfect demonstration or, if this is not practicable, show the finished product.

For example: when teaching map preparation, show a map with a cross-country trip all marked out as students will see the standard expected in preparing their own maps.

Give a step-by-step explanation of the required task. Use reasons, examples and comparisons to make the explanation clear.

Have students imitate a step of the skill while you provide close supervision. For example, have students practice the entry to a steep turn until it is correctly done before you go on to the next step.

Continue until the student has imitated each step. Provide time for the student to practice with assistance as necessary.

Ensure that the amount of time allocated for student practice equals or exceeds the amount of time for the demonstration, explanation, and student performance under very close supervision. Students should take as much time to practice as you take to teach.

Overall rule: while you are demonstrating and explaining, your student listens and observes; while your student is performing, you listen and observe. NEVER ask the student to fly/performance while you are explaining.

Complete the exercise with an evaluation (final check-up where your student has the opportunity to prove what they can do).

NEVER just explain and demonstrate a skill or procedure for students. **Always** have students perform the skill to ensure that the skill or procedure is done properly. **Stick with them until the skill is performed competently.** For example, during the pre-flight briefing, your student is unable to correctly state the engine failure immediate actions. Explaining how to do this drill, even with a demonstration, is no guarantee of student success. Have your student review the flight manual and verbalise the procedure to you, then have them practice in the cockpit on the ground until competent before departing for the air exercise.

The following techniques, if applied in a conscientious manner, will help the flight instructor to give effective instruction. Because most flight instructors also carry out some, if not all, of the ground school training, references to classroom-type instruction are included in this summary.

The techniques of instruction, questioning techniques, lesson planning, etc., are equally applicable for providing large group instruction or for air instruction on a one-to-one basis, individual preparatory ground instruction, or pre-flight briefings.



To present a lesson in a professional manner, you must prepare in advance and proceed as follows:

Preparing a lesson plan

Reason: A lesson plan acts as a guide and keeps you on track during your presentation. It also ensures that important points are covered and not neglected because of poor memory.

What to include:

- sufficient notes to jog memory on talking points
- specific questions and answers
- to confirm student learning
- visual aid instructions (including a white-board plan)
- a well-thought-out opening and closing statement
- estimates of the amount of time to be spent on each major idea or item, and
- a visual aids plan; any other material that you feel will help to get the lesson across

What to avoid:

- writing material out in full detail (this promotes reading of the material while you are in front of the class)
- using single space format (this does not allow for revision of the notes the next time the lesson is to be given), and
- writing in longhand, unless you are able to read your notes at a distance of 1 metre. (This makes you appear not to know your material because you have to look closely at your lesson plan rather than just glance at it to jog your memory.)

Prepare the classroom/teaching area before the lesson

Reason: The class must be arranged for best student learning. If students cannot see all the aids, they may miss a point. Lesson preparation appears more professional if no time is wasted organising aids or

Prepare/check training devices/aids before the lesson

Reason: This avoids embarrassment should an item not work, or should any chart, slide or graph be shown in the wrong order.

Prepare your students for learning

Reason: If students are to learn, they must be physically, mentally and emotionally ready to do so.

How to do it: Explain to your students specifically what is required of them during the lesson and what they will be able to do at the end of the lesson. Explain why they should take part in the lesson and how the new skill or knowledge will benefit them. Give as many advantages as you possibly can for having students learn, as they may not agree with some of your reasons.

Describe an overall picture of the lesson, and show them how it fits into the entire course. Relate the new material to some past and/or future experience of your students.

The length of time required to prepare students for learning depends primarily on their background knowledge and the complexity of the material. As a general guide, the amount of time needed is approximately 10% of the lesson.

"One of the greatest safety devices in the world is a free state of mind, a happy state of mind on the part of those at the controls" Eddie Rickenbacker

Start the presentation of new material at the students level of understanding

Reason: If you begin your presentation at a level your students do not understand, there will be confusion, time wasting and little or no learning will take place.

How to determine the student's level of understanding:

- Before the instruction starts, conduct a Threshold Knowledge Test to determine what your students know or don't know. A Threshold Knowledge Test is simply some form of examination, written or oral, of sufficient length to inform you as to the actual level of knowledge.
- During the course of instruction have periodic reviews.
- Conduct a review of previous lessons before you start each lesson. The review should consist of a series of questions. If your students answer correctly, proceed. If they do not, re-teach.

Check with other instructors for the strengths and weaknesses of your students, and arrange your material to fit the students' needs.

Proceed at the rate of student comprehension

Reason: If you get ahead of your students during the presentation, you are in the same position as if you started above their level.

How to ensure that you are proceeding at the required rate:

Arrange your material in stages. Stop at the end of each stage and ask specific questions on the material you have just covered. If your students answer correctly, proceed. If they do not, re-teach. The length of time for a stage depends on the complexity of the material being presented, but a good general rule is 8 to 12 minutes.

Write out in full a number of well thought out questions. Put these questions on your lesson plan and make sure they are asked during the presentation. The feedback you get from these answers will determine whether or not your students understand.

Observe your students closely for facial expressions that could indicate that they do not understand a particular point. If students say they understand, ask them a question to make sure.

Encourage students to ask questions on points that they do not fully understand. Provide for lots of practice of basic skills before you go on to the more complex parts.

Identify and emphasise major points for the students

Reason: During any presentation there is a mixture of 'need-to-know' material, which is extremely important, and 'nice-to-know' material, which may or may not have to be remembered for a long period of time.

How to identify and emphasise points for your students:

- Prepare a visual aid of the main points; approximately 75% of learning comes from vision, whereas only about 13% comes from hearing. The visual aid may be a heading on a white-board, chart, or projected image.
- Have students write the main points down in their notebooks, or provide notes that include these main points.
- Make a verbal statement to the students, such as: 'This particular point is very important:- remember it.'
- Prepare an orientation board (whiteboard or sheet of paper) that identifies the major points for a lesson. Students can refer to this board throughout the lesson, and this helps their thoughts to be guided to a specific area.
- Raise the volume of your voice and reduce the rate of delivery while stating an important point, to add emphasis.
- Besides emphasising the main points, you should also emphasise safety and the points that are easily forgotten or difficult to remember.
- Provide emphasis according to relative importance. The most important things get a greater amount of emphasis.
- Emphasise points by giving verbal examples (real or imaginary); by comparisons (similarity to, or difference from, known facts); and perhaps most importantly, by giving reasons for each point you make. Students tend to remember better if they understand the reasons behind every point they must learn.

- Repeat the point frequently by using summaries, or have your students repeat the point by answering your questions.
- Conduct periodic reviews of the 'need-to-know' material.
- Have the students complete a home assignment of the important points of a lesson.
- Have students record in note form the major ideas or items that you feel must be emphasised. By having them write ideas down you are using another sense, so learning may be reinforced.
- Use a variety of training aids to appeal to several senses (touch, feel, etc.).
- Do not emphasise 'nice-to-know' material.

Give clear explanations and demonstrations

Reason: If students do not understand an explanation, you will have to re-teach by rephrasing or by going over the material a second time. The same applies to a sloppy or inaccurate demonstration.

Suggestions for ensuring that your explanations and demonstrations are clear:

- Start verbal explanations by referring to something already known by your students. Association of ideas makes it easier to follow your explanation.
- Use words and phrases that are commonly used. Avoid showing off your command of the English language by using such phrases as: 'Elaborate on the fundamental ramifications of hylampherism'. Instead, ask 'What happens when the lever is lifted?'
- Attempt to reduce complex material and ideas to a simple, easy to understand form. The best way to do this is to start with something your students know about and build on that knowledge in small steps.
- If you are required to demonstrate something, make sure you can do it correctly before you show the students.
- Make sure all students can see even the smallest points of a demonstration; if necessary, gather them around you.
- If you are doing a simultaneous demonstration and explanation, break the demonstration down into small steps and explain each step thoroughly, giving reasons, examples and comparisons.

Use visual aids and use them effectively

Reason: Approximately 75% of all learning comes through vision. Ideas can be sourced from:

- graphic artists or personnel associated with the production of visual aids.
- other instructors, who can often give spark to an idea.
- commercial displays in newspapers, magazines, television and stores and,
- your own imagination, which (if you give it full reign) is an excellent source of ideas for aids.

Types of visual support:

- actual equipment.
- mock-ups, charts, diagrams, pictures or models.
- DVDs, films, videotape and cassette recordings.
- sometimes, people.

Guidelines:

- Plan the lesson first, and then select the type of visual support that helps students learn the material. DO NOT select a visual aid and then try to build a lesson around it. Just because the aid looks impressive, it does not mean it will fill the need, the need being to help your students learn the 'must-know' information.
- Plan to use a visual display of all major points that are covered during your lesson. Simple wording on the whiteboard is usually better than repeating the main points over and over again.
- Make your aids simple and clear. Eliminate all unnecessary data. Avoid the tendency to produce ornate, detailed artwork.
- Manufacture aids that can be seen by all the students. Before you use it, put the aid in the position in which it is to be used. Go to the position of the student farthest away, and ensure that you can see the aid clearly.

- Use a variety of colours to add interest, but make sure you keep associated parts or ideas or a repeating idea in the same colour. In this way, you help your students to follow your presentation more easily.
- When an aid is not in use, cover it up or remove it from sight. It can act as a distraction for your students if it is there but not being used.
- If the aid includes written words, have someone check for correct spelling and grammar. You would be surprised how many times misspelled words are displayed for students.
- If possible, stand well away from the aid and use a pointer so that you do not obstruct the view of any student.
- If you are using charts it is sometimes advisable to have two copies, one labeled and one unlabeled. The unlabeled one can be used later to test student knowledge. Alternatively, a duplicate work sheet of the chart can be given to each student to fill in or label.
- Consider: Will the aid help the student learn better, easier, or faster? You should 'show them as well as tell them'.



Vary the rate, volume and pitch of your voice when delivering the lesson

Reason: Any form of variety adds to student interest. Speaking in a dull manner will generally put students to sleep, or at least allow their minds to wander off the subject.

Consider:

- Speak at a fast rate while presenting 'nice-to-know' material. This produces the effect of observable enthusiasm, and enthusiasm is contagious.
- Speak at a slow rate when identifying 'must-know' information. This allows students to separate the 'need-to-know' from the 'nice-to-know' material and in most cases adds emphasis to the points being made.
- Adjust the volume of your voice to the conditions under which you are instructing. If there is background noise you must raise the volume of your voice so that all the students can hear what you are saying.

Generally you will have very little control over the pitch of your voice, but adjusting the volume and varying the rate of delivery will often help to vary the pitch to some extent.

Obtain feedback from students by looking at them (eye contact)

Reason: It gives students the feeling that you are interested in them and allows you to determine whether or not they understand what you are presenting.

Consider:

- Look directly at the students, but do not stare at any particular individual for too long at a time. If students avert their eyes it means you have stared too long and possibly caused some embarrassment, look at someone else or out the window.
- Make your eye contact impartial. Do not favour any individual student or group of students; include them all in your presentations.

Provide for maximum student activity during the lesson

Reason: Students learn more easily if they are actively engaged in the learning situation.

Consider:

- When learning a theory subject, students' practice of that theory is usually in the form of answering questions. Ensure that you ask questions throughout the presentation.
- Use sound questioning technique, as outlined in section 2 of the Appendix - 'Oral Questions'.
- Distribute your questions evenly among all the students, to avoid having a few answer all the questions.
- Make your questions thought provoking and challenging.
- Avoid questions that require a simple YES or NO answer, unless you immediately follow up with a 'why' or 'how' question.
- Always have enough information in the stem of your question to guide the students' thoughts towards a particular area. Avoid general or ambiguous questions, such as 'What goes up the cylinder of an engine?' You may not get the answer you are looking for.
- Meaningful activity while learning a skill is normally a combination of answering questions and practicing the various steps of the skill. Arrange to have students involved in the practice as soon as possible after the start of the lesson. If possible, build into the first part of the lesson a 'hands on' opportunity for your students. This increases their interest and in most cases will give them a positive desire to learn more.
- Always supervise student practice very closely; do not allow them to make mistakes from which they could begin to learn bad habits. If you do, you will have to reteach them. The phrase 'practice makes perfect' is only true if the person practicing receives close guidance and supervision.

"Once you've tasted flight you will forever walk on the earth with your eyes turned skyward, for there you have been, and there you will always long to return."

Leonardo Da Vinci



RECREATIONAL AVIATION AUSTRALIA



Developmental Teaching or Teaching By Questioning

Developmental teaching is based upon a student-centred philosophy of teaching that requires you to reason with students to have them meet predetermined objectives. By using the students' background knowledge, you ask questions that lead the students to determine the next step in a procedure, the logical application of a principle, or the final solution to a problem. The rate of progress in developing the more complex ideas of the lesson is governed by the students' perception and comprehension.

Questions should be asked to review previously learned material. The process of developmental teaching begins when students are required to reason out, and make suggestions, with respect to new material.

Developmental teaching has been used throughout the years by all good teachers. Because of the requirement for every student to participate, developmental teaching is effective with small groups and with individual students. It can be used at any level of student knowledge, provided that you know or determine the appropriate level and proceed accordingly.

Depending upon the subject matter, some lessons can be entirely 'developmental'. More frequently, however, there will be a combination of teaching by explanation (where it may be more efficient to explain certain material) and developmental teaching (where crucial areas of the subject matter can be reasoned with your students). In almost every lesson, some developmental teaching is appropriate and desirable.

The main advantage of developmental teaching is that it promotes efficient student learning because it satisfies all the basic aspects of learning. Since students participate in meaningful activity, they are forced to think about the material being learned, as questions are answered verbally.

Consequently, interest is maintained, a sense of accomplishment is gained, and effective learning takes place. You receive constant feedback and frequent confirmation of the students' progress.

Careful planning for developmental teaching is critical because you must formulate appropriate questions that demand reasoning on the part of your students. The standard questioning techniques must be observed, and student responses must be handled with tact and discretion.

In addition to being a master of the subject material, you must be flexible in your approach. You must permit adequate discussion, yet exercise sufficient control to move towards the lesson objectives. Frequent summaries are necessary to consolidate the material as the lesson progresses.

Novice instructors are frequently apprehensive about trying developmental teaching. Experience has shown that students consistently surprise instructors if given the chance to participate actively in the learning process.

The disadvantage of lecturing during preparatory instruction is that students are frequently told material that they already know, or that they reasonably can be expected to deduce on their own. The best teaching occurs when students are led to a point from which they can systematically direct their own reasoning to the solution of a problem. The secret of effective learning is to keep students mentally active in the learning process. With developmental teaching students are forced to think.

Student Progress

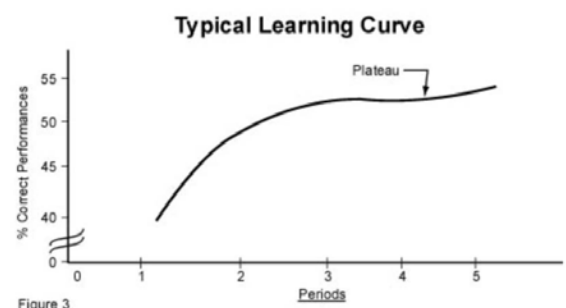
Rates of learning

Although it would be convenient if the rate of learning could be consistent and predictable, it is not always so. Students may progress rapidly for a period, and then suddenly progress more slowly or even retrogress for a time. Such variations are to be expected. It is your responsibility to detect them as soon as possible and to try to eliminate their causes by redirecting your instruction to level them out as much as possible.

Advances and plateaus

Learning proceeds rapidly at first when a new task is introduced then slows as a reasonable degree of proficiency is achieved. When plotted on a graph, this decrease in the rate of learning is shown as a leveling of the ascending curve that represents progress (see Figure 3). As students achieve the ability to bring together other aspects of training, progress then tends to resume its upward climb at a slower but fairly constant rate.

The relatively level portion of the learning curve is termed a plateau. It may represent a period of training during which the student is perfecting the application of the new skill. The correlation of the new skill with the other learning tasks may not yet be obvious.



The rate of progress in learning is affected by so many outside influences that it is not often predictable. The rate of learning is affected by such things as:

- diversions
- lagging motivation
- emotional disturbances
- upset training schedule
- weather
- equipment breakdown
- unavoidable absences

Slumps or plateaus in the rate of learning are more likely to occur as your student advances to more complicated operations, such as hovering or transitions. Often the reason is that a student has failed to master one basic element of the operation, and this leads to the appearance of deficiency in the performance of later elements. Improvement usually becomes normal again when this one basic element is mastered. You can accelerate improvement by careful fault analysis and by concentrating instruction on that one phase of the operation concerned.

Without competent instruction, students will probably not understand why they aren't improving and will become discouraged. This discouragement tends to prolong the plateau. During such periods of discouragement, you should step in to isolate and correct the situation and to provide special incentives until normal progress is resumed.

Reversals sometimes occur, during which a student's performance becomes worse with continued practice. Generally such reversals are due to a faulty habit pattern involving one of the basic elements of the manoeuvre or operation involved. This faulty habit causes your student to practice an erroneous performance repeatedly, until correction becomes very difficult. You must not accept such errors and misunderstandings as normal plateaus in the learning process. They must be corrected before progress can resume.

During advanced stages of learning, the rate of progress can be very slow. For example: An acrobat who can perform a routine to a level of 9.6 continually practices to improve the performance. Raising the score up to 9.8 or 10 requires extensive training and practice. Students may be nearly ready for a flight test at an early stage, and added training will only show slight, slow improvement.

Reversals in the rate of learning could also take place if you were to place too much emphasis on a single phase, element or manoeuvre.

You are likely to be discouraged when you discover that a well planned lesson does not teach all students with equal effectiveness. Usually, however, you soon see that this is natural. One manifestation of the difference among students is that they seldom learn at the same rate. Differences in rates of learning are based on differences in intelligence, background, experience, interest, desire to learn, and countless psychological, emotional, and physical factors. You must recognise that students are different. You must recognise that this fact dictates how much you can teach, at what rate, and when.

Personality differences

ATTITUDE: Students have their own personal attitudes and methods of thinking. Thinking patterns and reactions to the various philosophies and types of training must be reconciled. The instructor must consider whether the attitude is caused by hereditary or environmental factors. The root of attitude problems may sometimes be found in the general attitude of the school staff.

INTEREST: People sense ideas and activities that possess special values, uses or attractions for them. Three general categories of interest are the vocational, educational, and avocational. The interests of students in different aspects of flying will differ. Efforts should be made to take advantage of these and to channel students into different areas as needed.

Emotions

Emotions play an important part in the training of a student. You must know the kinds of emotions and the techniques needed to control them. Most of us think of emotion as overpowering feelings such as passion, hatred or grief. These are not typical of the entire range of emotions. Everything we do, or with which we come in contact, is coloured by some emotional feeling. Emotions vary from mildly pleasant or unpleasant feelings, all the way up to feelings so intense that physical and mental activity is paralysed. All of us experience a wide variety of emotions every day. Rarely do they bother us or interfere with our ability or willingness to do our job. However, students in flight training are in an abnormal emotional condition. Students are in unfamiliar situations where accelerated pressures are experienced over a long period of time. The learning situation tends to intensify the students' emotional problems more than we would expect in everyday life. You cannot ignore this problem but must learn how to recognise and overcome it.

Degrees of emotion

For our purposes, we will divide the various levels of emotion into three categories:

MILD EMOTION: This is the everyday type of emotion such as a small amount of satisfaction or dissatisfaction with our jobs, our personal lives or with other people. Mild emotions affect motivation.

STRONG EMOTION: This degree of emotion is not felt very often in everyday life, but it causes most of our emotional problems in flying training. Strong emotions cause a large amount of tension in an individual and no one can live or work normally with prolonged tension; however, strong emotion can be coped with.

DISRUPTIVE EMOTION: These are very severe, deep-rooted emotional tensions that disrupt logical action and clear thinking. Persons suffering disruptive emotions usually require the assistance of a psychiatrist; however, these problems occur so rarely that you need only be aware that they exist.

The effect of strong emotional tension

A person cannot tolerate strong emotional tension over any length of time. It causes extreme nervousness, irritability, and an inability to relax. It interferes with normal eating and sleeping habits and makes the subject generally miserable. Everyone, either consciously or subconsciously, tries to relieve prolonged emotional tension.

The effect of emotional tension on learning depends on the method chosen by the student for relieving it. If the problem is attacked directly, and solved, then learning is enhanced. For example, students may have strong feelings of frustration or worry due to deficiency in one phase of the flight training program. If they work harder, study more, and receive extra instruction, progress will probably become satisfactory and tension will disappear. On the other hand, if the real problem is avoided, an escape mechanism may be used to reduce tension and learning will suffer.

Use of emotional escape mechanisms

Students in flight training will often use the following escape mechanisms. Occasional use of escape mechanisms is normal in everyone, but their over-use indicates strong emotional problems. You, therefore, must learn to identify the symptoms that indicate that a student is using escape mechanisms.

PROJECTION: transferring the blame from oneself to someone or something else.

RATIONALISATION: finding a believable excuse for one's actions or failure; trying to justify unjustifiable behaviour.

RESIGNATION: becoming resigned to the situation; giving up.

FLIGHT: physically or mentally removing oneself from the tension-producing situation.

AGGRESSION: taking one's tension out on someone else by becoming belligerent or argumentative.

A student's overuse of one or more of the escape mechanisms, along with other symptoms, may indicate an emotional problem. You should not wait until emotional tension becomes extreme before taking corrective action.

Meeting the differences

You must be aware of the differences in aptitude, personality, and emotions among your students and understand the necessity to treat students as individuals. When you have analysed the situation and determined the differences, seek help from more experienced instructors or supervisors when necessary. You will attempt to equalise the different levels of understanding, ideally raising the level of some without retarding the progress of others. Coping with differences among students is perhaps the greatest challenge of instructing, and finding the correct approach for each student is essential.

Some traits and faults of students are fairly common and can be recognised easily. These are discussed in the following paragraphs, together with suggested corrective actions and also provided in Table 2 (p 91).

NERVOUS OR UNDER-CONFIDENT. Nervousness or under confidence in a student is a trait that may or may not disappear. Instruction may be too rapid and material may not be absorbed. Repeating the fundamentals and ensuring mastery will often alleviate this condition. You must ensure that this type of student receives deserved praise whenever possible. Harsh rebukes should be avoided. Patience is very necessary when dealing with a student of this nature. The student must be aware that you are trying to help. Nervous students may be so apprehensive that they may not be suitable for pilot training. You should avoid manoeuvres involving extreme aircraft attitudes, unless they are essential to the lesson being taught. Take the time to build the student up to exercises involving extreme aircraft attitudes.

OVERCONFIDENT OR CONCEITED. You must first ensure that this type of student has the ability to match the confidence and, if so, set more difficult tasks that require greater accuracy. More criticism of imperfections is advisable. If the student has little ability, counseling may be required. Any signs of familiarity must be discouraged.

FORGETFUL OF INSTRUCTION. At the beginning of training, students may forget previous instruction. Students with this problem require a great deal of patience and probably need more review than the average student. Extra time spent in briefing and debriefing and more study on the student's part should be rewarding for all concerned.

INCONSISTENT. Many students, at one time or another throughout the course, appear to lack consistency in flying proficiency. There are many reasons for this, and you must try to find the one that fits a particular student. You must look at yourself and your attitude towards the student. Most of us have good days and bad days, but when a student shows large fluctuations in proficiency the instructor must look closely at the teaching activities. A change in approach or even a change in instructors may be called for.

SLOW STARTERS. Slow starters are students who find difficulty doing more than one thing at a time. Again, patience is mandatory. Progress may be slow, but encouragement will help.

FAST STARTERS. Fast starters are usually students with previous exposure to flight training who quickly grasp the initial air exercises. You should not omit anything from the briefings.

Watch for signs of weakness when new work is introduced. This type of student usually slows down to the level of the others shortly after going solo. A high degree of proficiency throughout the course should not be anticipated unless the student has above-average ability.

IMMATURE. You must not be too harsh with students who appear immature. You will find that within a short time in the flying training environment, the students will attain a greater degree of maturity. Your attitude is of prime importance in setting an example. You must encourage and help these students whenever possible.

AIRSICKNESS. Some students may suffer from airsickness induced by motion, negative G, apprehension, claustrophobia, tension or excitement. You must attempt to determine what affects the student. When signs of airsickness show up, try methods of prevention such as letting the student fly straight and level, stopping instruction, inducing relaxation, making conversation about something else, or whatever will keep a particular student from becoming airsick.

Table 2: Student traits and how to address them

SUGGESTED ACTION	PROBLEM											
	Learns slowly	Know-it-all	Timid	Wastes time	Too aggressive	Antagonistic	Learns rapidly	Finds fault	Immature	Courts favours	Stalls, evades	Dominating
Tailor	*					*	*					*
Provide more work		*			*		*			*		*
Give more individual instruction	*		*	*								
Be patient in correcting mistakes	*		*			*		*				
Give no chance to dodge responsibility		*	*	*				*	*	*	*	*
Rigidly check students work		*		*	*			*	*	*	*	*
Let student know what is expected	*		*	*	*			*		*	*	*
Determine validity of grievances						*		*				
Give student more responsibility		*		*	*	*	*	*		*	*	*
Give more difficult assignments		*			*		*					*
Require student to prove ability		*		*		*		*		*		*
Have student work alone						*	*	*				*
Keep student informed of progress		*		*				*	*		*	*
Tell student why progress is poor	*		*	*	*	*		*	*	*	*	*
Check at first occurrence				*				*	*	*	*	*
Have a personal talk with student		*	*	*		*		*	*		*	*



The Student-Instructor Relationship

The primary responsibility for establishing a favourable student-instructor relationship rests with you. The successful performance of your job requires that your relationship with students accomplishes three things. It must maintain discipline and respect for you, the instructor: these are necessary for any leader. Students must obey your directions, especially in an aircraft. They must follow your example and strive to carry out your instructions and suggestions for improvement.

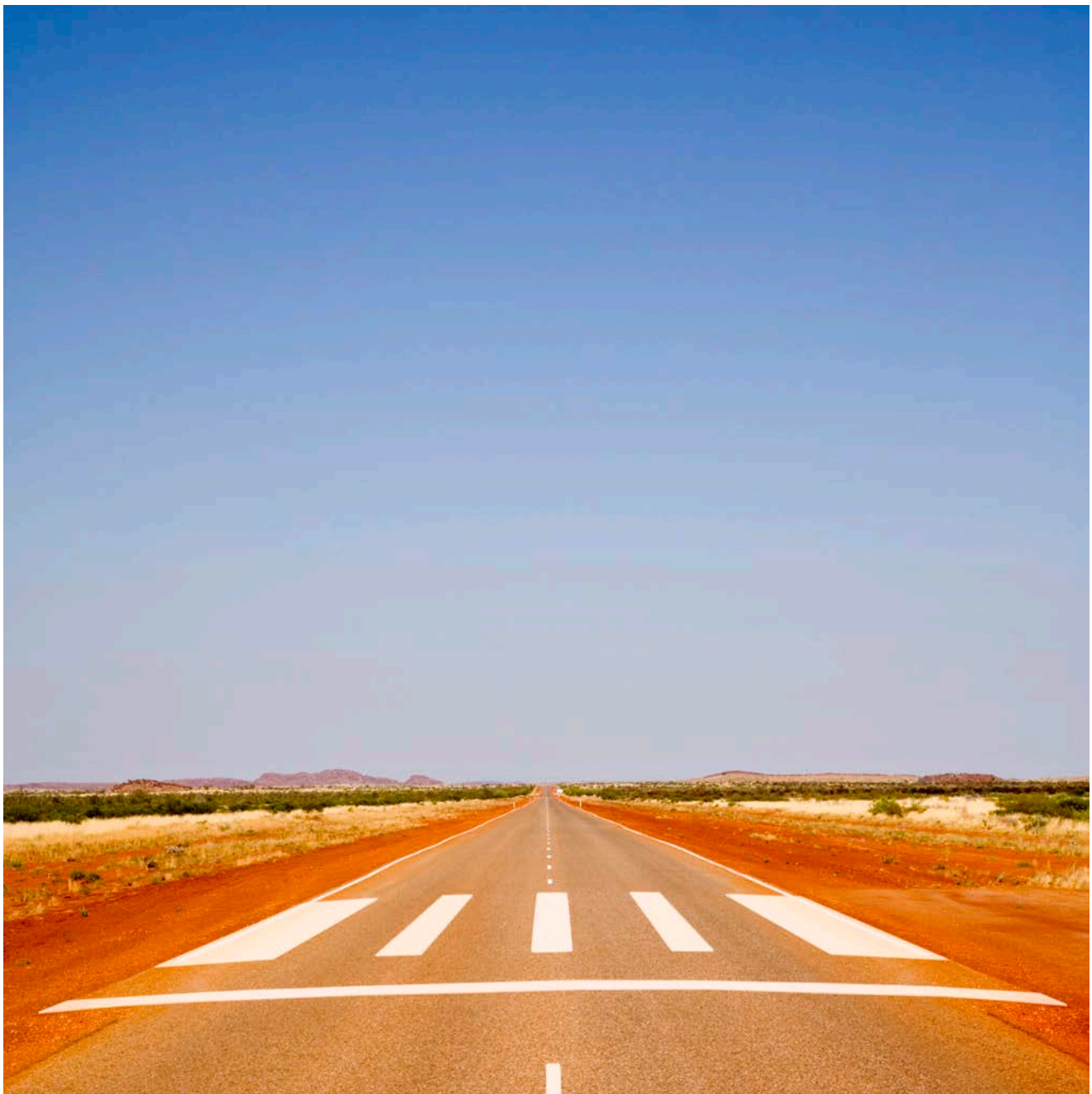
The desire to help your student solve a problem is an important part in student-Instructor relations. An obvious willingness to help students with problems will do more than anything else to hold respect, loyalty, and cooperation. This willingness to help can be demonstrated by counseling. Counseling is a continual process, and informal counseling takes place any time an attempt is made to help students with problems concerning training.

You want your teaching to result in good pilots who are able to use the initiative, judgement and skills that you have nurtured in them throughout the course. If students are to respect, rather than fear or resent, your authority, you must be fair, firm and friendly. Do the following and you will be considered to have some of the qualities of a good instructor:

- Inspire your students to set goals that will stand them in good stead in aviation. Your exemplary conduct and high ideals will help in this goal.
- Be decisive. Weigh all the factors necessary to make decisions and then act with conviction.
- Be interested in your students and let them know by being familiar with their backgrounds, problems and achievements.

- Respect their rights and, when correcting mistakes, do so in a straightforward manner, never using sarcasm as a correction method.
- Acknowledge your own mistakes. The admission that 'You were right and I was wrong' does much to develop morale.
- If you do not know the answers to relevant questions, say so, find the answers, and tell the students later.
- Be enthusiastic. Instructor enthusiasm is reflected in student learning.
- Encourage student initiative, self reliance, ideas and suggestions. By doing so, you teach your students to reason for themselves instead of driving them to rigid conformity. However, stress that there are certain boundaries that they must not overstep.
- Be impartial and fair: never show favouritism.
- Never bluff: much of your subsequent instruction may be distrusted.
- Use humour. Appropriate humour creates goodwill and can be used to teach difficult subject material-but don't become so humorous that the business at hand becomes secondary.
- If you doubt a student's progress or motivation, arrange for an independent check. Perhaps some modification to your teaching approach may be needed. In extreme cases a change of instructors may be in order, if your school situation will allow.
- Be aware that the use of cockpit intercommunication demands suitable phrasing, speech level, clarity, and discipline.
- Teach your students to have mastery over the aircraft, to fly with verve and spirit to the limit of the aircraft's flight envelope, and to know what they can and cannot do, but draw a very definite distinction between intelligent confidence and foolhardiness.
- Plan all solo lessons. Give your students thorough pre-flight and post-flight briefings, and make sure that they clearly understand the requirements and aims of the exercises. Thorough debriefings allow you to find out about difficulties that you may not hear about otherwise. To your student, failure to debrief may appear to simply a lack of importance of the exercise or a lack of interest on your part.

- Be present when your students are being debriefed after check rides or tests. You may find out points that you may have missed while flying with your student, and you will certainly get details in a verbal debriefing that will not be included in a written report.
- Maintain a professional image.





Fault Analysis

Fault analysis is necessary at all levels of flight training. The ability to debrief effectively is a skill equally as important as the ability to fly the aircraft to an exceptional standard. You must realise that the sole purpose of fault analysis is to improve future student performance.

A valid critique contains three essential elements:

1. Strengths;
2. Weaknesses; and
3. Specific suggestions for improvement.

Without each of these elements, fault analysis is ineffective, as it does not accomplish its sole purpose. Strengths are analysed to give a feeling of satisfaction and to show that you recognise what students can do well. If you are unable to identify strengths, it will be difficult for students to believe that your identification of weaknesses is accurate. Positive reinforcement of a student's strengths will frequently do more for the student than any number of remedial suggestions on your part. The necessity of analysing weaknesses is readily apparent. This leads into the third element: specific suggestions for improvement.

Whenever you are critiquing a student, consider the following: if you are unable to suggest a remedy for overcoming the weakness, your student does not have that weakness. Positive suggestions are mandatory for improving future performance; however, you should limit your critique to the identification of a maximum of three weaknesses with suggested remedies. Attempting to correct all the weaknesses that a student may have at one time could result in your student not being able to correct any weaknesses. During actual flight instruction you should attempt to pinpoint a single major weakness before considering the next. Improvement in a student's performance takes time: an expert will not appear overnight. More will be learned if a definite improvement in performance is experienced each time the student takes part in a lesson.

The recommended format to follow when conducting fault analysis is:**When in the air:**

- identify major strengths.
- pinpoint a major weakness.
- suggest a remedy to correct that major weakness.

On the ground:

- identify major strengths.
- identify a maximum of three major weaknesses.
- suggest remedies to correct the major weaknesses.

NOTE:

One way to think of a major weakness is: 'What item, if corrected now, would result in the correction of the greatest number of other faults? As student performance improves, the weaknesses that originally were considered minor ones now become the only weaknesses. All weaknesses will be dealt with in order, dealing with the most important ones first.

Characteristics of effective fault analysis

Effective fault analysis always strives for maximum objectivity. You should never allow personal bias to affect the grading or analysis of any particular flight.

Objectivity should be considered in both student personality and flying techniques. At times, personality conflicts occur but as a professional instructor you will hold these to a minimum. In the area of flight technique, you may become dogmatic and accept only one way to accomplish a manoeuvre. Always keep in mind that there are many techniques that accomplish the same manoeuvre correctly.

You must be consistent in your analysis. Always attach the same importance to an error, provided the circumstances remain the same. Without a consistent set of rules, you will be considered arbitrary or accused of playing favourites.

Honesty is the best policy for critiquing. The situation where you may attempt to motivate a weak student by giving better grades than deserved jeopardises the effectiveness of your instruction. Students must know exactly where they stand and be given specific suggestions for their improvement. This is the sole purpose of fault analysis, and emphasis must be placed on this function.





Preparatory Ground Instruction- Long BRIEFING

A long briefing is classroom-type instruction, normally on a one-to-one basis, but not excluding group instruction, covering the steps necessary to fly an air exercise. Whereas the basic theory of flight, where applicable, would previously have been covered in separate ground study, some theory may be necessary to explain a point related to the conduct of the air exercise. Essentially, preparatory ground instruction should cover 'how to do an air exercise'.

This is a presentation given by the instructor when introducing a new exercise. Ideally it should be given no more than 24 hours before the related training flight.





Pre-Flight Briefing

A pre-flight briefing is a discussion on a one-to-one basis just before the conduct of an air exercise to ensure that the student understands exactly what will take place.

This is essentially a practical briefing on the planned air exercise, avoiding theory but must cover three important aspects:

1. What are we going to do?
2. How are we going to do it?
3. Safety considerations.

A pre-flight briefing is separate from ground school/long briefings. It should precede all flights, whether or not there is a new exercise to be covered. It is also particularly important when sending a student solo. Points that should be covered irrespective of whether it is a dual or solo flight include:

- Meteorological and aerodrome conditions, and Notices to Airmen (NOTAM).
- The aircraft to be used, its fuel state and other relevant information.
- Where the exercises will be conducted.
- Take-off time, duration of flight, and time when the aircraft is due to land back at base.
- The sequence of exercises to be covered during the flight.
- How each sequence will be conducted.
- What the student will see, feel and do.
- Go/no-go criteria.
- Review of relevant airmanship points.



In-Flight Instruction

The in-flight exercise is the culmination of all ground training and preparation. To achieve maximum effectiveness, it must be flown immediately after the preflight briefing, and to avoid confusion it should be flown as briefed. The following is a guide to the conduct of a training flight. Variations may be necessary to suit individual student requirements.

Control of aircraft

There should never be any doubt as to who has control of the aircraft. The procedure for giving and taking control is:

When you, as pilot-in-command, wish to give control to your student, say clearly 'You have Control'. Teach your student to take control only when ready and to always say 'I have Control'. You do not relinquish control until you hear this phrase.

When you want to take control, say 'I have Control' and then take control, ensuring that your student says 'You have Control' when relinquishing control.

As pilot-in-command, you have the final authority. Your request to give or take control should not be questioned but acted on as quickly as possible by your students.

When the student has control, you must not 'ride' the controls. Your student may feel that you are taking control, and this could lead to a dangerous situation.

Additionally, you may rob your student of the feeling of accomplishing the manoeuvre independently. This is particularly difficult during critical manoeuvres, such as cross wind landings, when there is little time available to the instructor to correct errors. This procedure must be adhered to at all times.

In-flight teaching

For most new exercises you should first review the main points of the manoeuvre and then give a perfect demonstration. The review must be short. Include such items as airspeeds, power settings, altitudes etc. Usually you can obtain this information from your student. Your demonstration should be a complete manoeuvre and should set the standard you want your student to ultimately achieve.

In the case of a complex manoeuvre, after the perfect demonstration, demonstrate a small portion of the manoeuvre, giving a brief explanation either before, during or after the demonstration. Have your student attempt this small portion. Watch closely for any major error. If you observe a major error, take control immediately and explain to your student what was done incorrectly, then demonstrate as soon as possible what to do to correct the error.

Allow practice of that small portion before proceeding to the next portion. Continue the process of demonstration, explanation and practice with close supervision of each step or portion, until your student has completed the entire manoeuvre. Then, allow continued practice, slowly withdrawing your guidance and assistance.

As your student gains proficiency, you may look for minor errors and correct them in the same manner. Remember, though, that learning to fly well takes time and you should concentrate on the major points first. Many of the minor errors will be corrected as your student corrects the major faults. Also, remember to praise for good performance.

If practicable, conclude the air exercise with a perfect demonstration of the manoeuvre to be learned on the next lesson. This will help your student to fully understand the home study for the next exercise and will also provide a positive mental picture about what will be taking place during the next flight. Of course, you would not give a demonstration of new material if the next lesson were to be a review or a repeat of a lesson.

Fault analysis

When discussing a student's faults, always take control so that your student may devote full attention to the instruction. In some cases you may ask the student to analyse the errors in a particular sequence; usually this will happen during the later stages of training. Do not be overly critical of minor faults during early stages.

Correct major faults first, then as improvement is noted, correct the minor errors. If a student indicates problems on a solo flight, it may be possible to analyse the problems from the student's description of actions and the aircraft's response. The correct technique can then be reviewed and practiced on the next flight.

Sometimes, however, students may not be able to identify or describe a problem clearly enough for a good ground analysis to be made. You should then fly the exercise on the next dual flight, where you can analyse the performance and correct any faults.

Planning of flight instruction

To make efficient use of the time available, you should plan the flight to avoid delays between exercises. Fuel limitations, area restrictions and weather conditions should all be considered. Your flight should be planned so that one exercise is logically and directly followed by another, with a minimum of time spent losing or gaining altitude or in transit from one area to another.





Post-Flight Debriefing

The post-flight debriefing is a review with the student of each exercise undertaken during the flight. In the case of a dual flight, the debriefing should include strengths and weaknesses and suggestions to improve performance. An outline of the next training session should be given, along with study assignments.

This should follow all flights, dual and solo. Points should include:

- the student's own assessment of the flight and performance.
- your assessment of the student's performance. This should include both the strong and weak points, and advice on how to correct any errors.
- assessment of the student's performance. This should include both the strong and weak points, and advice on how to correct any errors.
- answering any questions the student may have.
- assigning study subjects where appropriate.



Flight Safety

Flight safety is an important aspect of flight training. Both aircrew and ground crew must be aware of the need for correct safety practices. You are in a position to reduce incorrect, unsafe and illegal practices. To be successful, a flight safety program requires the correct attitude, proper supervision, rigid enforcement, and proper training. Your student learns by example: you must set this example.

An experienced instructor is an effective supporter of the principles of good airmanship and flight discipline. As you gain experience, learn to recognise unsafe practices and do something to correct the situation.

Practice flight safety by:

- being alert to unsafe practices and taking the appropriate action.
- following up when you see an unsafe practice by informing the people involved that they have been seen.
- promoting the principles of effective flight safety to students and other aircrew and ground crew.

Flight safety consciousness by all personnel must become the fashion. Unsafe procedures must be watched for, identified, and eliminated by firm and consistent action. Throughout your instruction, stress the importance of being fuel conscious, the need for proper lookout and the danger of having loose articles in the aircraft.






RECREATIONAL
AVIATION AUSTRALIA

A Checklist For Good Instruction

*"Delicious autumn! My very soul is wedded to it, and if I were a
bird I would fly about the earth seeking the successive
autumns"* George Eliot

Table 3

Each Instructor Should: 
Explain to the student specifically what is required of them during the lesson and at the end of the lesson (the 'what' of the introduction).
Identify the main teaching points for the student by: <ul style="list-style-type: none"> - Using visual support (i.e. white-board, orientation board or other visual aids) - Verbally referring to the visual aids
Explain the purpose of the lesson and stress the advantages of the new knowledge or skill (the 'why' of the introduction).
Explain to the student where the lesson fits into the overall picture.
Related the lesson to the student's past and/or future experience (the 'where' of the introduction).
Confirm that students are the required level before having them learn new material.
Present the new material in stages.
Introduce each stage of the lesson and provide a link or bridge between stages.
Obtain student feedback throughout the lesson by: <ul style="list-style-type: none"> - Asking questions - Observing student performance of a skill - Looking at students (watching for facial expressions) - Taking student questions
Respond to feedback by: <ul style="list-style-type: none"> - Answering questions - Stopping students from doing a step of a skill incorrectly - Reviewing material or steps - Asking questions - Correcting the student if an error has been made - Explaining why the student's performance is incorrect - Using verbal support - Re-teaching (if necessary) - Praising students for good work
Appear enthusiastic about the subject being taught.
Use speech variation in rate, volume and pitch.
Have students answer questions related to the objective(s) for the lesson during the presentation of new material.
Use correct questioning techniques.
Use a variety of training aids to appeal to as many senses as possible whenever these aids help to achieve the objective(s) of the lesson.
Provide sufficient meaningful practice of the main points of the lesson so that students confidently achieve the objective.
Identify and correct errors or mistakes made by the students at the time they occur, or as soon thereafter as practicable.

Principles And Methods of Instruction

- Use clearly worded explanations.
- Deliver the lesson in a logical sequence.
- Conduct periodic reviews of critical areas of the lesson.
- Summarise the main points of each stage.
- Evaluate level of student learning at the end of each stage.
- Test students on the main points of the entire lesson towards the end of the lesson.
- Provide a final summary that links all stages to the objective(s) of the lesson.
- Re-motivate students by telling them how the new knowledge or skill will benefit them.

Upon completion of the above RAAus approved Principles and Methods of Instruction (PMI) material RAAus recommends trainee PMI knowledge be assessed as satisfactory before commencing further course components. It is recommended that the PMI training be undertaken over two days not exceeding 4-6 hours and active assessment by the instructor trainer be undertaken to confirm an appropriate application of the skills and methods outlined in this section.

Appendix 1 contains a list of 52 questions targeting PMI knowledge. The questions are open questions and are suited to either written or verbal answers. In this case it is recommended this material is presented to the trainee's in a formal examination format at the end of the PMI course.

Instructor Trainers should consider developing two 26 question examination papers with the second kept in reserve for resit attempts. In order to achieve the best training outcome, rather than a formal pass mark, it is recommended that all identified areas of knowledge deficiency should be satisfactorily addressed prior to considering that the trainee has passed the PMI course.

