packages which are essentially "stand alone" courses. A review of the course materials leads to the conclusion that specialized equipment requires specialized training of sufficient detail to develop a comfortable user.

A review of each of the categories of equipment appears to raise the same basic question for consideration by the instructional staff. Can the traditional "basic" course (regardless of what it is called) provide the necessary educational experiences to produce safe, effective, entry level divers who are comfortable with modern equipment? It may well be that the conscientious instructor can organize and extend the course to cover the equipment which they use in their course or they may train with less sophisticated equipment anticipating that the students, upon leaving the class, will seek training for the equipment that they ultimately choose to wear. It may also be the case that there will not be time available in the course to provide adequate training on the equipment .

The dilemma is of such a serious magnitude that consideration of alternatives seems appropriate. It is quite possible that the concept of a basic course will need to be modified so that modules for each of the more complex and specialized pieces of equipment can be fitted into an expandable curriculum. It is well known that individuals make remarkably specific adaptations to the demands that are imposed upon them. As a result, it is important to consider the specific requirements for each of the pieces of equipment that will be used and progressively expose the students to the use of the equipment, under realistic use conditions, while they are being trained. The students should be made aware that they are being trained. The students should be made aware that there is a learning curve with virtually every piece of equipment and that they have to make a personal decision to understand and execute the proper control for each piece of equipment they choose to use as a diver.

Conclusion

I believe that we have encumbered ourselves to the point where we are no longer able to operate as easily as we did before. It takes more training, more strength and more endurance to be able to dive effectively today than it did when the equipment was simpler. There is no way that we are going to be able to reverse the trend and go back to simpler equipment. We must recognise that for each piece of equipment that we put on our body, it is important to understand exactly how it functions in a given set of diving conditions and to become experienced with it to the point where we are completely comfortable. Also we must develop the strength and endurance to be able to use the equipment properly.

I believe that to design better diving equipment over the next 10 to 15 years we have to go back and take a look at what people do in the water and how they can do it better and more comfortably and what kind of training will they have to have in order for them to do it effectively.

Glen H. Egstrom, Ph.D., the Guest Speaker at the 1991 Annual Scientific Conference, was, until recently, Professor of Kineseology at the University of California, Los Angeles (UCLA).

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NATIONAL SCUBA QUALIFICATION COMMISSION BUOYANCY CONTROL INSTRUCTION

Terry Cummins

The National Scuba Qualification Commission (NSQC) is a Commission of the Australian Underwater Federation (AUF). It is a Commission composed of delegates of the AUF, the Federation of Australian Underwater Instructors (FAUI), the National Association of Underwater Instructors (NAUI), the Professional Association of Diving Instructors (PADI) and Scuba Schools International (SSI). The goals and objectives of the Commission are to:

1 Act as a review Commission for diving instruction and instructional standards in relation to the National Coaching Accreditation Scheme (NCAS).

2 Review the standards of those instructor agencies seeking NCAS Accreditation.

3 Act as an advisory body to the Australian Underwater Federation on matters relating to scuba diving and the National Coaching Accreditation Scheme (NCAS).

4 To have a public relations element so that it can act in support of the scuba diving industry in providing positive press releases as appropriate.

During the late 1980's when Standards Australia first started developing "Entry Level Recreational Diving Standards", the instructor agencies began to realize that they had much in common in relation to the teaching of a number of diving skills.

One of the most important skills that a diver has to learn is buoyancy control. Although slight variations may occur in the way the members of the National Scuba Qualification Commission may teach this skill, it is important to

realize that, without exception, buoyancy control is a prominent skill in all training programs.

It is also important for us all to realize that a high degree of emphasis and time is spent on this topic in the entry level programme of all agencies.

I will use the PADI Open Water Diver, or entry level diver, program as an example to illustrate several ways in which the skill of buoyancy control is taught. This is a valid approach to the subject because industry data shows that PADI certifies well over 50% of all divers in Australia and an even larger percentage world-wide.

I will discuss the way that the concept and skill of buoyancy control is taught in the classroom, the pool and open water.

I will show how, after initial training, advanced buoyancy control is covered in the various continuing education courses offered. I will give examples of how an instructor agency continually updates scuba instructors on training techniques and the impact of dive publications in the education process.

The PADI Open Water Course is divided into three major components.

Classroom presentations involves 5 sessions.
Pool or confined water training involves 5 sessions.
Open water experience involves 5 dives (4 scuba and 1 snorkel).

Classroom instruction

During the classroom presentations, entry level divers are exposed to buoyancy in three important ways. Firstly, buoyancy is introduced in concept form as part of the essential, or "must know", information of the theory content of the programme. Secondly, the participant is also exposed to the equipment that will provide buoyancy control during diving. Finally, participants are presented with a review of buoyancy control skills that will be presented in the pool or confined water.

The repetition of this vital information is fundamental to the PADI and modern educational philosophy, that is "must know" information cannot be presented only once, but several times during segments of training, for it to be adequately retained by the student.

It should be noted that the student is not permitted to progress to the pool training phase until the instructor is confident that the student has a clear understanding of the concept of buoyancy at this point. The instructor objectively measures this understanding by a PADI standardized "Student Quiz".

Pool instruction

During the pool and confined water sessions several buoyancy skills are taught. This often involves equipment use, especially the use of the Buoyancy Control Device (BCD), oral and low pressure inflators and correct allocation of weights.

The PADI in-water training philosophy is that training should take place in the safety of a pool or confined water and that ocean diving is used to practice skills already learnt. Therefore, emphasis is placed on ensuring that buoyancy skills are mastered before students move to the open ocean.

During the first pool session students practice:

Neutral buoyancy at the surface.
Inflating the BCD using both oral and low pressure inflator devices.
Inflating and deflating the BCD using the inflating and deflating mechanism during ascents and descents.

The key elements of instruction are; familiarization with equipment and the security that can be gained in having control over buoyancy.

In module two of the programme the student undergoes a proper weighting exercise. This involves the student entering the pool wearing full scuba equipment and ensuring that weighting is adjusted correctly. This exercise is also promoted as a way divers should check their weights and equipment when entering the water for the first time, when a transition is made from fresh to salt, when a transition is made from salt to fresh, when a change in salinity is experienced, or when new equipment is worn for the first time.

During the third pool module a neutral buoyancy exercise is performed underwater. This is called "fin pivoting". This describes practicing, in water too deep to stand up in, resting the tips of the fins on the bottom. The negative buoyancy is achieved by inflating and deflating the buoyancy compensator, using both the low pressure inflator and mouth inflation of the BCD. Then pivoting up and down on the fin tips as the student inhales and exhales. It is stressed that the student must breathe all the time. The objective is to have students fine tune their buoyancy control by using a combination of BCD inflations and deflations and breath inhalations and exhalations.

It should be noted that the student cannot progress to the ocean or open water training phase until all buoyancy skills taught so far in the program are performed satisfactorily. The instructor objectively records skill level on PADI Evaluation Cue Cards.

In the fourth module the student hovers in mid-water for no less than 30 seconds. This requires the student to have total control of equipment and breathing underwater.

During module 5 in the pool, as is the case in several

of the previous modules, the student gets to practice a number of skills in what PADI call a "combination skill drill", buoyancy control and other specific exercises are included in this drill. Again performance is objectively assessed on PADI Evaluation Cue Cards.

Open water training

During the open water dives of the entry level programme, the student gets to practice all the skills that were taught in the pool. This includes a revision of buoyancy skills in the following sequence:

Open water Dive 1
- Buoyancy check and adjust
- Controlled descent
- Fin Pivot with low pressure inflator

Open water Dive 2
- Free descent with reference
- Fin Pivot with oral inflator

Open water Dive 3
- Snorkelling and buoyancy check

Open water Dive 4
- Free descent without a reference
- Neutral buoyancy on bottom
- Removal and replacement of scuba on surface
- Removal and replacement of weights on surface

Open water Dive 5
- Free descent
- Hovering

Each of the 4 scuba dives of the PADI Open Water Training sequence includes an "underwater tour for pleasure and experience". During these tours the instructor monitors buoyancy control and offers assistance where necessary.

Only after all skills of the open water course are satisfactorily demonstrated and a PADI Standardized Exam is successfully taken, can a student be certified.

After initial certification, the student is offered a whole host of continuing education courses where the relevant emphasis is placed on buoyancy training. Some agencies call this advanced buoyancy training. One such specialty area is the Cavern Diving programme offered by the Cave Divers Association of Australia (CDAA), where buoyancy control is emphasised as an anti-silting technique.

Also after certification divers often subscribe to dive publications which carry, not only informative articles on subjects such as buoyancy control, but also equipment selection options to assist divers in appropriate purchase of a BCD. Recently both Australia's "Sportdiving" and U.S.A.'s "SkinDiver" magazines have carried major articles on buoyancy control and BCDs. In 1990 "Sportdiving" also released a complete publication on diving equipment entitled "1990/1991 Scuba Equipment Handbook". Considerable attention was focused on BCD selection.

To ensure that instructors are continually kept up-to-date on the latest techniques, the instructor agencies have a number of specialized publications which they mail to their members. Two such publication are PADI's "Undersea Journal" and NAUI's "Sources" magazines. These Journals carry informative articles and offers training guidelines to the PADI and NAUI memberships respectively. For example, in the "Undersea Journal", Second Quarter, 1990, PADI published an article entitled "Fight Buoyancy Illiteracy."

Similarly, agencies such as PADI hold Annual Member Updates, where key training issues are addressed. In the PADI "Update 1991" series, considerable attention has been devoted to buoyancy control in PADI's Advanced Open Water Program as a key topic at this Update.

Sometimes it is easier to obtain or reach an objective in a positive way rather than a negative direction. Rather than dwell totally on the negative aspects of poor buoyancy control in creating the need to know this skill, it is also presented to students by modern diving educators through an emphasis on conservation. By approaching the subject of buoyancy control from a reef preservation point of view, divers are encouraged to think buoyancy control makes not only your diving safer and more comfortable, but at the same time protects the environment.

Whichever way you look at it, buoyancy control, both as a concept and a skill, is emphasized during scuba training. This is acknowledged by all the training agencies, ensuring that buoyancy control is placed as a high priority in their respective standards.

The members of the NSQC acknowledge the potential dangers of an individual entering the ocean without adequate training in this vital skill and do all they can within their educational programmes to ensure, to the best of their ability, that divers are both skilled and knowledgeable in this area.

Terry Cummins was speaking as Treasurer (previously Secretary) of the National Scuba Qualification Commission. He has been President (and is now Vice-President) of the Australian Scuba Council.

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