FOR THE AWARD OF
DOCTOR OF PHILOSOPHY

2013

A DISSERTATION SUBMITTED BY KEITH CARDWELL

Workplace Competence for Recreational Diving Instructors through Situated Learning Environments in Established Communities of Practice

(University of Southern Queensland)

Certificate of Dissertation

I declare that the main text of this thesis is entirely my own work and that such work has not been previously submitted as a requirement for the award of a degree at the University of Southern Queensland, or any other institution of higher education.

February 2013

Signature of Candidate and Date

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Acknowledgements

This research project represents a shared effort as much as an individual achievement and I would like to acknowledge the contribution of the many people who assisted in its completion.

Firstly, and foremost, I would like to extend my most heartfelt thanks to my supervisors: Professor Patrick Danaher, my principal supervisor whose early provocation sent me on this journey, and the equally motivating Associate Professor Robyn Henderson for assisting in the capacity of associate supervisor. I am extremely grateful for their guidance and encouragement. Each of them has been a pillar of inspiration and I am lucky to have had such support.

Secondly, I would like to thank the directors and staff of the dive operations whom I collaborated with for their generous and unlimited cooperation during this study. I would also like to say a big thank you to all the other industry folk who went to the trouble of digging through their archives to find, in many cases, elusive historical information. Specific individuals I would like to thank in this regard are Tony Black, Tim Bonner, Ian Francis, Bob Halstead, Dave Johnson, Murray Leighton, Bill Lidyoff and John Lippmann.

Thank you to Dawn Lake for assistance with constructing the original conceptual framework figures, to Bonnie Cardwell for her tireless and painstaking efforts in organising and formatting all illustrations and transcribing all the taped interviews and to Julia Glover for ensuring my drafts were actually in English and her constructive criticism of and enthusiasm for this project.

Last of all, but nevertheless the most ardent of supporters and motivators, my lovely wife Kim, who has been a real support and inspiration throughout this entire journey.

A very big “Thank you” to all.

Abstract

The purpose of this study was to identify and analyse the competencies required of recreational diving instructors through an investigation of situated learning environments. Clarification of the desired competencies was required to understand the extent to which these competencies and associated decision-making capabilities are affected by involvement within established communities of practice.

This research followed a social constructivist approach incorporating ideas on situated learning and communities of practice from the works of Lave and Wenger (1991), Cross (2007) and Rowden (2007), and on social capital from the theories of Lin (2001), Grafton (2005) and Nicholson and Hoye (2008). An illustrative case study was used where semi-structured interviews were conducted with 29 recreational diving instructors and their three employers from three different diving organisations in North Queensland (N: 32 participants) during the years 2008 - 2010. Analysis of the data resulting from these interviews was corroborated with evidence gained from on-site observations.

This investigation of the intersection among workplace competence, situated learning and communities of practice from multiple perspectives using a bricolage of activities constitutes a substantial and original contribution to knowledge. The data show that the competencies required, and the predominantly informal manner in which those competencies are achieved, are in conflict with many of the prevalent formal processes specifically designed for that purpose. These findings contribute to our knowledge of interactions within communities of practice, the interaction between theory and practical decision-making capabilities, mentoring and company leadership. The data also reveal important information about conditions for improvement to instructor training courses and offer guidelines for appropriate continuing education and improved industry standards. For instance, final instructor development and examination should move more from teaching and assessing the conduct of ideal situations and move towards teaching how to deal with real-life, problematic situations. Theoretically the study extends current understandings of the character of competence by demonstrating its interdependent relationship with situated learning and communities of practice.

Selected Publications Related To This Work

Cardwell, K. (2009). Care and maintenance: Buoyancy control devices. *Dive Pacific*, 109, 59-61.

Cardwell, K. (2009). Care and maintenance Wetsuits, drysuits and woolly jumpers. *Dive Pacific*, 110, 53-56.

Cardwell, K. (2009). Care and maintenance: Gadgets, gizmos and MacGyver. *Dive Pacific*, 111, 53-56.

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List of Abbreviations

ACC	Accident Compensation Commission
AQTF	Australian Quality Training Framework
AS	Australian Standard
AWARE	Aquatic World Awareness, Responsibility and Education
BCD	Buoyancy Control Device
BSAC	British Sub Aqua Club
CD	Course Director
CET	Cognitive evaluation theory
CMAS	Confedération Mondiale des Activités Subaquatique (World Confederation of Underwater Activities)
DAN	Divers Alert Network
DEVTIR	Department of Employment, Vocational Education, Training and Industrial Relations
DVD	Digital versatile disc
EFRI	Emergency First Response Instructor
IDC	Instructor Development Course
IE	Instructor Examination
IAHD	International Association of Handicapped Divers
JCU	James Cook University
NAUI	National Association of Underwater Instructors
NTIS	National Training Information Service
NZS	New Zealand Standard
NZUA	New Zealand Underwater Association
OWH&S	Office of Workplace Health and Safety
OWSI	Open Water Scuba Instructor
PADI	Professional Association of Diving Instructors
RDP	Recreational Dive Planner
RTO	Registered Training Organisation
SCUBA	Self-Contained Underwater Breathing Apparatus
SDI	Scuba Divers International
SPG	Submersible Pressure Gauge
SSI	Scuba Schools International
TAFE	Technical and Further Education
VET	Vocational Education and Training
WRSTC	World Recreational Scuba Training Council

Chapter 1 Introduction

Why have men always been motivated to dive? Was there a subconscious yearning for the element that had produced life, for the mother-sea they came from? Maybe. But the conscious drive was for freedom and adventure. Today the motivations are more materialistic. If diving is to progress, it has to demonstrate that it is practical and economical. (Cousteau, 1979, pp. 247-248)

The motivation for people to participate in games and sports through the ages has been so complex that there is really no general agreement on the matter. People have taken part for fun, for recreation, for self-interest, for self-arousal and adventure, for health, for exercise, for competition, for money, and probably for still other reasons not readily discernible. (Ziegler, 1988, p. 297)

1.1 What is this thesis about?

This thesis is about the ways in which recreational diving instructors become competent, what those competencies are assumed to be, and at what stage and in what ways competency is measured. In brief, this first chapter looks at the evolution of diver and dive instructor training up to the present date and compares it with other benchmarks of performance required to become an instructor in other outdoor activities.

It is assumed by the various diver training agencies and many other dive organisations that, when a diver has performed a minimum number of 100 diving experiences over a certain time frame, and completed various prerequisite courses, he/she should be sufficiently prepared to attend a final instructor examination. This instructor examination is a two-day process and successful candidates are then considered fully qualified as recreational diving instructors able to commence teaching beginners to dive. This instructor examination results in a person being certified to teach beginners how to dive within six months of themselves having learned to dive. This situation is often given the pejorative descriptor “zero to hero” and is often applied as a definition of the present educational methodology for instructor training developed and instituted in the early 1980s.

Since then, little has changed, suggesting a stasis in the evolution of dive instructor training relative to a social adaptation of Eldridge and Gould’s (1972) thesis of punctuated equilibrium in evolutionary biology. In brief, change can be seen as Gould (2002) puts it as a set of rare episodes, short in duration relative to the periods of stasis between them (p. 782). It is argued in my thesis that now is the time for one of those rare episodes of change where educational methodology presently used as a basis for instructor training begins to incorporate more recent theory such as Wenger’s (2006) work on the role of communities of practice.

For now more than 20 years, there have been, and continue to be, few restrictions on a beginner instructor's practice other than the standards to which he/she must teach. For instance, once certified, instructors can usually start teaching independently of either diving organisation or supervisor, and are obligated to follow only a set of training standards. These standards are internationally mandated by the World Recreational Scuba Training Council (WRSTC) but are subjugated to local laws should they demand increased regulation.

Essentially, in accord with the Australian Standard, the majority of instructors certified are free to teach anyone they wish without further resort to advice or permission from either the training organisation that certified them or indeed any other dive organisation. The only restriction is that they must conform to the standards of training to which they have agreed to adhere, such as training a maximum of eight beginner divers in no deeper than 12 metres of water in ideal conditions on their first dive. This example, curiously, is a situation in which many experienced diving instructors would feel uneasy. This uneasiness will be as a result of having experienced many different situations where they know that, with a largely inexperienced group of eight beginners, it is more than likely that at some time more than one beginner can present with a problem: this may demand a decision to leave part of the group unattended while correcting those problems. The worst case scenario would be if a beginner were to panic and rush to the surface holding her or his breath; there is a high likelihood of the beginner experiencing an air embolism[1], where the expanding gas in the lungs is injected into the bloodstream, causing a relatively quick death. If more than one of the beginners commences such an ascent, what is the instructor to do? In this instance, does the instructor in charge have the competency to achieve a positive outcome? Whilst this particular scenario is relatively unlikely, it is possible. Furthermore, as can be seen from the data, new instructors are encouraged to take up to four student divers many times a day in less than ideal conditions. These student divers are possibly even non-swimmers experiencing an introductory dive. This work is often commenced within days of a newly certified instructor commencing work and with minimal mentoring (2-3 days).

The competencies required of divers and dive instructors, and the methods by which information and skills are learned, have changed gradually over the relatively few short years that recreational SCUBA (self-contained underwater breathing apparatus) diving has been a sport. Yet there has been only one significant episode of radical change, the effect of which is still evident in the present day situation. This change, as described more fully later in this chapter, was to move from a very physically demanding program of training, also requiring in-depth theory even at a beginner level, to a modularised systems approach requiring training in more defined and immediately relevant steps.

[1] An air embolism is often referred to as "bubbles in the blood" and is a condition precipitated by the injection of microscopic air bubbles into the vascular (blood) system by lung overexpansion. Breath-holding on ascent would create this situation.

What follows is a review of the necessity of this study, the importance of the recreational diving industry to Queensland, the possible impact of instructional staff on the many visitors received, a brief history of the training required to gain instructor status and a comparison of this history with that of other adventure sports, the research questions emanating from these considerations and a brief preview of the chapters explicating this thesis.

If one were to be pragmatic about whether the existing instructional training programs are a concern with regard to high rates of accidents and deaths of divers, this study would warrant immediate attention. If a sport, whether requiring certification or not, is considered increasingly unsafe or obviously life-threatening, greater scrutiny is mandated. However, this does not appear to be the case. From a recent study regarding scuba diving fatalities (Lippmann, 2008), the mortality rate among scuba divers in Australia, and Queensland in particular, when compared to other countries, does not appear to be statistically significant enough to warrant real concern. In fact, on the contrary, the relatively low mortality rate of Australian scuba divers indicates commendable safety control compared with the diving statistics generated by other countries (Vann & Lang, 2010).

So why study the way instructors become competent if they appear to be doing a good job already? Is the apparent absence of any other concern, evidence of an absence of concern? After the evaluation of the data presented here has been reviewed, there exists an argument that this is most certainly not the case. There are some very real concerns and they are not limited to how a diving instructor is trained. It is almost universally apparent within the recreational diving industry that most instructors entering the workforce learn far more on the job by informal means than through their prior formal training. This gives strong support for the study of what informal processes are efficient and necessary to complete the job of developing instructor competence in the further hope of retaining those instructors thus developed, and reproducing these processes in the future. However, because of such a highly visible turnover of instructors in many instances, this apparent loss of instructors to the industry does beg the question as to whether many instructors ever achieve a level of proficiency sufficient to be considered competent. Although competency is discussed in greater detail in Chapter 2 and Chapter 3, I have defined it in this context, as "compliance with accepted instructional and organisational standards simultaneously reflecting both exemplary diving and human interaction skills".

This situation of high instructor turnover may also go a long way towards answering why it is necessary for certified instructors to be produced in such numbers in such relatively short periods of time. After all, if many instructors leave the industry after only short terms of employment, there must be replacements made available to satisfy the market demand. A further question may arise from this, asking whether the customers whom these instructors are training receive adequate attention and satisfaction through being trained by such relatively inexperienced instructors. There is much anecdotal reference to high instructor turnover but one indication of this situation can be evidenced from that witnessed within the dive operations observed during the term of this study indicated in Table 1-1.

From the foregoing statistics, instructor loss ranges from between 0% to 66.66% in a time frame of less than three years. This indicates a significant difference in instructor retention across the three organisations involved in this study. The third, zero-loss operation reflects an equally significant difference from the others with regard to company leadership and management protocols. This relationship is referred to in Chapter 5 and Chapter 8.

Dive Operation	Instructors in the study in the same position	Instructors remaining in the same position	Instructors remaining in the dive industry	Transfer within the dive industry	Transfer out of the dive industry	Apparent net loss to the dive industry
	2008	2009	2010			%
1	11	2	2	4	5	45.45
2	9	4	3	1	6	66.66
3	9	9	6	3	0	00.00

Table 1-1 **Instructor turnover 2008 – 2010 within the dive operations under study**

Note: Instructor employment statistics listing those instructors who are remaining in their same position, those transferring within the industry (local or abroad) and those who have left to take up alternative employment. These data were obtained over the years 2008 – 2010 and indicate the net loss of instructors during this period.

This study has taken place in the far north of Queensland. This area, with the Great Barrier Reef on its doorstep, can quite justifiably be considered one of the most popular diving destinations in the world. In particular, with tourism being a substantial part of the Queensland economy, and with no fewer than 21% of all tourists visiting the reef (Tourism Research Australia, 2007), the question of instructor competence, or potentially lack thereof, could represent a substantial impact on return visits and reputation. This impact could be of particular concern if those visitors having an introductory dive, or learning to dive, have initial diving experiences that are less than optimal.

The entire situation could have a more general impact. For instance, tourists who are given an introductory dive on the reef and do not have a favourable experience are less likely to consider diving as one of their future sports than would, perhaps, someone who receives better attention and/or has a more positive experience in the first place. Whereas this situation may hold little interest locally ("Who cares if they don't come back? We got our sale and they survived"), negative feedback could represent a serious setback for the industry globally. For instance, did the Queensland visitors have a diving experience sufficient to inspire them to continue with this sport and either complete a full dive course or remain a diver when they return home to Blackpool in England or Cannes in France? A diving instructor's competence has a very real effect on the progress of the diving industry.

Fortunately, many dive organisations do understand that deficiencies may exist with new instructors and take some measures to compensate for any perceived lack of experience and knowledge where and when recognised. Part of the intention of this thesis has been to study what measures these are, how they are instituted and how the employee instructors in a dive organisation learn their craft without compromising the safety and enjoyment of those who are ultimately in their charge. It could be considered a search for how theory may merge from practice and addresses issues that involve interactions between real people and not contrived scenarios in a classroom.

Other than customers wishing to experience diving, it is implicit that this instructional occupation is reliant on other group interactions such as peers, retailers and marine personnel on the boats used to reach their diving destinations. These interactions have been studied in this thesis with reference to Lave and Wenger's (1991) theory of communities of practice. Certainly in the context studied, intersecting communities of practice are identified as having no small effect on the acquisition of competencies and it is from these associations that much of our knowledge of how instructors learn and refine their skills is drawn. Specifically, there are clearly defined communities of practice consisting of divemaster/instructor trainees, instructors and marine (boating) staff. Each has its own background and social capital to enrich the workplace, definitions of competence, learning abilities, personal identities and motivations. These factors and how they impact on this thesis are discussed in more detail in later chapters.

Instructors are individuals with their own identities, attributes and ambitions that may stretch beyond the industry in which they are presently employed. These personal elements have a definite impact on how instructors learn (inferred from Table 5-3, p. 244, Demographic of participants in the study 2008 - 2010) and secondly on how they are retained in the industry. With the high turnover of instructors in Queensland it is clear that, with the recognition and retention of those who have developed the necessary skills required to give optimal outcomes for employers, customers and the instructors themselves, these elements have also been considered crucial to this study. In particular, there has been considerable investment in developing these instructors and it is wasteful of both time and resources to have them leave the industry so early. It is therefore important to understand the personal elements that may contribute to this situation.

Finally with the study completed, there is greater clarity in understanding the ways in which diving instructors learn their craft. Some very real concerns have become transparent. This should issue a challenge to the manner in which diving instructors are finally accredited and it would be hoped that the various diver training organisations will re-appraise their individual curricula to satisfy these concerns.

But now: where did it appear to start?

1.2 A brief history of diver education

Diver training evolved from the (naval) military and consequently many of those divers thus trained became the first civilian instructors. This was reflected in many of the skills incorporated into the early beginner diver programs. One skill, for instance, labeled a "bailout", was considered by some as an essential and final test of how familiar a diver has become with his/her dive equipment. He/she is expected to stand on the edge of the deep end of a swimming pool and, holding all dive equipment, fall in (usually being pushed) and sink to the bottom. Successful completion of this skill was when the diver arrived back at the surface correctly dressed and wearing all of the scuba equipment he/she descended with. If one were to consider what a navy diver was to do when shot at by enemy fire, this would be an appropriate skill to be master of, but in civilian terms it does not really make much sense. This skill has its own inherent risks other than just failure to achieve; if beginner divers have trouble equalizing their ears, a ruptured eardrum might ensue as a result of too rapid a descent; conversely, if the descent were to be aborted, there could be a breath-hold on ascent which could result in a life-threatening air embolism (Cooperman, Hogg & Thurlbeck, 1968; Walker, 1991; Weiss & Van Meter, 1995). A navy diver is paid to take many risks; not so civilians, especially at this early stage of their training. The argument that this is a good way to evaluate whether a diver has mastered equipment familiarisation is just not sensible.

There are many other examples of clearly questionable skills previously taught such as 'snorkel buddy breathing' (in case of being caught in heavy seas and only one diver having a snorkel); three forward rolls and three backward rolls (again, being able to deal with the vertigo resulting from being caught in turbulent surf); high entries with all scuba equipment in place (in case of entering off a boat or pier at a greater than 'normal' height); diving with a blacked out mask (in case of suddenly reduced visibility); and carrying weights certain distances underwater (possibly a means of stamina training). Whichever way they are described, these skills serve no purpose other than pushing a person to limits that should never be realised in real life without specially oriented training. An insistence on developing these skills when training civilians indicates a misalignment of thought compared with the present day needs of diver training.

In the mid to late 1960s, organisations such as the Professional Association of Diving Instructors (PADI) and Scuba Schools International (SSI) formed and commenced using a more systems oriented approach to diver training where skill requirements are immediately relevant to the course being taught and obligate their trained divers to dive within the limits and conditions in which they have been trained. Skills related to a 'blacked-out' mask, for instance, are relegated to night diving or limited visibility training for divers wishing to experience this type of diving. In spite of progressively discrete changes (such as student to instructor ratios) over the decades since the commencement of these new training agencies, their training programs follow essentially the same protocols today. More detailed consideration regarding the evolution of this training is to be discussed in Chapter 2.

1.3 Comparisons with other adventure instruction methodologies

In an effort to establish some necessary criteria for the development of any kind of instructor competence in outdoor activities, research was also directed at the present protocols and formulae required to achieve this status in other adventure/recreational industries. Much of the general theoretical background regarding this is discussed in much greater detail in Chapter 2. However, from the data obtained within this study, an argument emerges that achieving a recreational diving instructor qualification is considerably easier compared with instructor qualifications gained from other adventure/recreational activities. Ultimately these comparisons may, indeed, prove misleading.

It is surprising, given the many reputable texts on outdoor activities and education written by well-recognised scholars in their fields (Bunting, 2006; Priest & Gass, 2005; Prouty, Panicucci & Collinson, 2007; Ziegler, 1988), that recreational scuba diving receives little to no recognition as an outdoor activity of note. Much is written by the authors referred to above regarding the history and philosophy on which other outdoor activities are based, as well as defining the skills and competencies required of adventure practitioners, concerns for risk management, leadership, programming and career paths. But the activities, which they then continue to discuss, omit any reference to recreational scuba diving. One exception to this can be found in Zeigler's text "History of physical education and sport" (1988), where he makes the solitary comment "The perfection of the aqualung in 1943 put man back into the sea with all the freedom of a fish and so increased his mobility and pleasure in another dimension" (p. 140).

For whatever reason, many sports and outdoor activities, regardless of being traditional or recently innovated, are today governed by professional organisations to ensure consistency of performance and in no small measure to assist in the prevention of accidents and deaths that may otherwise bring their respective sports under a spotlight and the scrutiny of higher authorities. In a worst-case scenario where a sporting or outdoor activity indicates unreasonably frequent accidents or other situations that capture and possibly distort the public's perception, government intervention could be brought to bear, resulting in an increasingly untenable future for many whose business it is to provide access to their respective sport or outdoor activity. An arguably still worse situation for business endeavours is the public backlash from cases that are reported and speculated on by the hyperbole of the mass media.

In this regard, and in contradiction of the earlier description of the relative integrity of the recreational diving industry in Queensland, there have been exceptions that still demand better explanation. One classic example of this is the shocking incident in 1998 where two American divers, Tom and Eileen Lonergan, went missing on the Great Barrier Reef, the events of which were the basis for the 2003 movie "*Open Water*" produced by Lau (2003). Only days after the disappearance of this couple, the then Queensland Government Department of Employment, Vocational Education, Training and Industrial Relations (DEVTIR) was mobilised and conducted an investigation of all vessels plying a similar trade along the East Coast of Queensland.

Eventually the dive tour operator who lost the couple was fined $27,000 but was not charged with unlawful killing, as was widely predicted. Other than a now tarnished reputation, a further repercussion for the recreational diving industry in Queensland was that new and more restrictive regulations detailing Queensland Office of Workplace, Health and Safety (OWH&S) requirements were introduced the following February in response to the Lonergans' disappearance (WH&S Bulletin Vol. 9, No. 193). Sadly, the lessons learned from this appear to have been poorly remembered, in view of a report by Fickling (2004):

> In a check on 59 dive shops by Queensland Health and Safety inspectors in 2002, from the Department of Industrial Relations – Workplace, Health and Safety Division, a total of 76 notices were issued for failure to do proper head counts, dive logs or lookouts - the main issues highlighted three years earlier in the Lonergan inquest. (p. 1)

It is possible that this was a sign of the general malaise existent in the recreational diving industry in Queensland and that the example reported above is an indicator of concerns relating to all facets of the industry, including not just the standards to which different dive operators conduct their business, but also and in particular the research problem framing this study: how do diving instructors conduct themselves with those wishing to try out an underwater experience?

If this is indeed a possibility, and as the diving instructor is frequently the final person responsible for placing a non-diver or novice in the water, it is important for the industry at large to scrutinise what competencies are required and how these are acquired. Comparisons are often difficult in relating occupations and pastimes equitably. Nevertheless, it seems appropriate to consider what benchmarks are used by other organisations offering outdoor activities to decide when their members are sufficiently competent to be qualified as instructors.

This study reviewed the requirements for gaining instructor status in the following outdoor/adventure activities: hang gliding, canoeing/kayaking, mountaineering, snow skiing, rafting and skydiving/parachuting. The reason these activities were chosen was that each necessitates support equipment requiring approximately the same financial outlay as recreational scuba diving and that, with the exception of rafting, each is a sport that can be performed alone. Each of these activities has its own special considerations but a brief description of each was obtained from respective websites and through personal communication with either the chief instructor or the general manager of each of the umbrella organisations responsible for the welfare of the particular industry. The relevant details are indicated in Table 1-2, with particular emphasis being placed on the minimum time it would take for a person to go from, say, a non-hang glider to becoming an instructor in that recreation, the type and duration of extra training and/or mentoring required immediately after achieving this goal and, finally, what annual requirements are deemed necessary by each of the respective governing organisations to maintain this qualification.

Adventure Sport	Minimum Time Required for Certification as an Instructor	Probationary / Mentoring / Supervisory Period	Minimum Annual Renewal Requirements
Hand-gliding	3-5 years + 400 Hours	Monitored by at least 2 CFI's over > 2 flying seasons CFI – Chief flying instructor	Continuous monitoring
Canoeing / Kayaking	No less than 2 seasons	Mentoring period but unspecified time frame	Continuous monitoring
Mountaineering	5 – 7 years	Final 2 years by assessor/s	4-10 days instructing
Rock climbing	Minimum 2 years	Continuously during formal training	4-10 days instructing
Snow Skiing	No less than 2 seasons	24 days formal training + 300 hours teaching under supervision + 80 hours supervised practical training	Continuous monitoring
Rafting	300 runs or 600 hours to qualify for Class 4/5 sites	Initial 8 weeks, then unspecified mentoring periods	Continuous monitoring
Sky-diving / Parachuting	Approximately 18 months but no set time limit.	6 months. All training performed under direct supervision of Chief Instructor + minimum 200 jumps	Continuous monitoring
Recreational Scuba Diving	6 months + 100 dives	Nil requirement other than individual company programs	Sign a statement of having read and implemented standards changes.

Table 1-2 Adventure Instruction Comparisons

Note: These data compare the minimum time frames required for an individual with no experience in any of the recreational activities listed to become certified as an instructor in that same activity. It also lists the comparative probationary/mentoring/supervisory periods during in which the recently certified instructor is monitored by a senior instructor or assessor (where applicable) appointed by the respective organisations established to ensure training integrity.

As will be seen, certification as an instructor in recreational diving requires considerably less experience and training than for any other outdoor activity. Similarly, there is a more stringent requirement for future supervision and annual renewal within other adventure industries. It may be argued by one recreational diver training agency (PADI) that they also continuously monitor the activity of their diving instructors by sending out random course evaluation questionnaires. This is to their credit but, by comparison, continuous monitoring by other non-diving adventure organisations is by regular scrutiny of their instructors' logbooks and records as well as customer feedback. Even so, although the simplest annual requirement for the diving instructor with regard to instructional ability is a signature on a compliance statement, there are other annual requirements that may have to be fulfilled or maintained for continuation of commercial employment. These are ensuring the currency of first aid, oxygen provider and personal medical fitness certificates. A further maritime requirement for dive professionals working in Queensland is the successful completion of a program entitled "Elements of Shipboard Safety" if the individual works for more than six months on any vessel offering dive experiences.

Data obtained during this study highlight the need for further experience prior to final instructor certification together with greater involvement by either dive organisation supervisors and/or mentors in the form of senior instructional staff in both the pre-and the post-certification phases of training. However, reflecting again on the relatively low risk of injury or mishap attributed to diving activities as reflected further in Table 1-3, the question should be asked not only whether the consideration that is given to improving the standards and safeguards related to recreational diving is necessary but also whether the standards of other outdoor activities are unreasonably high.

Sport Incidence	Number of Participants	Reported Injuries	Incidence
Football	14,700,000	319,157	2.17%
Baseball	15,400,000	321,806	2.09%
Basketball	26,200,000	486,920	1.86%
Soccer	11,200,000	101,946	0.91%
Volleyball	25,100,000	92,961	0.37%
Waterskiing	10,800,000	21,499	0.20%
Racquetball	8,200,000	13,795	0.17%
Tennis	18,800,000	22,507	0.12%
Swimming	70,500,000	65,757	0.09%
Bowling	40,800,000	17,351	0.04%
Scuba Diving	2,600,000	1,044	0.04%

Table 1-3 Occurrence of injuries in various sports

Note: Source: Accident facts. 1991 Edition: National Safety Council. Numbers represent individuals who participated in this sport more than once during the year, and injury represents those treated in an emergency room for an accident relating to the sport or involving sporting equipment. The scuba numbers reflect reports collected by Divers Alert Network.

The above data were obtained from a paper presented at "Safe Limits" – an International Diving Health and Safety Symposium, Cairns, Australia, on 23 October 1994 (Richardson, 1995). Although no later comparative figures are readily available at this time, it would be reasonable to assume that, with the increase in the need for better risk management, in part owing to more litigious societies, the low incidence of accident or injury in scuba diving means that scuba diving compared with other sports, appears to be comparatively safe.

1.4 Rationale of the study

From the earlier brief description of diver training, particularly in the location studied, it can be seen that, although there is apparently no real concern regarding immediate outcomes or safety, there could be global repercussions from giving those participating in diving experiences a less than optimal experience. In commercial terms, and regarding immediate concerns, further consideration of how these experiences are conducted may appear like tinkering with a piece of well-functioning machinery at the risk of breaking it. However, at this point it is well to be reminded of Sagan's (1996) advice that:

> A necessary aspect of basic research is that the applications lie in the future - sometimes decades or even centuries ahead. What is more, no one knows which aspects of basic research will have practical value and which will not. (p. 400)

Although Sagan was referring to scientific research, and the prospect of perhaps decades elapsing before research may make good, it is interesting to note, in reference to educational thought in this area, the change to commercially available dive instructor training in the 1980s. This was when Gagné's (1965) and Bloom's (1956) theories in particular were embedded and used within the changed instructor development process in a more practical fashion to improve and standardise the manner in which diving instructors could present their subjects. Maslow's (1943) hierarchy of needs is indirectly referred to frequently as the nascent motivation already present in the character of divers that allows them to continue with their education, again with no explicit credit being directed to these educational methodologists.

As suggested earlier, no apparent evidence of concern does not necessarily indicate any absence of concern. There are without doubt obvious concerns that affect the recreational diving industry, particularly those sections of it dependent on the income from visiting tourists. In general terms, all industries that rely on tourism have suffered from the repercussions of increased legislation and restrictions resulting from the tragedy of terrorism on 11 September 2001, the tsunami in the Indian Ocean in December 2004, global warming and its related effect on coral bleaching (hence less attractive tropical dive sites), the oil crisis with fuel prices temporarily doubling in 2008 and the present recession engendered by the world financial crisis. However, it is important to distinguish between these external concerns and those internal concerns generated and perpetuated by the recreational diving industry itself. Again, with the earlier reference to low mortality rates that offer little apparent concern to the industry, other concerns are evident which provoke study. Among these concerns is the relatively quick production of diving instructors compared with instructors from other outdoor pursuits, and in some instances the relatively high turnover of diving instructors within the industry. These concerns raise such questions as "How can diving instructors be so rapidly trained and, say, skydiving instructors not?"

Is there some methodological weapon in the training arsenal of the recreational diving industry that should be more widely understood and used? In other words, does the manner in which diving instructors are trained hold some significance for improvement in our knowledge of how any vocational education leader should be trained? Does this have global or merely local repercussions? And is the relatively high turnover in employment to be attributed to a characteristic of Generations "X" and "Y" or is it from general dissatisfaction with the industry's inability to deliver personal returns at least equal to the instructors' inputs? Or is it a result of more mundane problems, possibly including the fact that diving instructors may not be trained adequately and are thus leaving the industry as a personal step to avoid employment in situations in which they feel incompetent? Or, if this situation results from new instructors who are still enthusiastic and not suffering the 'burn out' often experienced by 'old hands', perhaps a high turnover of staff is not a disadvantage to the industry.

The questions that may be generated for study appear to be endless but the results of studying the manner in which recreational diving instructors eventually achieve their requisite competencies, or indeed what those competencies are meant to be, will have important implications for future directions in training. Findings from the study also assist with instructors having more clearly defined career paths with the associated motivating influence that this will have on present working situations. The focus of this study has been on one small section of the recreational diving industry in only one geographical area, but the results of this study offer broader implications for the vocational education and training (VET) system and those pursuing other outdoor activities. These results and their implications are described in more detail in Chapter 5, Chapter 6 and Chapter 7.

1.5 Research questions

These research questions relate to the interviews conducted with 29 recreational diving instructors from three diving organisations in a Queensland regional city during the years 2008-2009. The questions guided the analysis of the data that constitute Chapter 5, Chapter 6 and Chapter 7 respectively of this thesis:

1. How does a group of recreational diving instructors understand and demonstrate what their required competencies are?
2. In what ways do recreational diving instructors engage in situated learning within a community of practice to demonstrate their required competencies?
3. On the basis of the answers to the first two questions, how can instruction be designed to promote an improvement to what is presently known about the industry?

Looking at these questions separately:

1. How does a group of recreational diving instructors understand and demonstrate what their required competencies are?

This question examines how recreational diving instructors understand what competencies are required of them and how they are seen to be applied in the working environment. This had already been partially identified by my earlier work (Cardwell, 2005) but needed to be confirmed, or otherwise, by further consultation with both instructors and employers within the scope of this study. By observation of each instructor, those competencies determined through interviews were evaluated to confirm their general understanding of what those competencies should be. Further consideration was also given to the comparison, where evident, between the understandings of the instructors and those of their employers. This question acknowledges not only the differences between the competencies that individuals consider are required, but also what degree of competency is considered acceptable in the situation in which they are employed.

2. In what ways do recreational diving instructors engage in situated learning within a community of practice to demonstrate their required competencies?

This question focuses on how the various instructor groups interact with one another and how their understandings of requisite competencies are both formed and learned within situated learning environments. Also requiring investigation is the constitution of the community or communities of practice that are involved in these processes and their separate and divisive or mutual and consolidating effects on those understandings.

3. On the basis of the answers to the first two questions, how can instruction be designed to promote an improvement to what is presently known about the industry?

Whereas the first two questions are concerned with the definition and acquisition of competencies through established communities of practice, this question looks to answer how this information may be used to improve existing situated learning practices presently formulated as adjuncts to formal training received prior to employment. From understanding the epistemological underpinnings of what is presently taught and learned (about what we know, or think we know) appears a disparate ontology (about what is) that may have important ramifications for the design of future instructor development programs. For instance, Gagné's (1965) methodology for formal classroom training regarding prescriptive teaching appears sound, sensible and perfectly appropriate. However, when is this ever followed as designed? A further example would be Vygotsky's (1987) principle of scaffolding and how this could be used to encourage instructors to follow guidelines for problem solving (Lajoie, 2005).

1.6 A personal note

Originally trained and qualified as both a mechanical and a production engineer, I learned to dive in 1970 and became a diving instructor in 1975. During the following four years I concentrated on developing a medium sized insulation and engineering company, with the only diver training I performed during that time being for my friends and colleagues. On selling this business and being presented with an opportunity to teach divers on a contractual basis, my initial intent was to make this a form of sabbatical until I could find another 'real job'. Curiously, the phrase "And what do you do for a real job?" was asked of me considerably more than "What about the sharks?" After I commenced this new vocation it took me a while to realise that I had become the only full-time diving instructor doing just that job in all of New Zealand. This was both daunting and a challenge.

My original intention of having a sabbatical quickly changed, given my realisation that I had now entered pioneer territory with endless possibilities. Over the next few years I initiated day, weekend, private and flexibly scheduled courses for young, old, disadvantaged and team-building groups. This transformed the enterprise I was working with from training 150 students a year to in excess of 800 students a year. I assisted (and starred!) in the production of two half-hour programs for Television New Zealand on how to learn to dive in the years 1982 and 1992. In 1982 I also successfully completed a four kilometre, eight and a half hour "seabed cycling" marathon riding a custom-built tricycle underwater from Rangitoto Island to Mission Beach on the Auckland waterfront to raise funds for the "Spirit of New Zealand", a sailing ship to be built for the training of disadvantaged children. This brought a substantial lift to the number of divers trained in the subsequent year.

If it were not for an inebriated and comatose proctor designated by the Guinness World Book of Records, I'd be able to lay claim to one myself.

Other 'claims to fame' in 1992 included training the then captain of the All Blacks (New Zealand Rugby Team), the Miss New Zealand beauty pageant holder and the ladies' world surfing champion as open water scuba divers.

I was the principal architect behind the introduction of the PADI training organisation to New Zealand, with the subsequent replacement of its existing traditional system of training. What followed from this was a 12-month period where every existing instructor in New Zealand was "crossed-over" to the PADI system of training. I then became the PADI College Course Director in New Zealand for the following seven years. During this period I also attained a post-graduate diploma in business administration through the University of Auckland and a diploma of recreation and sport through the Central Institute of Technology in Wellington.

I then spent nearly two years directing a dive operation in the Republic of Maldives and four months establishing a PADI Five Star Instructor Development Centre (IDC) and travel agency in San Diego, California. On completion of these tasks I then settled in Cairns, Queensland, where I currently reside and operate as an independent trainer.

I have now been involved with the recreational diving industry for 30 years and directly produced well in excess of 3,000 instructor level certifications. I have seen the evolution of training methods, beginning with those inherited from the military to the present systems-oriented approaches used today. Although it can be said that many discrete changes have been made over the years to improve beginner and instructor training, both are often criticised for the speed and relative lack in both diving knowledge and depth of experience required to become finally certified, particularly with regard to instructor training. And in this latter regard, it is of great importance to me to establish what is really necessary to be learned, where, when, how, with whom and at what point we say, "You are sufficiently trained to do the job".

1.7 Overview of the thesis

The chapter so far has described the background factors surrounding the study in order to locate this discussion in its particular context. The rationale for the study and the reasons why it is a worthwhile area of investigation have been given. The research questions that have guided the research process have been identified and the chapter includes a personal note.

Chapter 2 presents an overview of the existing literature relevant to the research questions. This chapter discusses specific literature regarding the origins and evolution of diver and dive instructor training, followed by a review of the general literature that prevails regarding adventure sports, of which recreational scuba diving can be seen as a part. This discussion traces the changes in recreational scuba training and its philosophical underpinnings from inception to the present day together with a comprehensive review of the theory related to adventure training and how it is, or could be, embedded within the recreational diver training framework.

Chapter 3 explores the conceptual underpinnings of this study. This looks at the manner in which learning instructors become competent professionals through situated learning processes within a range of communities of practice. This draws on the theories of Harris, Guthrie, Hobart and Lundberg (1995) and Garrick (1998) regarding competence; Lave and Wenger (1991), Wenger, McDermott and Snyder (2002) and Marquardt (2002) regarding communities of practice; Cross (2007) and Rowden (2007) on discrete methods of learning; and Dewey (1938), Coleman (1990), Putnam (1993/2000), Mergel (1998) and Burt (2000) in a discussion of social capital and the value of existing knowledge and experience.

Chapter 4 provides a detailed analysis of the research design, together with how the methodological assumptions have been linked to the conceptual framework. This links the epistemological understandings of the incumbent instructors and the ontological disparities among the groups studied. There is a clear description of the strategies used for data collection and analysis, drawing on the works of Stake (1995), Simons (1980) and Yin (1993/2003/2009/2012). The discussion of trustworthiness and the limitations of the findings reflect the works of Lincoln and Guba (1985). Finally, there is a description of how ethical and political considerations evident throughout the study, and that continue to the present time, influence future decisions on instructor development.

Chapter 5, Chapter 6 and Chapter 7 elaborate the analysis of the data to answer the study's three research questions. Chapter 5 is a review of the instructors as individuals and how their existing characteristics influence the learning processes. Although identifying demographic models for employment, it uncovers the baseline for trainers to work with in order to identify appropriate measures for ensuring early instructor competencies. It further examines the role of leadership and its impact on organisation, reflecting the works of Senge (1994) and Marquardt (2002). Chapter 6 discusses the existing situated learning environment and the what and how of information necessary to bridge the gaps within the communities of practice identified in the previous chapter. Chapter 7 gives an overview of existing instructional design, including both formal and informal processes presently utilised. It further examines how these latter processes are, or could be, augmented by mentoring relationships within the existing communities of practice and how this entire process is evaluated.

Chapter 8 provides an overview of the entire thesis from literature review to data analysis. A further personal reflection is followed by an outline of findings from which conclusions may be drawn. The significance of these findings indicates a substantial contribution to theoretical, methodological and empirical knowledge in this area of education.

1.8 Summary

This chapter has reviewed the necessity of this study, the importance of the recreational diving industry to Queensland, the possible impact of instructional staff on the many visitors received and a brief history of the training required to gain instructor status compared with that of other adventure sports. Following this was a brief description of the research questions and a personal note that has attempted to position myself as an experienced and knowledgeable identity in the recreational

diving industry suitably disposed to conducting this research. It is from these aforementioned points that the chapter has concluded with a brief review of the chapters explicating this thesis.

Chapter 2 Literature Review

The early divers were mostly water people….Water experience was important because there were no classes in the beginning. People would buy equipment from surplus stores or fabricate it in their home workshops. If there were instructions they would read them; if not they went diving anyway. (Hanauer, 1994, p. 11)

Learning is a process as well as an outcome. (Zuber-Skerrit, 1992, p. 103)

2.1 Overview

The purpose of this chapter is to examine the existing literature regarding the origins, philosophies and training of divers and diving instructors and to locate the study in its appropriate historical and sociocultural context. Further to this, and owing to the paucity of information regarding recreational diving instructor training alone, this chapter reviews elements of the literature regarding two important themes that occurred during my data acquisition: leadership and communication skills. It also examines some of the generic literature regarding the historical, psychological and sociological theories associated with the training and direction of adventure oriented, recreational and leisure activities.

Examining the existing literature will allow the reader to reach a better understanding of the development of recreational diving instructor training and its reliance on what can be described as the learning of relatively unchanging skill sets. This static situation appears to allow training agencies to avoid the necessity of digging more deeply and looking outside its present framework to improve other more socially required skills, such as interpersonal communication, which would enable earlier acquisition of competence in the area of diving instruction.

Finally, in reviewing some of the dominant theories that impact on adventure training as a whole, I hope to raise issues that are common to most, if not all, other adventure activities and to highlight the more overt role they can play with particular reference to those instructors trained in the recreational diving industry.

Together, the review of the existing literature on dive instructor training and that generic to the adventure industry as a whole give a better theoretical and practical insight into the manner in which this situation may be analysed to answer the research issues framing this study: what competencies are required of diving instructors, how do instructors achieve them and how do we improve future training?

2.2 The origin of diver and dive instructor training

As referred to earlier, diver training commenced with the military and this became the model for the first civilian diver courses. These courses included teaching skills that continued for two decades with only slight variations that were reflected in the recommendations given by the diving books available throughout this period. However, with changing demographics and technology, as can be evidenced in Table 2-2, p. 46, the teaching of these military styled skills is questionable. Further to this, skill learning methodology referred to in these diving books ranged from the rather *laissez-faire*, suggesting learning from another diver to those recommending a

'trained' instructor, also suggesting which skills must be learned (Atkinson, 1962; Brennan, 1962; Burke, 1963; Cropp, 1974; Dugan, 1956; Jeppeson, 1980; Kenyon, 1956; Matkin & Brookes, 1963; Morrison & Sinclair, 1984; Owen, 1955; Roberts, 1963; Rossier, 1999/2008; Sand, 1964; Strykowski, 1974; Sylvester, Perry & Blackburn, 1987; Vallintine, 1981), to rather more brutal methods (Hampton, 1970). The latter, according to the flyleaf of Hampton's text *The master diver and underwater sportsman* states that he was the chief instructor at the British Underwater Centre and that since its first publication in 1955, the text was used as a training manual in diving schools around the world. Extracts from this text suggest that beginner divers should either perform, or observe, as follows:

> As an exercise only, swim around near the bottom until exhausted. When breathing becomes an effort and every breath has to be dragged from the lung-stop-do nothing, and rest in whatever position one happens to be…. On descending, the external pressure collapses the rubber to a certain extent, after which the eyeballs tend to be sucked out of the head….The pain can be acute…as a ruptured eardrum will result ….The diver could still become a victim. (pp. 41-44)

And this is from the first of several lessons. In more recent texts, words such as "pain" are exchanged for the less distressing sounding "discomfort"; "excruciating" for "uncomfortable". Very rarely is the word "death" used. This may well be an endeavour to present scuba diving as a more benign sport than it could otherwise be perceived and hence to improve student numbers in an increasingly commercial environment. In Hampton's (1970) defence, however, as much as he explains diving concerns in a rather crude manner, he is nevertheless relating possible consequences and is certainly not pandering to any commercially oriented agenda.

In all of this available literature on diving, there is little to offer in describing what it took to become an instructor other than a list of tasks that are necessary to accomplish. Taken from a Dive Qualification booklet (1982) produced by the New Zealand Underwater Association (NZUA) outlining all requirements from snorkel diver to Four Star Instructor, the tasks set out for an initial instructor certification to become a *Confédération Mondiale des Activités Subaquatique* (CMAS) One Star Instructor are as follows:

1. Attend a Preliminary Instructor's Seminar for tuition in all aspects of student training, lecturing and practical.
2. Attend a Final Qualifying Seminar demonstrating ability in instructing theoretical and practical subjects to Instructors' Representatives.
3. Present for evaluation and have approved a manual prepared by the Student Instructor for the training of students up to Basic Scuba level (Open Book Exam). (NZUA, 1982, p. 19)

CMAS (2008) (English translation: the World Confederation of Underwater Activities) is an organisation based in France and considers itself to be the international umbrella organisation for recreational diver training organisations (Aquaviews, 1999). This is a doubtful claim as many more commercially oriented diver-training agencies such as PADI and SSI do not align themselves well with the standards that some members of the CMAS organisation adhere to. For instance,

within CMAS, some members still insist on incorporating into their training some of the highly questionable skills referred to earlier in Chapter 1.

The above instructor training program is what I had to adhere to for my instructor qualification. For this, there was no open water segment examined and only one basic pool skill was evaluated. The only real challenge of the program was in the production of a self-written text for training beginners. This, in effect, meant that every instructor who wished to graduate had to produce his or her own individual training manual. These productions often leant towards their particular interests. For instance, a student instructor who was a mechanic may have included a large section of text covering more extraneous equipment knowledge than necessary, while a nurse or schoolteacher could possibly write more about physiology and cover only whether equipment is operational or not. This individual requirement to produce an instructor manual may have evolved as a result of an apparent dearth of suitable diver training texts.

Another earlier indication of what instructors were expected to do for certification is found in a movie entitled "*Anyone for Diving?*" produced by the Los Angeles Department of Parks and Recreation in 1962. This is a program showing the broad strokes required to become a qualified diver and interjects commentary on the manner in which their diving instructors are trained. The implication is that their instructors have to be able to do what their future students will be required to do, only swim further, dive more deeply, do it better and faster, and on any subject be able to write an essay as opposed to the beginners' sentence.

Although this covers only a small segment of the full range of skills required to become a diver, there appeared to be little or no consistency about what divers had to learn, and by inference how and what a diving instructor was to teach. Where instructor training was seen to be required, their training ranged from a somewhat relaxed two-weekend set of seminars (the type I attended) to what was often referred to as a "hell week", an expression borrowed from the Navy Seals, which lasted for seven to nine days. The name says it all. On any day, a student instructor could be failed and the stress of this situation was, to say the least, unpleasant. At worst it created an unrealistic situation that was close to sadistic. One early example of this that I personally witnessed was a response from an instructor candidate at an end-of–day review. This candidate also happened to be a medical doctor. He gave a long, well thought out but outraged address regarding the unrealistic stress that was placed on him and his class peers. His argument was that the more than 12 hours training a day plus extra time needed for homework, coupled with the fact that from day one candidates could make only two unacceptable presentations from the 12 required during the entire nine day program, was far more stressful than the conditions he had to endure when he was an intern working in an emergency ward frequently going without sleep for two to three days on end. The initial response to this was stunned silence, followed by a promise to forward these comments immediately on to the agency's directors of instructor development. It is likely that this message was probably echoed universally as change occurred shortly afterwards. In the effort to create a thorough training and testing process for recreational diving instructors, it appeared that with at least one diver training agency there was a desire to move away from this military style, "do-or-die" ethos embedded in instructor training.

So it was that in the early 1980s PADI instigated a significant shift in the manner that their dive instructors were trained (Brylske, 1984a, 1984b, 1984c). This created an instructor training program that was capable of completion in seven to eight days and consisted of developmental exercises that were designed for just that purpose only: development. There was now no undue stress placed on student instructors; at that point in time, the program could not be failed, as long as there was full attendance by the student. After this development phase, a student could then choose to continue immediately to complete a two-day examination, or relax in the knowledge that there was a 12-month gap allowable within which to take this final step without having to repeat the earlier development stage. With this new approach to training, educational theories such as Gagné's (1965) categories and conditions of learning are clearly embedded (though not as clearly credited) in the formats recommended for the construction of instructor teaching presentations.

What has been termed Gagné's (1965) "Five categories of learning" are addressed in PADI's (2001-2004) Instructor Candidate's Workbook, and how they may be applied is as follows:

1. Motor skill – physical movement by the body, arms, hands, legs, etc. For example, mask clearing.
2. Intellectual skills – knowing how and why things occur, being able to formulate and complete calculations, etc. For example, looking at a submersible pressure gauge and knowing how to calculate air supply.
3. Verbal information – learned facts or information needed for a particular application. For example, being able to state how water affects an object's apparent size (appears 25% larger).
4. Attitude – beliefs and values that affect what choices people make. For example, choosing one colour of mask over another, or making a safety stop at the end of each dive.
5. Cognitive strategy – a mental plan of action or method intended to accomplish a specific objective. For example, using BWRAF (Begin With Review And Friend) to remember how to perform a pre-dive safety check. (pp. 2-4)

Further to this, Gagné's (1965) "Nine events of instruction" underpin all classroom, confined water and open water presentations that instructors are required to give at all levels of training. Presentations are expected to include all instructional events as illustrated in Table 2-1. These are listed alongside what Gagné (1965) considers the related internal mental process to be, together with examples of use in diving instruction.

Instructional Event	Internal Mental Process	Method
1. Gain Attention	Stimuli activates receptors	Ask a stimulating question related to the subject to inspire interest
2. Inform learner of objectives	Level of expectation for learning is created	Make a clear and measurable statement of what it is that the students are expected to achieve

Instructional Event	Internal Mental Process	Method
3. Stimulate recall of prior learning	Short-term memory is activated and assessed	Refer to prior coursework related to the new subject to be learned
4. Present the content	Content is selectively perceived	Use multimedia (visual, written, oral) to optimize students' learning abilities
5. Provide "learning guidance"	Information is semantically encoded for storage in long-term memory	Identify methods for best memory retention such as the use of acronyms
6. Elicit performance (practice)	Encoding and verification are enhanced by responding to questions	Give oral or written test questions
7. Provide feedback	Correct performance is assessed and reinforced	Review answers to questions set
8. Assess performance	Final evaluations reinforces content retrieval	Give a summative evaluation by written, oral or practical examination.
9. Enhance retention and transfer to the job	Learned skill is generalised to a new situation	Refer to future possibilities, continuing eduction

Table 2-1 Gagné's (1965) Nine Events of Instruction adapted from Gagné (1985, p. 246)

Since this early departure from traditional training, and apart from the occurrence of gradual alterations to training such as a reduction in waterskill requirements and certain theory segments capable of online completion, no significant change has been made to the way in which instructors are trained today. Currently, after completing industry-accepted instructor development training programs, graduates are still expected by many prospective employers and students to be already cognisant of, and competent in, their future roles.

This belief in the adequacy of competence is not entirely unexpected. In Australia, for some diver related qualifications, certain elements of diver training are expected to be compliant with 'units of competency' through established Registered Training Organisations (RTOs). These RTOs operate in conformity with the Australian Quality Training Framework (AQTF) and the Australian Standards (AS) 2815 and 4005 and the Australian/New Zealand Standard (AS/NZ) 2299. These Standards are available through the Standards Association of Australia (2012). Some diving instructor levels also require the successful completion of a Certificate IV in Training and Assessment to ensure further conformity with federal training standards. This certificate is a requirement for meeting the AQTF Standards for delivery and assessment of vocational training. Another controlling organisation, the WRSTC, established in 1999, offers guidance about the development of worldwide minimum training standards to which such organisations as PADI and SSI adhere. With this apparent reach and involvement of accepted authorities on training and education, it does appear that the means by which diving instructors achieve their certification to teach, and more importantly their ability to do so, should be easily defined. But it is not that easy. Much learning has to occur after these formal processes are completed before an instructor becomes in any way competent.

2.2.1 Other relevant and related diver training literature

In 1982 I produced a report for my postgraduate diploma in business and industrial administration at the University of Auckland, New Zealand, entitled *"A Strategic Plan for Sportways Aqualung Centre"* (Cardwell, 1982). Sportways Aqualung Centre was a company I was working for at that time. One conclusion that I drew from the research was that the traditional method of training being used by that operation had to be replaced by a more forward looking and systems-based approach. At that time the only alternatives were PADI and the National Association of Underwater Instructors (NAUI). The other conclusion that I came to was that the customer demographics were exactly the same as those experienced in the United States of America and printed in the earlier PADI materials. This was also mirrored by results from an Australian survey conducted by the team who started PADI Australia (T. Cummins, 1982, personal communication).

The company's response to the data produced in my 1982 report was essentially a twofold decision. The first decision was to make alterations to its marketing strategies focusing on continuing education programs that were more environmentally friendly such as courses in marine biology and underwater photography; retail sales of spearguns began to be displaced by improved camera sales. The second decision was to give greater consideration to changing its affiliation with the nationally recognised diver training agency coordinated by the NZUA to the training program associated with PADI. This change in training affiliation was reluctantly approached but eventually changed 18 months later when new management was introduced. This change appeared to concur with an upsurge of business enterprise in the recreational diving industry and consequent, related employment opportunities. However, opportunities for employment as diving instructors did not often reflect the same benefits as those enjoyed by more traditional endeavours.

In 1995, Jeffrey Wilks and Trevor Atherton published a paper entitled *"The lifestyle factor: Employment practices in the Queensland recreational diving industry"*. In their summation they aver that:

> There appears to be a conscious trade-off for standard entitlements against other benefits such as staff discounts, and accommodation and meal packages that are acceptable to the working instructor. This flexibility to pursue a much-loved hobby, and be paid at the same time, is clearly a characteristic of the Australian tourism worker….To design and structure the optimum human resource arrangement for small business in the adventure tourism industry, the lifestyle factor must be recognized and balanced against standard employment conditions. (p 28)

This latter injunction has in some ways been recently adopted by the industry, with many small business operators offering their staff sickness and holiday leave as well as other entitlements such as the compulsory superannuation entitlements they are obligated to provide. Although Wilks and Atherton's (1995) work gives a clear call for the recognition of standard employment conditions, there is little doubt that recent changes in this regard have been a result of the recommendations made by the Workplace Ombudsman resulting from his 2007 investigation of "a number of

allegations of unfair, inappropriate or unlawful activity in the industry" (Queensland Workplace Rights Ombudsman, 2009, p. 1).

Other supportive literature regarding how educational theory is related to practice has been produced periodically by the respective diver training agencies. These have had an appreciable partisan bias but include short generic articles such as "Knowledge vs. learning: A choice of approach" and "Teaching psychomotor skills: A perspective for the diving educator", as evidenced in PADI's "Best of the *Undersea Journal*" (1995) and "Affective instruction" in a more recent PADI *Undersea Journal* (3rd Quarter 1998) as reproduced in PADI's *"Guide to Teaching"* (2010).

These articles, both the partisan and the generic, are constructive and required reading for those wishing to complete a PADI Instructor Development Course (IDC). However, although of utility for their future careers, the knowledge contained in these articles are perceived by instructor candidates to be of little, if any, value to the challenges faced at the Instructor Examination (IE). Once an IE is successfully completed it is then a debatable issue as to whether the latent value of these articles and the knowledge they contain will ever be recognised by the new instructor unless there are appropriate measures taken to ensure that these articles are read and the knowledge is incorporated into their future learning. Sadly, it is my experience that many newly certified instructors do not want to retrace steps poorly taken (or avoided) and have shown considerable reluctance to perform further immediate study unless it can give them a better certification level, and hence a better chance at employment. Such a level would be the PADI Master Scuba Diver Trainer (MSDT); the MSDT certification is one that indicates an instructor has five specialty instructor certifications and has certified 25 divers at any of the levels to which the instructor can presently teach. This MSDT level is relatively easy to attain in the geographical area in which this study has been performed and does not necessarily indicate a much more knowledgeable instructor than those at a subordinate instructor certification level.

In 2005 I completed a project as part of my Master's degree in education. The project title was "*Stakeholder perceptions of an appropriate standard of training to ensure workplace competence of recreational diving instructors in Australia"* (Cardwell, 2005). Conclusions drawn from this project indicated the following areas for further investigation into the future design and delivery of instructor training programs to ensure a more positive outcome with respect to workplace competency:

- Improvement in dive theory knowledge, experience and work related problem management in subordinate training.
- Post examination training prior to certification.
- Changes to the instructor development course curriculum.

These recommendations alone were an influential stimulus to complete this current research project.

2.2.2 Training philosophies

As can be clearly seen in earlier training methods discussed, the skills necessary for a diver to learn were more focused on survival than on enjoyment. This has engendered the commonly expressed industry epithet regarding earlier training as "learning to dive with your back, not your brains". Without doubt, the aquatic world can appear unfriendly, alien and a dangerous place to be - a place to drown or be eaten, among many other perceived possibilities. As exciting and challenging as this new adventure activity appears, it is quite understandable that survival training was previously the sole concern in training, without much consideration of what other attributes training could be directed towards: for example; enjoyment and future motivations, such as relaxation and photography, as opposed to watching out for things that may kill you and ensuring you return alive. Further to these earlier perceptions, and by the very nature of the then novelty of the sport, the equipment available to participate in diving was very basic and quite often home-made (Hanauer, 1994).

Table 2-1 gives a good approximation of the evolution of dive equipment alongside the changing methods of training and customer demographics. This table briefly illustrates the type of equipment available at a certain time period, the respective methods of instruction used to train divers at the time, and a description of the changing demographics of those wishing to be trained.

Date	Equipment	Instruction	Consumer Demographics
1945	• Prototypical and crude design	• No civilian training programs	• Exclusively military
1960	• A few 'sport-diving' companies came into existence • Still designed for survival rather than energy saving	• Formalised training begins • Programs similar to military are adopted	• Mostly ex-military or those with extensive aquatic backgrounds
1967	• A few changes and innovations (SPG, BCD, single-hose regulators) • Larger manufacturer base	• No significant changes • Little attention paid to changes in equipment technology or consumer demographics	• More variety in type of individuals • Many beginning to see diving as not as difficult as they thought or were led to believe

Date	Equipment	Instruction	Consumer Demographics
1977	• More energy-saving devices • More comfortable designs • Divers can now "dive with their brains, not their backs".	• Still no significant change • Programs now needlessly weed out many prospective participants • PADI programs institute fundamental departure from traditional diving instruction.	• Much broader consumer base.
1984	• Increasing sophistication • Smaller, lighter, better design • More attractive	• PADI programs institute fundamental departure from traditional diving instruction	• Very wide range of participation, but most are well-educated, have higher-than-average incomes and hold technical / professional jobs.

Table 2-2 Historical Perspectives on Diver Training

Note: Historical perspectives on diver training reproduced from *The Best of the Undersea Journal* (PADI, 1995, pp. 4-6). This indicates the changes in equipment and instruction that took place with the changes in consumer demographics.

It is therefore understandable the early trainers in this sport leant more towards teaching physically demanding activities which not only enabled greater ability to cope in this perceived alien environment but also allowed divers to compensate for the almost utter lack of equipment available to assist in this transition from non-diver to diver. There was sense in providing training activities which produced divers who could rely on their strength and endurance. As a simple example, fins or flippers then used for underwater diving were of the very sort often seen now only on children swimming at the surface. With SCUBA in place, considerable resistance to movement is created and to compensate for using such basic fins the diver had to become a very strong swimmer to move about. Since then, however, fin technology has developed to compensate for those with less than optimal fitness. This improvement in technology has of course occurred with all diving equipment, creating an inversely reciprocal change in the physical preparedness required for participation in this sport at basic levels.

Alongside the progress made in technology, there has been a change not only in the physical preparedness required to dive but also in the type of skills necessary. Today this has evolved into the provision of learning skills that are considered realistic and immediately relevant to the level of training and in turn the production of instructors who can discriminate between these levels of training and conform to the standards of a recognised training agency, and in some cases governmental standards or codes of practice. From my experience, this has also produced many instructors who have more limited knowledge and experience levels than their forebears.

As an indicator of the rapidity with which a diver today may become an Open Water Scuba Instructor (OWSI), Table 2-3 lists the minimum time frames required for this transition, indicating a minimum of 24 formal course workdays necessary to achieve this goal.

Course	Minimum time in days to complete	Waiting period in days/dives prior to attendance at next level of training	Accumulated developmental course work timeframe / supervised course dives
Open Water	4	0/4	4/4
Adventure	1	0/7	5/5
Advanced Open[2]	1	0/9	6/9
Rescue[3]	4	Variable /40	10/11
Divemaster	7	>6 months / 60	17/18
IDC[4]	7	0/100	24/22
IE	2	NA	N/A

Note: Minimum time frames for formal training leading to Open Water Scuba Instructor certification (OWSI) after attendance at an Instructor Development Course (IDC) and an Instructor Examination (IE). The hierarchy of courses in the above table, and progressing from top to bottom of the course list column, follow the PADI training progression.

In recognition of this limited formal coursework requirement, it is easy to see why doubt can be generated as to the efficacy of instructor training, and further why the training performed by those now trained as instructors is often considered equally inadequate.

2.2.3 Training the trainers

References to the training of early diving instructors is surprisingly thin but the greatest concern with regard to this study is how instructors are currently trained, who does it, what constraints are placed on their training and whether that training is sufficient. Presently, the industry-accepted formula for training diving instructors is to accept divers into an instructor development course after they have achieved the required qualification and level of experience. This experience is determined by the

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[2] An Advanced course may be commenced immediately after completion of Open water training, taking two days and 'sidestepping' the need for the intermediate course of Adventure diver.

[3] The difference in waiting period for the Rescue diver prior to attendance at a Divemaster (DM) course is based on a rate of three dives a day to achieve the necessary minimum number of dives required to attend a DM course.

[4] The 60 and 100 dive requirements can be gained in any way and there is no standard requiring minimum depth or number performed in any one day. Using a rate of three a day is arbitrary though quite usual, suggesting approximately another 30 days of diving. This diving is not necessarily supervised.

number of, not necessarily the quality or variability of, dives. This development course is often seven to 10 days in duration, with a further two days of evaluation performed by a recreational diver training agency appointed examiner. The examiners appointed are more often than not full-time employees of the agency and they and the instructor candidates enrolled at the examination are expected to be unknown to each other. The intention of this is to provide the unbiased testing of an instructor candidate's fitness to teach, avoiding collusion with the development instructor or the dive operation promoting the development course. This also gives the instructor candidates the reassurance that their abilities are at a level that can truly meet the scrutiny of an independent examiner and meet the expectations of the industry in which they hope to be employed.

Once certified, the main constraints placed on instructors are those prescribed by the standards of the training agency or agencies of which they are members. These standards usually have a rider stating that required government regulations or local "Codes of Practice" take precedence over any training agency standard. For instance, internationally, PADI stipulates the minimum age to commence SCUBA training as 10 years of age but the "*Recreational Diving, Recreational Technical Diving and Snorkelling Code of Practice 2011"* in Queensland produced by the Department of Justice and Attorney-General – Workplace, Health and Safety Division requires that individuals be at least 12 years of age (p. 12). Training agency standards also stipulate continued annual membership to enable the instructor to continue training. However, this "teaching status" is usually endorsed only after an instructor obtains public indemnity insurance where required. In Australia this is mandatory. However, in a few countries this is not compulsory, owing to government legislation. In New Zealand, for instance, obtaining this form of insurance is not deemed necessary as their Accident Compensation Commission (ACC) manages this form of legal liability.

Other constraints are often imposed by employers such as requiring instructors to hold extensions to a regular driving license, enabling them legally to transport students from class to accommodation, but in some cases constraints may also be brought about by the creation of a mythology. A current example is the supposed requirement in the local area under study that underwater photographers, because they are considered to be working alone without a designated "buddy diver", must obtain a "Solo diver" qualification. The good intention behind this is aimed at enabling the divers to become more self-sufficient should they have an "out-of-air" emergency whilst working alone, but the demand for this is not by government Act or local code of practice. Nevertheless, this has become, for some in the area under study, a local imposition placed on this type of worker. A similar constraint has been placed on research workers in Australia who now appear to have to attain a "Scientific diver" qualification in accordance with Australian Standard (AS) 2299.2:2002 (JCU, 2008).

Through legislation, codes of practice and the various agencies' training standards, it is relatively easy to determine many of the practical skills required of a recreational diving instructor. What is not so easy to determine, however, are what other, unwritten skills are necessary, such as inter-personal communication, leadership and the co-ordination of dive groups, and how competence in these areas can be achieved. These and other issues reflecting on theoretical knowledge regarding the broader subject of adventure education may well be necessary but

absent from consideration in the training of recreational diving instructors. It is to this theory that reference is now made.

In summary of this literature review thus far, it can be seen that the early training of diving instructors transitioned from the military to the civilian population and became supported by diver training agencies evolving from groups of amateur enthusiasts to the more business oriented agencies such as NAUI, PADI and SSI that now produce the majority of the world's diver certifications. In the early 1980s a radical change was made to the manner in which dive instructors were trained, displacing the old "hell week" with a more conservative systems approach to instructor development training that requires only two days of summative evaluation. This has continued to the present day but with an increasingly visible involvement by governmental agencies producing Codes of Practice and, in this geographic region, requiring conformity to AQTF and Australian/New Zealand Standards. These latter requirements are implicitly designed to protect those participating in this sport and also clearly to protect what is, in Queensland at least, a vital income earner.

It could be argued that this increasingly visible involvement by governmental agencies is as a result of an industry being perceived as unable to monitor itself well and requiring greater monitoring. This may or may not be so, but what is clear is that from my earlier study and as a result of responses from more than 100 industry members (Cardwell, 2005), there was a uniform concern regarding a general incompetence and lack of knowledge in the workplace (p. 37).

This now brings us to more generic literature that reflects on how to address these perceived deficiencies and can lead to a greater awareness as to how current educational theories can affect the practice of the recreational diving instructor. This next section thus deals with the topics of communication, leadership and some of the more pertinent social and psychological theories related to adventure education in general.

2.3 Communication

Successful communication involves the transfer and understanding of meaning (Hargie, 2011; Szabo & Csepregi, 2011). Paradoxically, even though much communication is performed with the assistance of increasingly sophisticated technology, the need for face-to-face communication skills is becoming more important than ever (Barnlund, 2008). This is evidently so in the recreational diving industry where there is a constantly changing flow of customers from a variety of backgrounds and age groups on a daily basis; customer contact is not only made from behind a counter: it is also often in a boisterous, somewhat cloistered environment demanding constant attention. Versatility in communicating with people face-to-face is paramount; the acquisition of knowledge and learning of interpersonal communication skills with regard to this facet of instructional development should neither be presumed nor disregarded.

In general terms, the communication process involves the conception of a message that is conveyed in symbolic form (encoding) and passed by a suitable medium (channel) to the receiver, who translates the sender's message (decoding). Feedback is then generated to confirm, or otherwise, that what has been received has the same meaning intended by the sender. Many writers (Barnlund, 2008; Berko, Aitken & Wolvin, 2010; Bodie, 2011; Clarke, 2010; Hargie, 2011; Iverson & McPhee, 2008) subscribe to this process as illustrated in Figure 2-1.

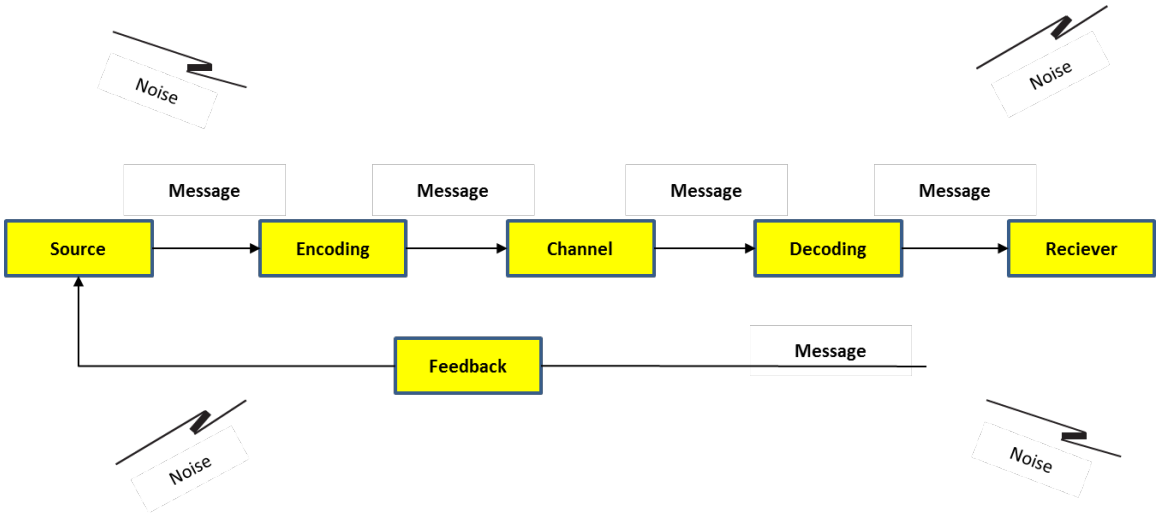

Figure 2-1 The Communication Process

Note: Reproduced from Robbins, Bergman, and Stagg, (1997, p. 604). This indicates the progress a source message takes through encoding by the sender, transmission through a medium, decoding and feedback by the receiver whilst dealing with interference (displayed as noise) among all elements of the process.

As the original message and feedback are being transmitted, noise may distort the meaning of what is being received. Noise can be either external, such as static during a telephone call or illegible writing, or internal sources such as skill (for instance, is the sender literate?); attitude (will the receiver listen to my argument about one training agency's reasons for doing things or does he/she already have preformed ideas on the subject that makes dialogue a waste of time?); knowledge (do sender and receiver have similar technical backgrounds so that one can understand the other?); and the socio-cultural context (will these men actually listen to this young female diving instructor?).

Further to noise generation are other barriers to effective communication such as filtering (the deliberate manipulation of information to make it appear more favourable to the receiver); selective perception (hearing [and not listening] to what one wishes to hear alone); emotions (interpreting the same message differently depending on mood); and language (some words mean different things to different people [Venkatachalam & Sellappan, 2011, pp. 124-127] - do sender and receiver speak the same language or understand specialised jargon?). This latter is of particular significance when instructors are communicating with people who have little or no knowledge of diving and other marine expressions.

With the eclectic mix of customers that instructors have to deal with on a daily basis, communication is often fast-paced and, as well as standard mass briefings, individual differences may be recognised by the decoding of non-verbal cues: gestures and movements, muscle tension, facial expressions, eye movement and general appearance. There is some training given regarding these elements during rescue diver courses with an emphasis on discrete inquiry on recognition of anomalies, but that training is scant. This is of particular relevance to anxious people anticipating their first dive or whether some customers, because of the sea conditions, will exhibit unwelcome physiological reactions such as seasickness and/or vomiting.

As much as it may be trying for those who have to deal with many customers on a daily basis, there is a positive spin for those instructors possessing less than optimal communication skills: any awkward customer they have had to deal with will be gone at the end of the day. This does not, however, resolve issues that may result from a lack of interpersonal skills that are necessary for the development of the longer term relationships vital for team co-operation or in dive operations that are more reliant on a less transient customer base. As a measure of the significance of this ability, Robbins, Bergman and Stagg (1997) cite a study published in the *Wall Street Journal* stating that more managers are fired because of poor interpersonal skills than for lack of technical ability on the job (p. 612). If this is the case for managers, why not for instructors who use communication as their prime working tool? For the diving instructor, effective interpersonal communication skills are necessary both for membership within the organisational team and for effective leadership of those eclectic groups of people wishing to experience diving in environments with which they are often unfamiliar with.

2.4 Leadership

Recreational dive instructor training is often referred to as leadership training and it is without question that someone who is learning to guide beginners from ignorance to knowledge and ensuring the avoidance of risk and harm in a different environment should be able to provide role model directions. Leadership is important: according to Mitten & Clement (2007), "Leaders build caring relationships with participants while maintaining professional boundaries; authenticity and relational skills are vital" (p. 80). In this study of competence and its acquisition as it relates to the diving instructor, leadership ability is integral to future competency but this also applies to the direction or leadership given to the instructors by their management. The concerns regarding leadership in the study therefore relate to both instructional staff and the managers giving them direction. Traditional leadership styles are often described as autocratic, democratic and *laissez-faire.* (Bass, 2008; Clemmer, 2008). Autocratic leaders make decisions alone, demand strict compliance to orders, dictate each step to be taken and do not participate actively in work to be performed. Democratic leaders work through collective decision-making processes before initiating tasks, and they gain perspective from group discussions and technical advice. Group members are given responsibility to organise tasks. *Laissez faire* leadership gives freedom to the group to manage what is to be done with little, if any, participation from the leader. The styles of management leadership prevalent in this study range from autocracy in the form of benevolent dictatorship to a more *laissez-faire* leadership where decision-making is becoming decentralised and shared. This in many respects appears to be more consonant with Cherniss and Goleman's (2001) more defined leadership styles of visionary, affiliative, democratic, coaching, coercive and pace-setting, and their suggestion that "the most effective leaders integrate four or more of the six styles regularly, switching to the one most appropriate in a given leadership situation" (pp. 42-43).

In the latter case, this also appears to be falling in line with Senge's (1994) observation, cited in Robbins, Bergman and Stagg (1997), that "such people are not made to order" and that "what distinguishes them is the clarity and persuasiveness of their ideas, the depth of their commitment, and their openness to continually learning more" (p. 359). He further identifies, as paraphrased by Robins, Bergman and

Stagg (1997), the three skills that are important attributes of leaders in learning organisations: the ability to design a system that allows people to work towards a shared vision; a stewardship attitude towards resources and the organisation; and a teacher/coaching relationship towards other people in the organisation (p. 591).

Significantly, this also reflects what Mancall and Hubbard (2000) suggest:

> When workers are more involved in their organisational development, they are motivated to become more productive. Besides the positive influences on productivity stemming from the increased motivation workers feel when they are involved in managing their work, an even more direct reason for supporting this democratic approach to management is the fact that subordinates are often more capable of making decisions about the future and direction of their work than are their managers (p. 3).

Effective leadership is a much-needed capability for most processes to move forward and be productive. The attributes of leadership should be understood and developed both by the instructor to enhance his or her role in guiding subordinate divers, and by managers to ensure achievement of organisational goals. As mentioned earlier in Chapter 1, recreational diving is not without risk, albeit considerably less so than is often perceived; diving instructors who are effective leaders ease the pathway for successful learning in this new adventure.

2.5 Adventure education

Adventure education, as defined by Prouty, et al. (2007) encompasses "direct, active, and engaging learning experiences that involve the whole person and have real consequences" (p. 12). It does not necessarily have to occur outdoors; rock climbing and ice-skating are two good examples of adventure activities that may be performed indoors. However, those activities that are outdoor based or, as in the context of this thesis, both outdoors and underwater may be considered as a subset of outdoor education which saw its modern origin from such early initiatives as Lord Robert Baden-Powell's Scouting movement (1907) and Kurt Hahn's Outward Bound (1941).

Hahnian principles as explicated by Richards (1990) and resonant with Baden- Powell's philosophy (Smith, 2002) were to address youth attitudes and abilities that he perceived as declining: personal responsibility and service to the community. Specifically, the issues were:

1. **Fitness**, due to modern methods of locomotion.
2. **Initiative** and **enterprise**, due to the widespread disease of 'spectatoritis'.
3. **Memory** and **imagination**, due to the confused restlessness of modern life.
4. **Skill** and **care**, due to the weakened tradition of craftsmanship.
5. **Self-discipline**, due to the ever present availability of stimulants and tranquilisers.
6. **Compassion**, due to the unseemly haste of modern life. (Richards, 1990, p. 69)

Typical of Hahn's Outward Bound program was that participants lived together in small groups for up to 28 days undergoing orienteering, search and rescue training, athletics, small-boat sailing, ocean and mountain expeditions, obstacle-course training and service to the local communities (Miner, 1990). Even though these programs were designed with the more altruistic approach of improving moral and social development, many of these issues addressed by Hahn filtered into all adventure sports, including that of recreational scuba diving but for more pragmatic and commercial reasoning. For instance, fitness training as mentioned earlier with regard to early scuba training was considered to be essential to compensate for the early lack of appropriate equipment needed to participate; initiative, enterprise and self- discipline were stressed to enable divers to be completely self-sufficient in handling problems underwater and memory (with less emphasis on imagination) was challenged by comprehensive examinations both in and out of the water. It is only relatively recently that the elements of compassion and community service have become recognised as part of any diver training agency's recommendations and/or certification programs. These issues are today exemplified in the programs organised by the International Association for Handicapped Divers (IAHD) founded in 1993 (Connell, personal communication, July 29, 2010), and PADI's Project AWARE (Aquatic World Awareness, Responsibility & Education), commenced in 1992. (Nimb, 2003).

Although now more formalised and controlled, recreational scuba diving exhibits many of the basic elements reflected in Hahn's (1941) outdoor educational initiatives, and is often perceived as an adventurous, outdoor activity that can, in certain circumstances, offer extremely challenging situations. In explanation of this view regarding general adventure activities, Ewart and Garvey (2007) put it thus:

> Moreover, inherent in adventure education is the inclusion of activities and experiences that often include elements of danger or risk and uncertain outcomes. As a result of these dimensions, adventure education can offer participants a broad spectrum of psychological, physical and emotional outcomes that are not often readily achievable in more traditional forms of education. (p. 22)

Recreational scuba diving certainly falls within the ambits of both adventure and risk; people can experience intense exhilaration or die or suffer seriously life-altering disabilities from participation in the sport. Even though diver training has evolved such that non-divers can be certified as divers within a few days, they should have been taught the necessary skills to avoid common problems and the skills necessary to deal with them should they occur. Similarly, diving instructors are taught how to teach these skills and the order in which to teach them such that learning efficiency is optimised. For instance, they study the infrastructure and artifacts necessary to conduct a course within established standards, codes of practice and recommended time frames.

Owing to the short time frames presently accepted for learning the skills required for all levels of recreational diver training through to instructor development, much of the theoretical background regarding adventure education used in the construct of training the trainers as it has presently been designed must be either viewed by their designers as implicit knowledge already known by future

instructor candidates or neglected, possibly to their disadvantage. I find the former presumption of existing implicit knowledge somewhat debatable but in some regard this abridged design may appear inevitable when influenced by the necessity of commercial activity. That is, in recreational diver and diving instructor training, just as in any other industry, time is of the essence and quicker completion times imply earlier profits. Extraneous information such as reference to original background theory or theorists not adding directly to the production of quickly desired outcomes is removed from the learning process. This does, however, raise the question whether this economy in course content works to the detriment, not the betterment, of the industry it is trying to build, and how, if altered, this may impact on the acquisition of instructional competence and also influence future changes to the ways in which diving is taught.

Background theory often directs course content and the associated systems and minutiae of artifacts contained within any training program. For instance, Gagne's (1965) theory regarding the nine events of instruction is now utilised when training recreational diving instructors in how to construct knowledge development presentations, together with the production of appropriate forms used for the evaluation of those presentations. Knowledge of the essential elements of a program thus enables its defence by those who use it. In other words, knowledge of background theory can be used to support an argument that clearly explains why things are performed in a certain manner, not merely by blind trust, perhaps relying on statements from questionable authorities. It is important for there to be transparency towards instructor candidates in the transference of knowledge regarding supporting theories used in the construction of training programs, together with the use of critical thinking within the sport of recreational diving to appreciate the industry's position within the broader theoretical domain of experiential education.

2.5.1 Adventure education as experiential learning

Experiential learning is not a new subject. Drawing from the theory of evolution, it could be argued that this is one of our most important abilities; we did not graduate from the marshes via a classroom, even though the latter venue is where humanity, in the latter two centuries at least, is considered by many to have substantially begun its education. However, in more recent history, and with greater thought given to how we learn best and become more critical in our thought processes, Dewey (1938) produced his seminal text *Experience and Education*, a thesis arguing for a change in educational direction when considering the transfer from classroom to the workplace. At the time that this text was produced, learning was viewed as more instructor/teacher centred, not student centred. In other words, at that time, more concern was directed to what and how much the teacher considered was necessary to be taught, with less emphasis on how, why and what students could, should and wished to learn. In Chapter 2 of Dewey's text, and in general terms on the need for a theory of experience, he criticises the existing classroom approach to education by posing the following questions regarding the callousness of rote learning in the then present day teacher/student relationship:

> How many acquired special skills by means of automatic drill so that their power of judgment and capacity to act intelligently in new situations was limited? How many came to associate the learning

process with ennui and boredom? How many found what they did learn so foreign to the situation of life outside the school as to give them no power of control over the latter? (p. 27)

This offers an early challenge to the rift seen between theory and practice and intimates the importance of the search for a more relevant form of learning, endorsed in much later works by a multitude of theorists such as Kolb and Fry (1975), Lewin (1943/1997) and Piaget (1953), and the more recent Cross (2007), Lave and Wenger (1991), Marsick and Watkins (1990), Rowden (2007) and Senge (1994), who advocate more informal and, by inference if not by direct statement, experientially designed learning processes.

Further to his earlier questions, Dewey (1938) asserts also:

> Perhaps the greatest of all pedagogical fallacies is the notion that a person only learns the particular thing he is studying at the time. Collateral learning in the way of formation of enduring attitudes, of likes and dislikes, may be and often is much more important than the spelling lesson in geography or history that is learned. For these attitudes are fundamentally what count in the future. The most important attitude that can be formed is that of desire to go on learning. (p. 48)

Dewey's assertion is that with traditional learning processes students may lose their desire to learn and that more appropriate learning experiences are those that engage the learner in solving problems, making meaning and building understanding. These issues are not dissimilar to the higher order thinking stages of Bloom's (1956) taxonomy of the cognitive learning domain.

In very general terms, these theorists, alongside many others, have produced theoretical guidelines that argued for more experientially based learning processes using educational tools that may enable learners eventually to operate more effectively in their future working environments and be capable of solving real life problems, ensuring perhaps that the whole of the learning experience is greater than its parts. Early in Chapter 1, I stated that the developmental process for recreational diving instructors indicated the embedded theories of Gagne (1965) for certain parts of the training process whilst giving no credit to these works. This should be in no way considered deceitful but a result of the training agencies' need for economy of language in text production and with the aim of producing material that would be understood by its target audience without the clutter of unnecessary detail. For instance, in like manner and in the case of a critical subject taught to divers, Robert Boyle (1670), the discoverer of the relationship of absolute pressure to an elastic volume at constant temperature (Clericuzio, 1990), is unknown to the vast majority of divers trained. However, understanding the relationship that he discovered is a fundamental part of diving and therefore known to all certified divers. All divers know the most important rule in scuba diving: never hold one's breath. If breath is held during ascent, as the ambient or surrounding pressure falls, the elastic volume of the lungs will catastrophically rupture (Acott, 1999).

There is an appearance of similarity in approach to the training of both divers and their instructors despite the disparity in the depth of knowledge required to achieve their respective competencies. With regard to the beginner diver, there is an economy of language used in the training media evident in the diver and instructor manuals utilised in the learning processes; many of the texts available are uncluttered by unnecessary expressions and references. Although a beginner diver does not need

to know about Robert Boyle or Archimedes, he or she does need to understand such basic principles as volume expansion resulting from falling pressure and how to manipulate buoyancy; understanding concepts is vital, their origin is secondary and presumed unnecessary. In contrast with this, the diving instructor, often having more familiarity than the beginner (one would hope) with the laws and principles relating to the more physical aspects of his/her sport, appears to have little knowledge relayed to her/him regarding the psychological and social theories that may impact on and assist her/him in achieving competence as an instructor via the curriculum designed for instructor development.

For instance, knowledge of buoyancy manipulation, enabling the skill of becoming negatively buoyant to descend, positive buoyancy to ascend and neutral buoyancy to minimise swimming effort, may become routinised and alterations in practice can be made through knowledge of weight, water density (salt or fresh water) and buoyancy of the wetsuit used together with one's own personal buoyancy characteristics. That is, in this particular example, there is information readily at hand for a diver and/or instructor to rely on to assist with any buoyancy concern.

However, from my experience teaching these courses, there is little, if any, information contained within an existing instructor development course that the instructor can rely on to assist with some of the psychological or sociological aspects impacting on the training of beginner divers; lack of knowledge regarding communication and human interaction skills appears to be two of those deficiencies. With the contributions of the many educational theorists that can be specifically related to experiential learning, it does raise the question whether the limited skill sets demanded during the present instructor development process weaken the entire learning experience by the omission of these areas of theoretical knowledge, thus leaving the certified instructors less than optimally prepared to undertake their future roles.

2.5.2 Psychological and sociological theories related to adventure education

It is one of my arguments that knowledge and not ignorance of educational theory should be part of recreational diving instructor training. Although this is not uncommon in any endeavour, dealing with the vagaries of human communication and learning in practice would be all the more efficient if a solid knowledge of basic, proven principles were already understood prior to application. For instance, much civil engineering depends on the use of such theories as those of da Vinci, Euler and Bernoulli (Ballarini, 2003) but there are many other theories and established principles from which civil engineers also draw their knowledge. This not only enables them to complete the mechanical calculations necessary for construction but also how to deal with those who do the constructing, such as those regarding initiatives and incentives as outlined in Taylor's (1911) principles of scientific management. In the context of this study, it has already been established that recreational diving instructors use the educationally focused principles established by theorists such as Gagné (1965), but how much will instructors' practice be improved with knowledge of other educational theories that can be deliberately introduced into their basic developmental courses? The theories and resources available relating to educational practice appear almost countless (Price, McFadden, & Marsh, 2000). Some of those theories relating to experiential learning in general, and adventure learning in particular, that could be used to augment a recreational diving instructor's

knowledge and impact on his/her achievement of competence are listed in Table 2-4.

Theory	Proponents	Salient points
Behaviourism	I. Pavlov, B. F. Skinner, E.Thorndike, J. B.Watson	Only that which can be seen and measured (behaviour) is a reliable indicator of individual change and associative learning
Cognitive evaluation	E. L. Deci, R. M. Ryan	Perception of personal competence and control over outcomes is a powerful force in motivation
Functionalism	William James	Behaviour is adaptive; focuses on causes of events
Learning styles and multiple intelligences	David Kolb, Roger Fry, Howard Gardner	The experiential learning cycle: from concrete experience to formation of abstract concepts and the "intelligence/s" we use
Goal-driven behaviour	A.Maslow, L. Festinger, M. Csikszentmihalyi	Actual or expected goals serve to guide individual action
Social learning	Albert Bandura, Julian Rotter	Interaction between individuals and their environment is key
Attribution	Fritz Heider, H. H. Kelly	People assign causes or outcomes as internal (i.e., self) or external (i.e., outside one's influence)
Self-efficacy	Albert Bandura	Participation is a function of how successful people feel they will be at the activity
Optimal arousal	John Hunt, Michael Ellis	Factors such as novelty, variety and change are important variables in psychological health
Cognitive dissonance	Leon Festinger	Focuses on situations when an individual is faced with competing thoughts or beliefs

Table 2-3 Psychological and sociological theories

Note: Psychological and sociological theories related to adventure education (adapted from Ewart & Garvey, 2007, pp. 26-27). This table lists the given title of an author or author's theory with a brief description of the essence of that theory.

This table of theories is by no means an exhaustive list of those that may impact on a recreational diving instructor's future abilities. Even so, this could be used as a starting point from which to construct a useful addendum to existing instructor development courses that offers practical significance and, although requiring a short- term increase in time for completion, will possibly give a medium to long-term acceleration in competency acquisition. The relevance of including this information in the literature review is to indicate, in part, the wide range of educational theory offering knowledge that may directly impact on the acquisition of competence through interaction with colleagues and customers. In particular, instructors should have more robust knowledge of why and how certain activities such as feedback, reward systems, construction of learning systems, learning cycles and styles, goal setting and motivation are of vital importance not only to the

achievement of competence but also to the well-being of themselves and those in their charge.

In this regard, what follows are brief notes on some of the basic theories listed in Table 2-4 with at least one example of how this matters in a more practical and understandable sense to the learning instructor.

2.5.2.1 Behaviourism – Pavlov, Skinner, Thorndike and Watson

Instructors are taught to provide positive feedback consistently to students about specific aspects of their performance, following up with recognition of possible errors and offering suggestions for improvement, ending once again on a positive note: often referred to as using "bouquets and brickbats". On a grander scale, instructors are rewarded for the production of certain numbers of student certifications achieved in a year. Each of these examples indicates a reward for particular behaviours and there is little doubt that these are examples of behaviour modification in use.

Behaviorism is a theory that concentrates on the study of overt behaviours that can be observed and measured and relates directly to skill development and the conditions required for learning. It originated with the work of J. B. Watson in 1913 (Hothersal, 2004) but other developers of the behaviourist theory were Pavlov, Thorndike and Skinner. Their theories emphasise changes in behaviour that result from stimulus- response associations made by the learner.

Pavlov (1927) first demonstrated classical conditioning: a form of associative or reflex learning where an unconditioned stimulus such as food (which produces the normally occurring unconditioned response of salivation), when presented together with a conditioning stimulus such as a ringing bell, eventually produces salivation as a conditioned response on ringing the bell alone (Pavlov, 1927/1960).

Thorndike's (1928) work followed a similar vein and led to the development of the theory of connectionism and his formulation of the law of effect. This states that responses that are closely followed by satisfying consequences that become associated with the situation will eventually result in similarly satisfying consequences more likely to recur when the situation is subsequently encountered on its own. If the responses are followed by averse consequences, associations with the situation become weaker (Zimmerman & Schunk, 2003). From my experience, this mirrors the frequent rewarding of new instructors with certificates and awards for achieving certain goals, thus giving pleasure to and producing motivation in those recipients. Eventually, whether awards are received or not, the efforts made earlier are repeated without the need for, or even disdain towards, those rewards; pleasure and motivation are still often found in the efforts of the work alone. This also resonates with Csikszentmihalyi and Csikszentmihalyi's (1988) work on "flow", which is discussed in more detail later.

Skinner's (1957) work theorised that learning is a function of change in overt behaviour through response to certain stimuli. His Stimulus-Response (S-R) theory emphasised the use of reinforcement processes and their effect on behaviour. These processes were called operant conditioning and integrated four conditioning mechanisms:

1. Positive Reinforcement or reward: Responses that are rewarded are likely to be repeated. For example, this can include bonuses on each unit of production

or in the diving instructors' context on the number of students trained, or receipt of certificates of merit for training certain numbers of students during specified periods.

2. Negative Reinforcement: Responses that allow escape from painful or undesirable situations are likely to be repeated. For example, this can include a reduction of work assignments when customer levels are high enough to employ extra staff to share the workload.

3. Punishment and extinction: Responses that may or may not weaken behaviour; an aversive stimulus, removal of a desired stimulus or the absence of a rewarding stimulus may decrease or extinguish certain behaviour. For example, this can include removal or reduction of bonuses regardless of the number of students trained or management ignoring requests for action when more assistance is required to handle certain tasks safely.

From all of this, Skinner (1968) suggested that positive reinforcement is more effective than punishment in establishing appropriate behaviour and that in overcoming obstacles to learning teachers must:

1. Clearly specify the action or performance the student is to learn to do.

2. Break down the task into small achievable steps, going from simple to complex.

3. Let the student perform each step, reinforcing correct actions.

4. Adjust so that the student is always successful until finally the goal is reached.

5. Transfer to intermittent reinforcement to maintain the student's performance. (p. 93)

All of these theories - Pavlov's (1927) classical conditioning, Thorndike's (1928) "law of effect" and Skinner's (1957) "S-R theory" can be seen to have merged to enable the production of concise and effective learning situations such as have evolved into programmed instruction. In the 1950s and 1960s this was reflected in the development of the systems approach to instruction that involved setting goals and objectives, analysing resources, devising a plan of action and continuous evaluation/modification of the program (Saettler, 1990). This is the very basis on which the early Instructor Development Course (IDC) was developed by PADI in the early 1960s.

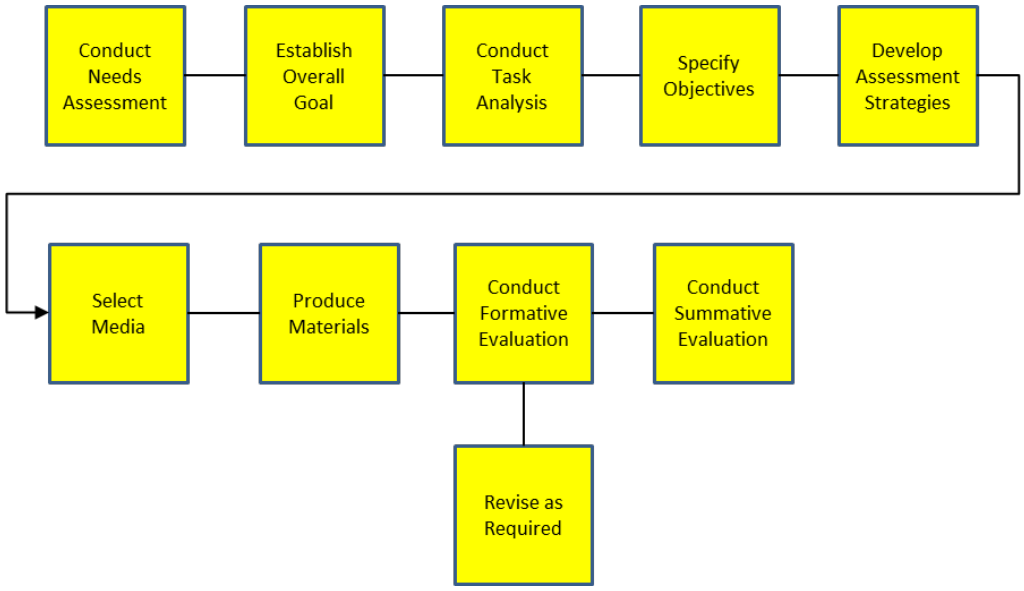

Figure 2-2 **Systems approach to training adapted from Mergel, (1988,p. 16)**

2.5.2.2 Cognitive evaluation theory – Deci and Ryan

Cognitive theory is concerned with how people understand material: their aptitude and capacity to learn, learning styles and how the learner constructs his or her own view or model of the situation or skill under study (Atherton, 2010). Indicators of ignorance regarding this theory are exemplified by learning instructors displaying a lack of ability in dealing with certain situations, such as the inability to achieve remedial action within a limited time frame or by indicating a lack of integration or involvement with decisions regarding the training process. One example of this inability could be how to deal with a difficult student successfully, yet at the same time manage to complete the training of other students in the group and within the time given before the pool closes or the boat has to return to port.

A lack of understanding of cognitive theory is evidenced in the new instructors' perceived incompetence when dealing with trainees taking particular medications, uncertainty about what to do with trainees who need extra time on certain skills when the schedule for completion disallows that extra time, and frustration at being told that there is no leeway for any alternative, no matter how creative. Admittedly, this may be a reflection more of organisational leadership than of instructional ignorance, but, as is often the case, the leaders of most dive operations started their careers in the dive industry as instructors themselves, and with this in their backgrounds, generally do not ask the impossible of their employees. This is also an indication of the need for knowledge of cognitive theory to be a well-established background for all involved in the diver training industry. The intrinsic motivation that instructors start with can rapidly turn to demotivation on discovery that the reward for their effort is not understanding and assistance, but instead abuse and the generation of an inner feeling of uselessness.

Cognitive evaluation theory (CET) is a theory dealing with extrinsic rewards and intrinsic motivation. The theory asserts that extrinsic rewards affect intrinsic motivation by having either a controlling effect that can be perceived as the primary reason for participation or an informational effect that affects the recipient's opinion of his or her own competence. When being asked to accomplish a task, individuals consider how competent they are and the control they have over its accomplishment.

If the task is considered achievable, there is an intrinsic motivation to accomplish it without the requirement of external motivation, but the controlling effects of extrinsic rewards affect intrinsic motivation, arguably affecting the very desire to continue participation in whatever task is concerned. In other words, lack of awareness of this issue can see the early demise of an instructional career; hence competence may not be achieved.

Deci and Ryan (1991/1995) differentiated between intrinsic and extrinsic motivation, proposing three intrinsic needs involved in self-determination: the need for competence; the need for autonomy; and the need for relatedness. These motivations refer to being effective in dealing with the environment in which individuals find themselves (Ryan & Deci, 2000), the urge to be the architect of their own destiny and the universal need to interact, be connected to and experience caring for others (Baumeister & Leary, 1995). In the dive instructor's frame of reference within the scope of this study, this then urges: experience and knowledge of the work situation, on board and/or underwater; freedom of expression within the limitations of a dive operation's required standard of conduct; and the need to be assimilated into a group that has, as one of its common objectives, care and concern for their customers/dive students.

2.5.2.3 Goal-driven behaviour – Maslow, Festinger and Csikszentmihalyi

Recreational diving offers a multiplicity of goals: many of them are achievable in the short-term and give insight into many diverse subjects. Apart from basic diver training, there is a minimum of 30 different specialty areas of diving that offer certification and direction for future learning. Many divers relish the sport for its apparently limitless goals and move quickly and enthusiastically from one target to another. Further to this, there are those in the industry who enthusiastically embrace each day, even though an outsider may see the day's work as so repetitive and routinised as to be uninspiring and monotonous. The challenge that these instructors face is not in the rote aspects of completing forms and counting heads, but in dealing with the ever changing flow of customers. To these workers the benefit of their workplace is the opportunity for interactions with people and this offers the promise of continuous personal challenges, as is evident from many of the interviews conducted in the research for this thesis.

Csikszentmihalyi and Csikszentmihalyi's (1988) explanation of the enjoyment that can be experienced through work and the search for more complex challenges is that the activity itself is seen to be an end in itself. This is partly explained by an earlier researcher, Maslow (1943), who called the type of motivation that requires minimal extrinsic motivation "self-actualisation", which was "a need to discover one's potentialities and limitations through intense activity and experience" (Csikszentmihalyi & Csikszentmihalyi, 1988 p. 5).

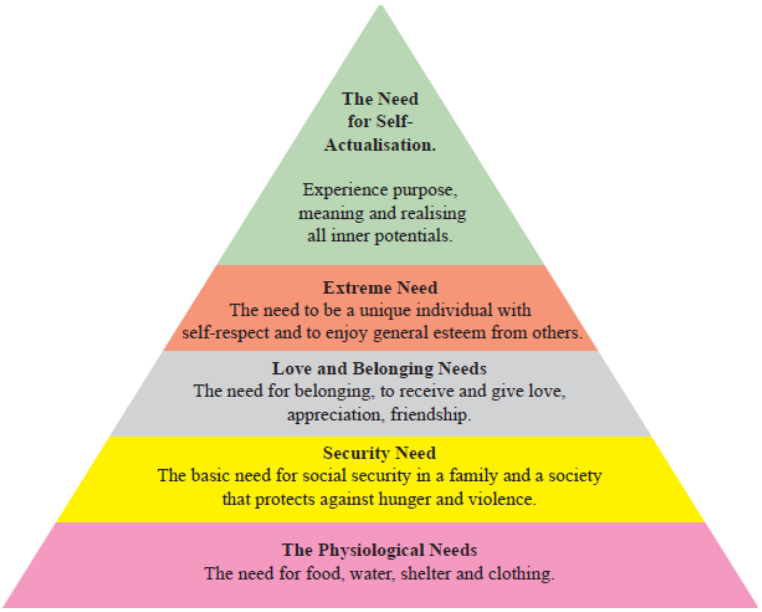

Figure 2-3 **Maslow's (1943) hierarchy of needs**

Note: **Reproduced from http://two.not2.org/psychosynthesis/articles/maslow.htm indicating the vertical transitioning from the physiological needs for food, shelter and clothing through to the ultimate phase of self-actualisation, which is being able to realise one's full potential, often considered to be possible when all other subordinate needs have been met.**

From the early study of the demographics of "typical" divers reported by PADI, and those data that I personally acquired in my 1982 project (Cardwell, 1982), it is clear that many of those engaging in recreational diving at that time, whether as divers or as career instructors, were close to the top of Maslow's pyramid and at the stage of achieving the optimal experience of self-actualisation. This was evidenced at that time by instructors having incomes sufficient to support both physiological and security needs; being a welcomed member of an instructional team; and having self-respect and the esteem of others, particularly with those whom they have, or were currently training.

Achievement of optimal experience, which Csikszentmihalyi and Csikszentmihalyi (1988) termed "flow", requires a balance between the challenges perceived in a given situation and the skills a person brings to that situation. Challenges must also include a clear set of goals to give direction and structure to a task, and the task at hand must have clear and immediate feedback. This helps the person negotiate any change in demands, enabling modification of behaviour to maintain the flow state (Csikszentmihalyi, Abuhamdeh, & Nakamura, 2005). This gives reinforcement of purpose to the recreational diving instructor when either demanding support or giving instruction; clarity of purpose combined with the skills to achieve a task is absolutely necessary for both accomplishment of activities and providing the means for enjoyment in their execution - finding flow.

This condition of flow and a real sense of purpose, the essence of Maslow's (1943) self-actualisation, can, however, be disrupted when goal-driven behaviour is presented with simultaneously conflicting ideas. This situation is what Festinger (1957) described as cognitive dissonance, as presented in Figure 2-4. The

theory of cognitive dissonance proposes that people have a motivational drive to reduce dissonance between opposing issues and in doing so may be led to rationalise the decisions they have made and offer additional reasons or justifications to support their original choices. Research on this subject has led to four major paradigms of which I shall discuss only one: the belief disconfirmation paradigm as it relates to an inability to deal with fact over fiction. This theory directly relates to many issues within the diving industry, and in particular with regard to choice of, and opinion of, particular training agencies and the methods of learning their particular skill sets. This directly influences instructors' achievement of competency, as a tendency to cling to preconceived ideas, even when faced with conflicting evidence, does not aid in learning and developing skills.

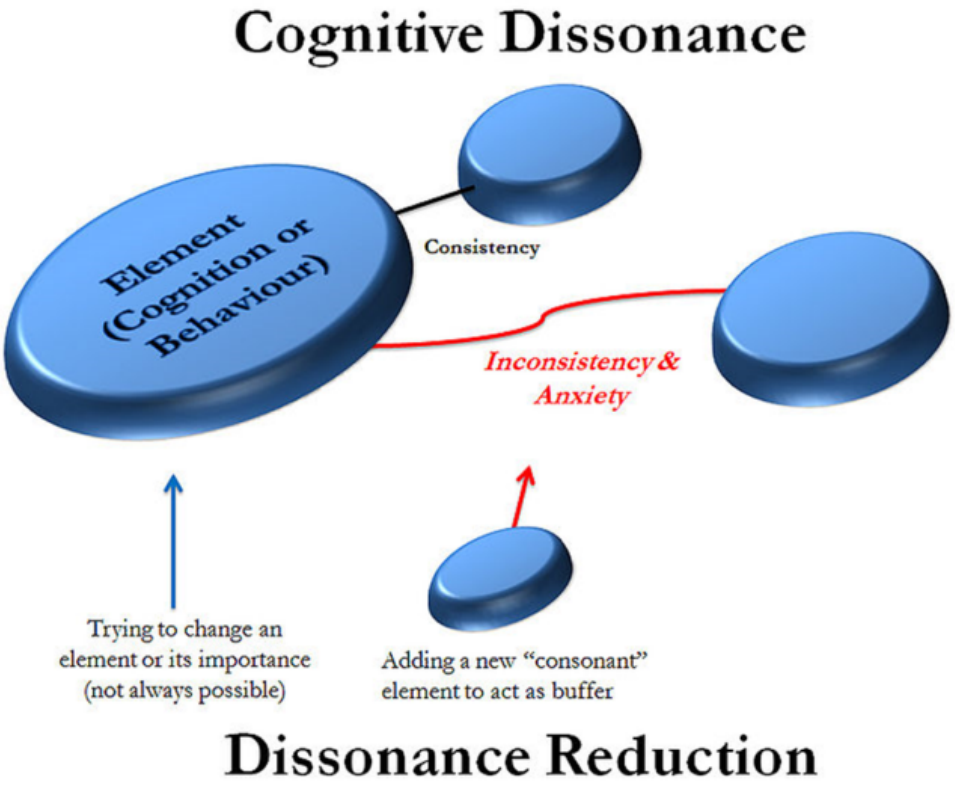

Figure 2-4 **Cognitive dissonance diagram**

Note: **Reproduced from** http://commons.wikimedia.org/wiki/User:Tesseract2**. The illustration indicates a new "consonant" element being introduced to reduce the dissonance caused by the existence of an inconsistent comparator or the introduction of a reason to justify an originally determined solution.**

The belief disconfirmation paradigm suggests that dissonance is aroused when people are confronted with information that is inconsistent with their existing beliefs. If belief cannot be changed, rejection of the disconfirming evidence may result and support sought from others with similar beliefs. A general example of this would be a fundamentalist religious believer discounting the theory of evolution by holding fast to the belief that the earth is only about 6000 to 10000 years old and refuting all scientific evidence to the contrary (Dawkins, 2009). This often goes hand-in-hand with a refusal (or possibly an inability) to read any texts that supported a contradictory view.

Within the diving industry there are many examples of this form of dissonance. One often heard example is the fervent belief of a diver having completed a particular course with a particular instructor/training agency and why it was the best choice available. However, when challenged on sections of their course that appear to have been less than optimally taught, it is almost a certainty that the student will not go to the trouble and expense of attending another similar course with another instructor and/or training agency to compare the difference. After all, they are already certified at that level, so what is to be proven by doing so?

As an example of differences in basic training, for instance, one agency teaches the skill of buoyancy control by moving from a simple surface skill, through an intermediate skill enabling confidence in manipulating breathing and the inflation/deflation of a buoyancy control device whilst working on a fixed substrate (the bottom) and ultimately challenging the learner to hover in mid-water. One competing agency moves directly from the simple surface skill to the skill of hovering. The argument for this abbreviated form of learning buoyancy skills is anecdotal but is essentially that the intermediate step the former training agency uses is unnecessary and time-wasting. After more than 30 years of experience as a full-time trainer, I would strongly disagree and suggest that this intermediate step allows for a more comfortable and essential step in the learning process particularly for slow or disadvantaged learners. Here again a situation exists that may give rise to dissonance. Students who receive certification as scuba divers after completing either course of instruction are highly unlikely to complete a similar course that produces the same certification outcome, so, when they are confronted with facts that may contradict certain actions contained within their particular course, reasons may be invented to justify why their particular method was the better choice. But was it?

As has been established, people do things to achieve goals - ultimately to achieve what Maslow (1968) calls self-actualisation and what Csikszentmihalyi (1988) goes further to term “flow”. This minimises any dissonance that may be aroused by the appearance of conflicting data.

Goals of both individuals and organisations may in certain ways be either common or contrary. In the bid to achieve harmony to facilitate the maximum fulfilment of either mutual or individual goals, a learning process must be followed. Whether this relates to subjects such as learning the skill of buoyancy, constructing an entire instructor development program or how new instructors learn to be an integral and competent part of the diving organisation in which they are employed, an overarching ideal to be aimed for should be to optimise the experience and create what Csikszentmihalyi and Csikszentmihaly (1988) call “flow”.

2.5.2.4 Learning Styles – Kolb, Fry and Gardner

When conducting a diving course, it is quite apparent from my experience, that the students in the class come from a variety of backgrounds and undoubtedly have many ways of learning skills and information. According to Kolb (1984), all learners follow a cycle of learning together with specific learning styles that they use to solve problems. The construction of most dive courses today is such that learners are presented with a variety of methods to optimise their learning ability.

Specifically, on commencement of a class, learners are presented with a text composed of several chapters (PADI Open Water Diver, 2008), each of which ends in a knowledge review that challenges them with questions on the subject matter of

the preceding chapter. This is then followed up by a review of those questions and then a digital versatile disc (DVD) is shown giving full visual representation of the subject matter. After this there is a quiz – again questions challenging them on their knowledge of the relevant subject matter. Following this it is usual to continue with a confined water (pool) session where skills are learned relevant to the chapter of the manual just discussed and reviewed. This process is usually repeated five times until all relevant material has been covered, with students then proceeding to a final summative test and open water diving. All knowledge development and skill sessions move from simple tasks to the more challenging, giving learners plenty of time to reflect on their progress and make improvements where necessary. However, as mentioned earlier with the example of buoyancy training, there are different approaches by different training agencies, indicating that some may be shortening skill sequencing to the detriment of adequate learning.

Kolb (1984) states, "Learning is the process whereby knowledge is created through the transformation of experience" (p. 38). His theory suggests that learning is cyclical and presents a way of structuring and sequencing a learning situation to maximise student learning potential. The cyclical format he proposes involves four stages: sensing/feeling; watching/reflecting; thinking; and doing (Fielding, 1994). An important feature of this theory is that the different stages of the cycle are associated with different learning styles; recognition of the preferred learning styles of both student and teacher is the first stage of raising their awareness of possible alternatives regarding learning and teaching strategies respectively.

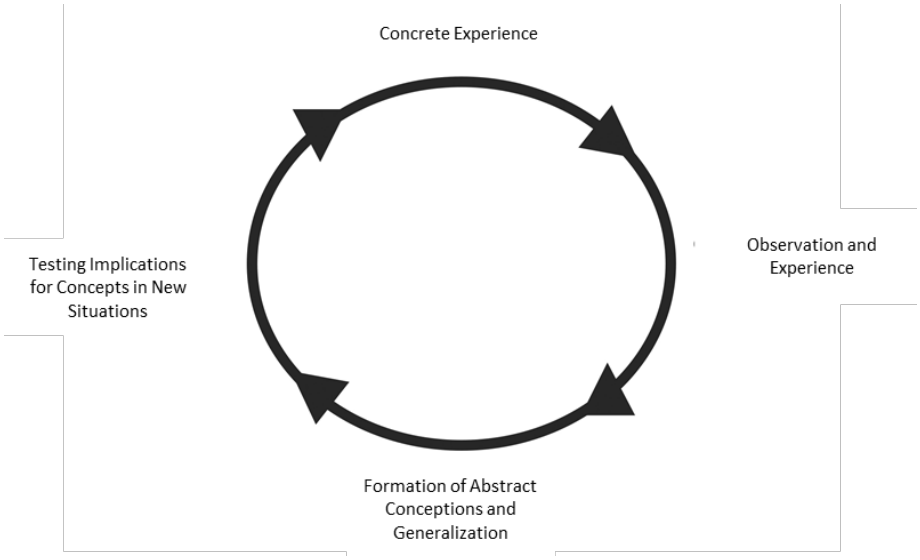

Figure 2-5 Kolb's (1984) learning cycle

Note: Reproduced from Kolb and Kolb (2005) at http://www.whitewater-rescue.com/support/pagepics/lsitechmanual.pdf. After the observation of a phenomenon and reflective thought, concepts formed can be tested in new situations to achieve, or otherwise, validating experiences. The cycle turns full circle and offers a process for constant improvement.

Kolb and Fry (1975) argue that effective learning entails the movement through each of the poles represented in their cycle of learning: concrete experience; reflective observation; abstract conceptualisation; and active experimentation. In an effort to improve the ability of a learner to achieve successful movement through this cycle, and consonant with the necessity to recognise appropriate learning styles, Kolb (1976) developed a learning style inventory. Using this, Kolb and Fry (1975)

identifies four basic learning styles. Each of these four learning styles is associated with a different way of solving problems:

Diverging	Viewing situations from many perspectives and relying heavily upon brainstorming and generation of ideas.
Assimilating	Using inductive reasoning and having the ability to create theoretical models.
Converging	Relying heavily on hypothetical-deductive reasoning.
Accommodating	Carrying out plans and experiments and adapting to immediate circumstances. (p. 37)

Kolb's (1984) learning cycle is a simplistic representation of the four stages required of experiential learning but gives guidelines for considering the different learning styles that may be used in the presentation of subject matter. The particular choice of learning style reflects the individual's abilities, environment and learning history (Nulty & Barrett, 1996). Kolb considers that learners learn better when the subject matter is presented in a style consistent with their preferred learning style (Healey & Jenkins, 2000). With the varied methods and media made available by some training agencies for their diving instructors to use, it is unlikely that any of their students will miss out on a learning method to suit their predisposition.

Also to be noted is how aspects of Kolb's (1984) theory parallel the work of the Harvard psychologist Gardner's (1999) theory of multiple intelligences. Both Gardner's (1999) and Kolb's (1984) theories emphasise the different learning styles of individual students and the necessity for teachers to use a wide range of teaching methods to meet their needs (Healey & Jenkins, 2000). A good example of this is the method as illustrated in Table 2-4 used in the PADI Open water diver course to teach the subject of buoyancy: the learner is guided through a series of steps involving a variety of media, providing the learner with the opportunity to achieve mastery by moving from simple to complex tasks and using a variety of learning methods: reading, writing, watching, doing.

Step #	Task
1.	Read about buoyance in manual or multimedia
2.	Watch DVD and learn about buoyance
3.	Complete quick quiz questions
4.	Complete knowledge review, answering questions on buoyancy
5.	Review answers with instructor
6.	Take quiz, answer questions
7.	Review quiz with instructor
8.	Listen to instructor elaborate on fine-tuning on buoyance in briefing in confined water
9.	Listen to instructor explain and demonstrate buoyance
10.	Practice skills in confined water
11.	Take final exam, answer questions
12.	Review final exam
13.	Practice buoyance on open water dives

Table 2-4 Learning Steps for Buoyancy

Note: Learning Buoyancy. Adapted from PADI IDC Lesson Guides 2006 and clearly illustrating repetition and accommodating different learning styles by the use of different media.

Whether it is the subject of buoyancy or learning to deal with out-of-air emergencies, the protocol followed in a PADI dive course is exactly the same. In this manner, the instructional method optimises the chance that a learner will find a way to master efficiently the knowledge and skills required to dive.

Gardner viewed intelligence as "the capacity to solve problems or to fashion products that are valued in one or more cultural setting" (Gardner & Hatch, 1989, p. 5). He formulated a list of eight intelligences - linguistic, logical-mathematical, musical, bodily-kinesthetic, spatial, interpersonal, intrapersonal, and naturalist intelligences - and argued that a significant challenge facing the deployment of human resources "is how to best take advantage of the uniqueness conferred on us as a species exhibiting several intelligences" (Gardner, 1999, p. 45).

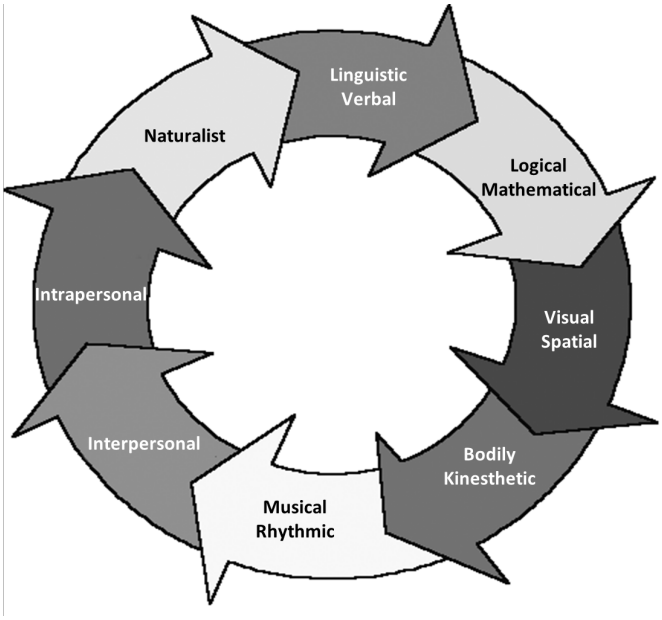

Figure 2-6 **Gardner's multiple intelligences**

Note: **Sourced from http://sos.net/~donclark/hrd/history/mi.html, indicating the eight different intelligences that account for a broader range of human potential than any traditional notion of intelligence such as an I.Q. test.**

In the context of this thesis, this theory gives further substance to the importance of instructors' backgrounds and innate "intelligence/s", directly influencing the manner in which they can be best assisted both to achieve workplace competence and to improve operational efficiency. For instance, regardless of any form of induction program that may be incorporated into a dive operation's modus operandum, any multi-lingual person would be of greater value to the operation if utilised in conversing where possible with customers in their own language. This would not only give that person a greater feeling of worth and motivate him or her towards greater involvement, but also improve the efficiency of the company. Similarly, many larger dive operations entertain their customers on the long return trips from the Great Barrier Reef back to shore, and those with musical talents could be used for this purpose. But how will this happen if managers and supervisors do not know of their instructional staff's abilities?

Gardner's (1999) theory of multiple intelligences further illustrates that there are not only different styles of learning but also many different strengths that individuals, and instructors in this context, may possess that make them both unique and useful within a community of practice.

2.6 Summary

This chapter has reviewed the origins and philosophies of early diver and dive instructor training and some of the theoretical aspects of adventure education. The sport of recreational diving had its origins in the military but was quickly, though crudely, adopted by the civilian population. The demographics of those wishing to learn to dive began to change and the literature from the early 1980s regarding the training of beginner divers indicates that there was a radical shift in emphasis from the traditional strength and stamina requirements in basic training to the more moderate physical demands of a restricted range of skills immediately relevant to the course/s being taken.

The literature regarding the training of diving instructors from this period is relatively limited but nevertheless what is available reflects a similar change in emphasis in the training processes used for beginner divers. This changing demographic created the need for training larger numbers of diving instructors to meet the ever-growing demand of those wanting to learn how to dive. With this high demand has come the problem of streamlining the training of instructors to ensure competence in as short a time as possible and, particularly to the area under study, the continued production of properly trained divers or, at the very least, the facilitation of dive experiences that are both safe and enjoyable.

This streamlined instructor training process does give the short-term impression to many of the instructors thus trained, and the employers hiring them, that they are competent to perform the job for which they have earned certification. But this has become an increasingly challenged issue, demanding more scrutiny of the methods used in current training and the often ensuing comment similar to what is heard from many organisations when receiving new recruits: “Now you’ve finished school, you can start to learn what it’s really all about!” This in turn demands reflection on the processes of learning that occur and how, why and where they occur, thus shining the spotlight onto prior training and the communities of practice of which diving instructors eventually become a part.

Drawing from the research carried out and in response to knowledge gaps identified, carefully selected literature has been reviewed regarding interpersonal communication skills, leadership and, in particular, adventure education of which recreational scuba diver training can easily be seen as a part. Alongside the original aims of early, organised adventure education as seen in Hahn’s (1941) philosophy as appropriated by the Outward Bound organisation (2011), later theorists have identified issues that may influence the manner in which recreational diving instructors approach their work. These have little to do with the motor skills that at this level of diving experience should be second nature, but much more to do with personal development and the implicit need for appropriate coaching and mentoring needed to transform learner instructors into competent professionals.

This lends emphasis to the need for interpersonal communication and leadership skills to be an integrated part of the learning experience required to produce competent recreational diving instructors. Competence and how it is achieved are of prime importance to this thesis and it is within this interconnecting web of issues and their theoretical foundations that I now turn to the conceptual framework according to which this study has been carried out.

Chapter 3 The Conceptual Framework

Concepts enable us to impose some sort of meaning on the world; through them reality is given sense, order and coherence. They are the means by which we are able to come to terms with our experience. (Cohen, Lawrence and Morrison, 2000, p. 14)

Qualitative studies ultimately aim to describe and explain a pattern of relationships, which can only be done with a set of conceptually specified categories. (Mishler, 1990, p. 431)

3.1 Overview

The literature review in Chapter 2 identified some of the issues related to this study - the background and philosophies from which the recreational diving industry evolved and the theories relating to adventure education in general. This chapter describes the conceptual framework within which this study is embedded. It reviews the key elements that specifically influence the training methodologies used and how these elements interact to give the qualification of competence to a recreational diving instructor. It also provides the foundation for the study's contribution to theoretical knowledge, which is elaborated in Chapter 8.

Based on this conceptual framework, the new diving instructor moves into the situated learning environment already armed with a range of capabilities and social capital developed from prior experience. From here, he/she then joins a network of individuals from whom is learned the further skills and knowledge required to emerge as a fully competent recreational diving instructor.

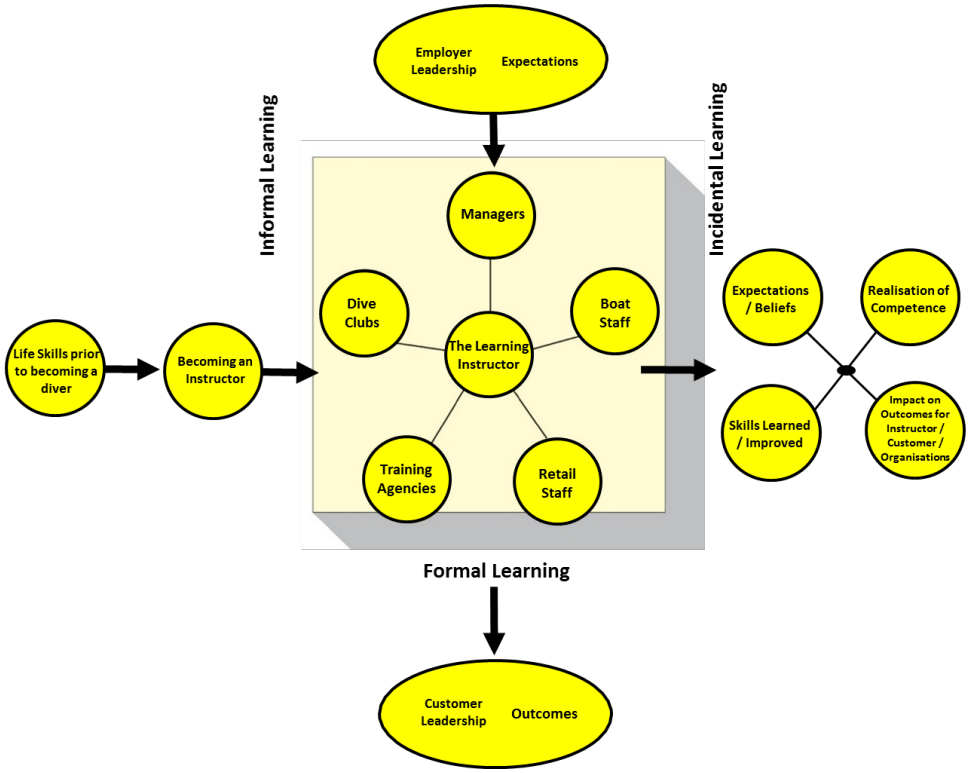

Figure 3-1 **Transition from non-diver to competent diving professional**

Note: The learning instructor's transition from non-diver to competent diving professional takes place within a community of practice through formal, informal and incidental learning processes in conformity with both employer and customer expectations

This transitional process as shown in Figure 3-1 shows the non-diver commencing diver training ultimately to learn the skills required to complete instructor certification. The newly certified instructor now enters the situated learning environment represented as a three-dimensional learning process including formal, informal and incidental learning patterns that may occur either in isolation or linked with one another. During this process there are expectations and outcomes from both employer and customer that also assist in the production of skill mastery and instructional competence.

The key elements reviewed in this chapter are as follows:

- How competence is defined in general but specifically in relation to the new diving instructor;
- What competencies are required;
- Through what communities of practice existing in the situated learning environment the new instructors learn from formal, informal and incidental patterns of learning;
- How social capital impacts on the transitional process; and
- How the new instructor navigates through this maze of learning to become a competent professional.

In combination, these elements constitute the study's conceptual framework and facilitate its contribution to extending current theoretical knowledge.

3.2 Competence

Competence has many definitions - Bowden and Masters (1993); Burgoyne (1993); Johnson, Lenartowicz and Apud (2006); and Sternberg and Kolligian (1990), but may be considered as what a person can do well as a combined result of prior knowledge and experience, present learning processes and the environment in which he/she is situated. In this regard it is important to consider how competencies are developed and defined in the workplace environment; how integration within a community of practitioners may contribute to the acquisition of those competencies; and the effect of social capital brought to and developed within that working environment. The importance of this is implicit but clear: competence offers quality, reduced risk, satisfied customers and improved operational performance.

3.2.1 Workplace competence

Boyatzis (1982) defines competence as "an underlying characteristic of a person, which results in effective and/or superior performance in a job" (p. 21). But there are many variations on this definition, some of which have been outlined by Hoffman (1999), Tovey and Lawler (2008), reflecting on the work of Bowden and Masters (1993), Burgoyne (1993) and Sternberg and Kolligian (1990), who propose meanings that fall in line with their own specialist activities of psychology, management theory, human resources, and politics and education respectively. Although all of these definitions may have some bearing on the competence required

of recreational diving instructors, a more clearly defined description of the skill sets necessary for workplace competence in this context is desired to make it clear as to what is required for its achievement. This subsection looks at the literature available describing experience and skills that are necessary to achieve workplace competence.

The recreational diving industry is an important sector of the tourism industry in many tropical destinations such as Far North Queensland. With the existing systems of instructor training offering relatively easy access to involvement within the diving industry, there is an obvious financial advantage to be gained from having more instructors to train, and being as expeditious in that training as possible. On the other hand, there is the possible future disadvantage of producing instructors who are not yet workplace competent and who may be 'accidents waiting to happen'.

3.2.2 Standards of compliance

Doing a job competently requires compliance to set standards. Gonczi, Hager and Athanasou (1990) put it this way: "Since the performance of a role and its associated tasks can be judged competent or incompetent, competence requires that the performance be of an appropriate standard. Hence we need standards against which competence can be assessed" (pp. 9-10).

The specific competency standards demanded of recreational diving instructors are referenced in the recently revised *Recreational diving, recreational technical diving and snorkeling code of practice 2011*. This code of practice issued by Workplace Health and Safety Queensland gives reference to Australian Standard (AS) *2815: Training and certification of occupational divers*, *The Safety in Recreational Water Activities Regulation (2011)*, Australian and New Zealand Standard (AS/NZS) 2299: *Occupational Diving Operations* and AS 4005: *Training and certification of recreational divers*. The code is designed to "help persons conducting a business or undertaking identify what control measures need to be implemented to ensure the health and safety of persons at or near the workplace" (p. 2) and specifically points to guidelines exemplifying "Proof of competence" for the occupational dive industry (p. 59). Diver training agencies also have standards of compliance. One such diver training agency, PADI in Australia, has been granted a Registered Training Organisation (RTO) status, which enables the delivery of nationally recognised training encompassing these standards. According to this organisation, in order to achieve requisite competencies, as they define them, "PADI programs are performance based, not time based" (PADI Instructor Candidate Workbook, 2001-2004, pp. 2-3). In other words, the achievement of skill competency should not be restricted by time; a fast learner may finish earlier and move on, a slower learner may be given a longer time to achieve successful performance.

3.2.3 Competence through experience

Time, however, is when we gain experience and, according to Harris et al. (1995) "Competency and experience are inextricably linked" (p. 99). In an attempt to define competency, the Australian National Training Board in 1992 maintained that standards should relate to workplace practices, be expressed in outcomes and be understood by trainers, supervisors and prospective employers. The Board also contended that these standards should acknowledge workplace reform requirements and an industry's needs. These needs should include the ability to apply

skills in varying situations, rather than just perform current tasks (Harris et al., 1995, p. 94), and not where, as Garavan and McGuire (2001) suggest, the utilitarian perspective of workplace learning poses the dilemma of producing "a very narrowly defined, short- term type learning activities at the expense of more development-type learning" (p.146).

This means that it is important not only that the training received gives the student a structured set of immediate objectives to achieve, but also that achievement of those objectives will enable performance under changing conditions. A good example is a diving instructor who is capable of dealing with students in a calm, clear, confined water area but who should also be able to deal with those same students when the conditions are not so tranquil or so clear. Current instructor training programs discuss these changing situations but rarely, if ever, give the opportunity to experience them; there are only two days of open water training in an instructor development course. To expedite learning and evaluation of student instructors' abilities within this limited time frame, calm, clear waters with little, if any current are used. Presumption has to be made that these situations have already been experienced, and already learned from, or that the training contained within the program will teach protocols sufficient for a learning instructor to deal with such situations competently. It is this type of situation that prompted Garrick (1998) to comment: "The pre-defined nature of competencies can remove elements of professional judgment" (p. 157). Workplace competence is thus a result of learning processes that involve conformity to a set of pre-defined standards applied in a working environment.

Using competencies as part of the conceptual framework allows the analysis of an individual's abilities to achieve competence according to specifically outlined objectives. Hager and Gonczi (1991) argue that one approach to conceptualising competencies is by "analyzing knowledge, skills and attitudes in the context of the performance of realistic tasks. This integrates attributes and performance into a single framework" (p. 30). Many of the competencies required by diving instructors are outlined in the various standards of compliance and it is reasonable to expect consistency and sensibility in any assessment when made according to the criteria of judgment by those with the authority to examine and certify according to the respective guidelines for compliance. It is also important that there is some benchmark where "Participants in workplace training activities desire -- indeed expect -- to have their experiences validated in the form of competencies" (Garrick, 1998, p. 52).

Yet two of the limitations recognised regarding this are how diving instructors are certified as competent, and if the process of achieving that certification is flawed, how this situation can be resolved. The initial achievement of certification as a diving instructor is decided upon without any scrutiny in that role in the workplace and appears somewhat presumptuous. Eraut (1994) argues that:

> The pathway to competence is characterized mainly by the ability to recognize features of practical situations and to discriminate between them, to carry out routine procedures under pressure and to plan ahead. Competence is the climax of rule-guided learning and discovering how to cope in crowded, pressurized contexts. (p. 125)

This perspective, which I would concur with, indicates the necessity for capabilities for which the majority of newly certified diving instructors are unprepared. That is, there exists an incompatibility with the mantle of competence so bestowed on diving instructors when certified and the inferred authority to deal with situations in which they may have virtually no experience. For instance, how can an instructor deal with a group of beginner divers in an environmental situation where wind and waves replace the calm tranquil conditions they have themselves been tested in? Hence, another limitation can be seen as the necessity to develop competencies at the workplace that compensate for this disparity so as to address this apparent incompatibility.

As it is in the existing situation, the working environment often changes and exposure to variations, with time and experience, will enable good judgment and yield positive outcomes. With regard to the above example, this would then indicate that a knowledge of industry standards limiting maximum student numbers to have in the water at any one time given ideal conditions is necessary; but experience would be the factor defining the reduction in numbers indicated by this specific situation and further indicate the learned responses to the varied behavioural characteristics of the people under supervision.

In synthesising what has become evident during the development of this study, workplace competence in this context could now be defined as "compliance with accepted instructional and organisational standards simultaneously requiring both exemplary diving and human interaction skills." However, it is clear that, once employment is commenced, the only available formula for achieving this level of competence is through practical involvement within the communities of practice located in the immediate workplace.

3.3 Communities of practice

The industry under study is essentially a people business. I have never known it to be any different, nor have I found the achievement of instructional competence to happen in solitude. As Cross (2007) puts it, "We humans exist in networks. We are part of social networks….Learning consists of making and maintaining better connections to our networks" (p. 7). Skills may be developed and sharpened and become second nature, but it all happens through people and within a network of entities from which can evolve a community or communities of practice. Often networking is confused with a community of practice and therefore at this juncture it is essential to define the two situations and make it clear how this affects the process of competency acquisition in the context under discussion.

Networks are described variously from the mathematically derived models regarding random network theory (Barabasi, 2003; Dorogovtsev & Mendes, 2003; Erdös-Rényi, 1959) to those giving more direct reference to social networking models (Boyd & Ellison, 2007; Granovetter, 1973; Hanneman & Riddle, 2005). However described, whether by the manipulation of numbers or written text, there are similarities that have evolved from the former mathematical theory to the latter, socially oriented derivative. These similarities offer in the context of this study a definition of what a social network is: a social structure made up of individuals or organisations (nodes) linked by the relationships established between them.

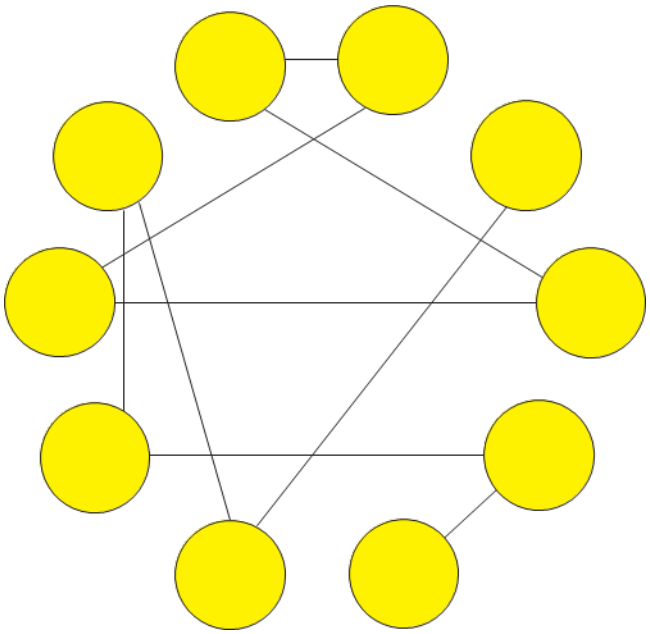

Figure 3-2 **Network of notes and linkages**

Note: **Nodes of activity may be adjacent and have linkages proximate but, though not connecting, follow pathways that offer the possibility of further nodal creation, and hence possibly increased productivity.**

Wenger, McDermott and Snyder (2002) suggest, "All organisations have informal networks of people who communicate, share information, and build relationships and reputations. A community of practice is different from such a network in the sense that it is 'about' something" (p. 43). Even though it is possible for a community of practice to be derived from a network, the network itself may not have common objectives among all of the links connecting its nodes (or actors).

Wenger (2006) defines communities of practice as "groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly" (p. 1), thus accepting that an individual's knowledge is not merely that person's alone. Wenger avers that people need to interact with their colleagues and to benefit from the mental stimulation of that interaction, therefore indicating that knowledge in any field is too complex for any one individual to acquire in isolation. He maintains that this is where communities of practice play a critical role.

Communities of practice provide a set of frequently overlapping environments in which the diving instructor can best learn his/her profession in both formal and informal environments and discover how to apply good judgment in a variety of situations to achieve the best methods of skill performance. This accords with Nickols (2003), who states that "the missions and outcomes of communities of practice encompass stimulating interaction, fostering learning, creating new knowledge and identifying and sharing best practices" (p. 4). Because of this complexity of knowledge items, organisations must recognise the critical role that communities play in fostering, maintaining and transferring knowledge.

In understanding the role of communities of practice, Brown and Gray (1995) contend that work in today's organisations is bounded by three principles. The first is that people do the work, not the processes. They state that, if you examine the inner workings of any company, you will discover gaps between the "ideal" flow of tasks and procedures and the "real world" practices. The second is that work and learning are dependent upon each other. They maintain that the more you explore real work the more you appreciate tacit knowledge – in other words, intuition, judgment and common sense. Their final principle is that organisations are "webs of participation" and that if you change the participation pattern you change the organisation. Only those workers who participate can make a strong company. This would support the argument that low employee turnover is of prime importance in maintaining a company's future viability; minimal change is possible if the workers are in attendance long enough to be able to contribute. Figure 3-3 represents the network of relationships at the workplace in which these "webs of participation" or communities of practice are embedded, including the entity that is the ultimate reason for its existence: the customer.

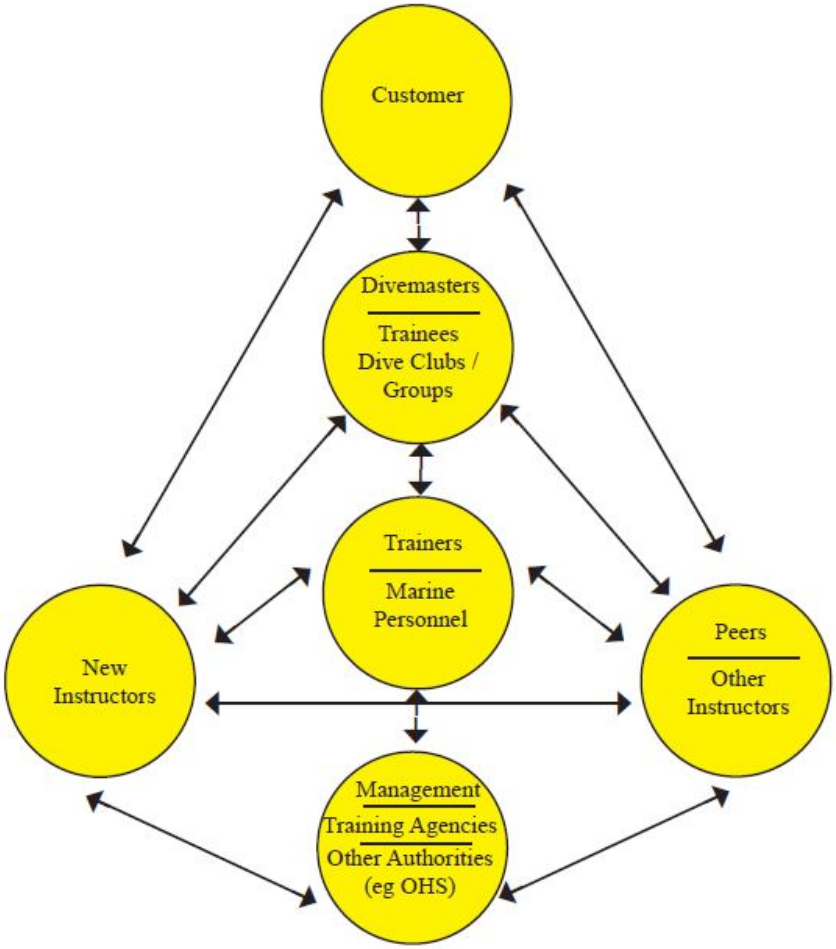

Figure 3-3 Diving communication network

Note: This network illustrates the interactions taking place between management and other authority figures and the trainers or senior instructors. They in turn receive feedback

and give direction to new instructors and "old hands" who communicate with divemasters, divemaster trainees and customers.

This network of relationships not only provides individuals (especially new workers) with a bridge between established standards and real world practices but also presents a means of promoting organisational excellence through clear lines of communication. The teaching of recreational diving is a very people-oriented enterprise where practitioners may encounter rapidly changing environments by way of both clientele and weather on a daily basis. The transition from the classroom to the workplace thus requires the support of a strong community of practice within this network that can provide a positive and ongoing learning experience within the work situation through clear-cut lines of communication.

While Figure 3-3 represents the entire network of relationships within an organisation, Figure 3-4 represents the community of practice in which the learning instructor becomes involved: local representatives who may advise on training queries represent the training agencies: retail staff advise on product lines that require selling; boat staff give assistance with protocols for working at sea with students in training; and operations managers direct the flow of work both on land and at sea. Finally, instructors, divemasters and divemaster trainees who form dive groups meet at the end of each day; this is where they can unwind and review the ups and downs of their day, providing a good source of informal and incidental learning.

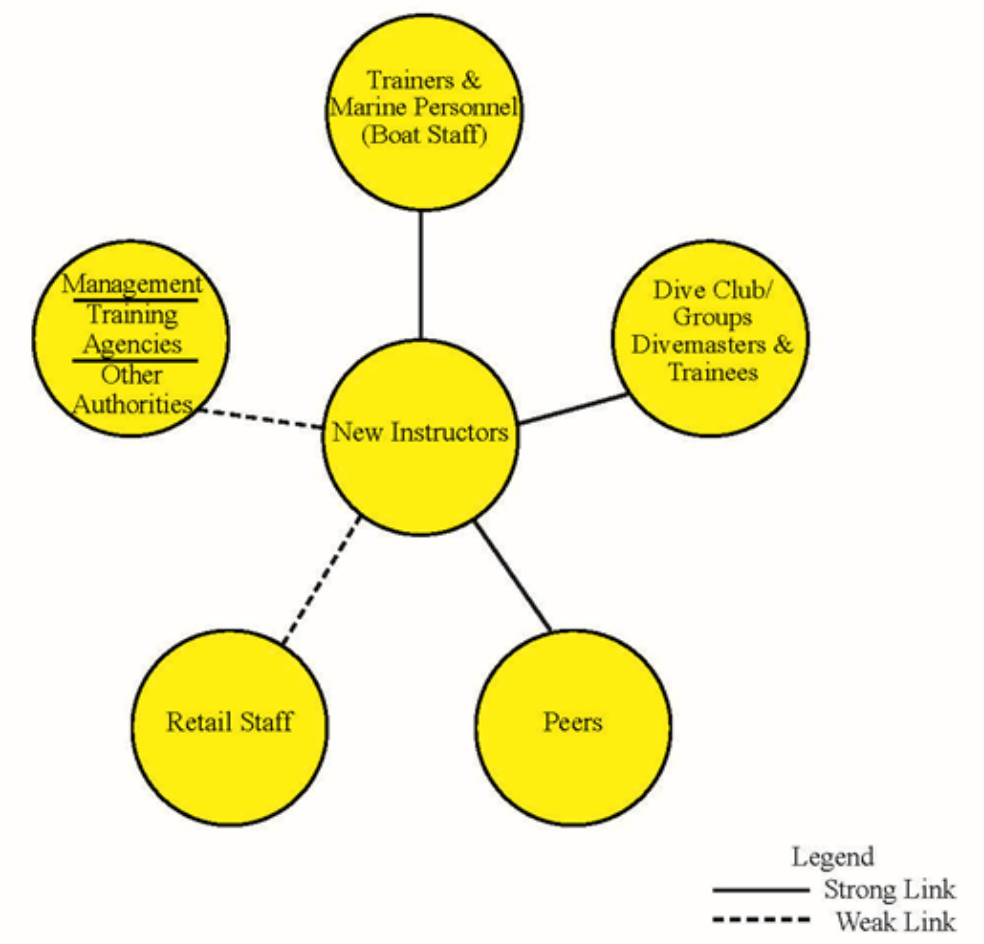

Figure 3-4 **Community of practice – diver related training services**

Note: Areas from which is drawn a community of practice. This illustrates the more centralised grouping of those directly engaged in providing diver training related services at sea.

However, on the dark side of these arrangements, Wenger, Dermott and Snyder (2002) point out that organisational conflict through irrational politics, short-term focus on tangible outcomes and anti-learning cultures can inhibit the growth and productivity of any community of practice. "Communities alone cannot develop countermeasures to most organisational disorders. They need engagement from senior managers and others outside the community to manage political issues, set priorities and fine-tune organisational systems" (pp. 155-156). This is further reinforced by Kirkwood and Pangarkar's (2003) view that no amount of training can solve problems of poor supervision and organisational planning (pp. 10-12).

Communities of practice occupy a significant part of the conceptual framework for this study as that framework locates the learning of competencies "not in the acquisition of structure, but in the increased access of learners to participating roles in expert performances" (Lave & Wenger, 1991, p. 17). The framework acknowledges that this learning is a situated activity and as such "has as its central defining characteristic a process that we call *legitimate peripheral participation*" (p. 29: *emphasis in original*), where new instructors can interact with the old hands and enter "the process of becoming a full participant in a sociocultural practice. This process includes, indeed it subsumes, the learning of knowledgeable skills" (p. 29). This is, of course, the ideal to be strived for: entry into a community of practice, tentatively at first with sufficient time spent listening and learning from old timers eventually to become a competent and capable full member of the community. Observation of what communities exist and are developing gives a lens through which to see the linkages involved with the learning process and the common goals driving them.

However, a limitation on this process may occur when the community of practice loses focus through disorder, such as stratification where "an active core group is a key success factor, but too much distance between the core group, experts, and other participants creates distinct classes of members that prevent the community from developing a common identity" (Wenger, Dermott, & Snyder, 2002, p. 146). This is typical of clique formation where some individuals set themselves above others, possibly by pride and arrogance, and are reluctant to admit new entrants unless indicating similar attributes, not necessarily constructive in nature – such as bullying behaviour or a common prejudice perhaps towards women or those of a religious disposition. Other limitations are also the aforementioned concerns of poor supervision and organisational planning (Kirkwood & Pangarkar, 2003, pp. 10-12). Even though communities of practice are ideally positioned as functional, directed sub-sets of a social network working towards common goals, these goals can be thwarted when not all actors are working together and frustrate the development of the competencies desired within the learning environment in which they are situated.

This brings us to another lens through which to view this conceptual framework: how through a community of practice competences are achieved through situated learning processes.

3.4 Situated Learning

Situated learning theory suggests a learning process reliant on the interaction of authentic activity, context and culture (Brown, Collins, & Duguid, 1989; Serrano & Tormey, 2010). In support of this, Fuller and Unwin (2008) and Herrington and Oliver (1995), consider the notion of the apprentice observing the community of practice as a critical aspect of the situated learning model. This implies direct involvement with a community or communities of practitioners and from this it is assumed that sufficient knowledge is gained to make decisions wisely. Unfortunately, this is often not the case in the short period of time that is available during final instructor training which occurs in prescribed settings using contrived scenarios, prior to employment and entrance into the situated learning environment.

In this context, it is the movement from theory to practice that became part of this study. Billett and Somerville (2004) cite a further problem that can occur later where "individuals bring about transformations in the workplace through remaking practice" (p. 310) but Zukas (2006) questions the validity of this by commenting, "If skill (and therefore practice) is prescribed through reified competencies, how is it possible for individuals to transform the workplace in relation to complex change, of which so much is written?" (p. 74). One prescription for general diving instruction is to perform the deepest dive first on a day where performing more than one dive is anticipated. Many recreational diver texts recommend this as one way to reduce the chance of succumbing to decompression sickness. Divers performing otherwise, an activity that is termed a 'reverse profile', are often chastised and prohibited from further dives. However, this practice of 'deepest dive first' has been researched (Lang & Lehner, 2000; Edmonds, McInnes & Bennett, 2005) and found to be based on little more than inherited, unsubstantiated dogma (Mitchell, 2004).

This difference between reified practice and reality thus creates the interesting scenario where not only the epistemological underpinnings of the existing formal training situation may be inadequate for situations in which the student is being trained, but also skills may or may not be capable of transformation into practice within the workplace situation. Wenger (2005) offers severe criticism of the formal training processes presently used and "suggests scrapping our industrial model of training and the notions that go with it. Let learning become an integral part of life itself. Teaching will fade in importance; progress along a trajectory of development will replace skills training" (p. 153). Wenger's implication appears to be that situated learning will eventually be the only method of training. By contrast, and counter to Wenger's implication, there is the entrenchment of national training frameworks, such as described by Australia's National Training Information Service (NTIS) advocating and implementing competency based training measured substantially by the achievement of formally acquired units of competency. This has the appearance of a false dilemma and both of these extreme views, as considered in isolation to each other, are somewhat idealistic and unrealistic. Wenger is perhaps concerned with the education of the individual whereas the NTIS is more concerned about coursework having the ability to prove compliance in case of litigation.

Rather than scrap industrial training models as expounded by Wenger (2005), Capra (2002) contends that both traditional, formal structures of training and emerging ones are needed, embodying power relationships and creativity even though there is often tension between them (p. 121). Cynical dismissal of prior learning in formal settings, as often heard by new entrants into a working environment, does not offer any good argument as to what is to be learned, or how it is to be learned *in situ* through more informal methods. What follows is a brief review of the formal learning undertaken as a prelude to a discussion of situated and informal learning processes.

3.4.1 Formal learning

Rowden (2007) defines formal learning as "discrete planned events (experiences) used to instruct people how to perform specific defined jobs. It is typically institutionally sponsored and highly structured" (p. 7). In Australia, this is well reflected in the requirements of the myriad units of competency comprising the various training packages listed by the NTIS. Many diving courses are now being aligned with these units of competency but, whilst containing basic and defining elements of knowledge essential for certain subjects, these packages still fall short of explaining how the learning takes place. For instance, the unit of competency SROSCB001A: SCUBA dive in open water to a maximum depth of 18 metres gives the basic description of the course teaching a non-diver his or her basic or initial diving skills. This contains several out-of-air emergency skills to learn. However, the training does not require any assessment of the new diver's ability to respond to spontaneously created situations where they may have to think to control this type of life-threatening situation.

Present diving instructor development processes are similarly composed of a set of short-term learning activities grouped to teach the trainee instructor how to teach in the classroom, swimming pool and open water environments. This is followed by a cluster of knowledge development sessions explaining the standards, procedures of conduct and marketing of various programs available for the instructor trainee to teach. After a similarly constructed two-day summative assessment phase, the successful trainee instructor is deemed capable of entering the workforce as a productive unit. There is little, if any, requirement for spontaneous or challenging problem-solving skills in either individual or group settings in relevant and realistic environments.

Criticism of this type of formal competency-based training is provided by Cooper (1992), who observes that "in the assessment process no question could be asked of a participant for which the answer was not provided in the modules; and that no materials were presented as problems to be engaged with, or situations to be investigated" (p. 20). This agrees with Bone, Harris and Simons' (2000) findings indicating that trainer competency standards do not match the actions involved in formal training (p. 7). Hager and Halliday (2009) approach this issue from a different direction in their critique of formal learning with the statement that:

> This is the basis of our rejection of restrictive vocationalism with its key assumption that all learning is specifiable in advance. This assumption underpins marketisation of vocational learning as products,

> and promotes credentialism with efficiency being the overriding aim….In reducing learning to a suite of pre-packaged products to be marketed, we badly misrepresent the nature of learning and its role in human living. (p. 236)

This criticism reflects on another dimension of formal training, implying that there is more concern with the sale of training products and the subsequent production of "certified and qualified" students with the appearance of possessing certain abilities.

With formal learning there also appears to be little reference to any developmental learning such as reflective activity (Rodman, 2010; Schön, 1983) to "bridge the gap between academic theory and professional practice by integrating the two into a cycle of learning" (Johnston, 1995, p. 76). The gap between traditional schooling and professional practice requires consideration of complex problems and new professional images to deal with them (Posner, 2005; Rodman, 2010; Schön, 1983).

Learning may be planned and prepared for but it is a common event to see complexities arise and variation between the formal training in the classroom and the way in which that knowledge is applied on the job. Formalisation can offer a set program to follow but according to Cross (2007) it is "Informal learning [that] is the unofficial, unscheduled, impromptu way people learn to do their jobs" (p. 15).

3.4.2 Informal learning

It is an emerging realisation that informal learning has more validity in the workplace than the quantum of information learned in less contextualised settings (Cross, 2007; Davies, 2008; Rowden, 2007). Cross (2007) comments "Workers learn more in the coffee room than the classroom" (p. 235) and the value of this may well be indicated by the dive instructors' daily reflections when informally discussing their problems on site during breaks in the day or in the pub at the end of it.

If informal learning is then seen to be of such significance to the development of appropriate training in the workplace environment, it requires more research to answer the question as to how the training of recreational diving instructors could, or should, be modified to enable workplace competence. As well as technical competencies such as diving skill performance, other attributes ascribed to competent trainers are well developed human interaction skills such as those of questioning, listening and providing considered feedback. Lave and Wenger maintain that human interaction skills are an important part in the development phase of technical competencies (1991, p. 93). They suggest that apprentices learn much from their peers, noting the effectiveness of the circulation of information. This further suggests that engaging in practice (rather than being its object) may be a condition for the effectiveness of learners.

This is supported by Cross (2007), who writes that there is another factor at work which makes learning informally often more memorable than formal education methods (p. 79). He states that repetition spread over intervals is more likely to be retained in long-term memory than repetition taking place within a relatively shorter time frame. In other words, regular and constant exposure to certain methods and practices is better than reading and memorising detail about a process and perhaps considering it only once or twice. In the former instance, the learning can become an

embedded capability learned through practice; in the latter instance, possibly not, which furthermore may breed the belief that because a subject has been shown once sufficient learning has taken place and does not need revisiting until such time as it may be needed. This could produce a very dangerous situation if the learner who had a brief and cursory practice at life saving techniques in the classroom was called on to attempt resuscitation in a real life situation.

Informal learning in the workplace situation in the company of communities of practitioners is thus asserted to be of greater importance to job performance than formal training in classroom settings. This is a likely reflection of the manner in which much recreational dive instructor training occurs in practice. However, this does not in itself entirely negate the value of formal learning processes. The question remains now as to the boundaries of the formal and informal learning processes that take place in this context and whether these can be modified, if at all, to enable and maximise more effective and efficient workplace competence.

Informal learning could very well be responsible for the bulk of the learning that takes place in the workplace but this form of learning interconnects with incidental learning or the more spontaneous events of learning that this study identifies as too important to ignore.

3.4.3 Incidental learning

Incidental learning is defined variously as "a byproduct of some other activity, such as task accomplishment, interpersonal interaction…" (Marsick & Watkins, 1990, p.121); "a spontaneous action or transaction, the intention of which is task accomplishment, but which serendipitously increases particular knowledge, skills, or understanding" (Ross-Gordon & Dowling, 1995, p. 315); "unintentional or unplanned learning that results from other activities" (Kerka, 2000, p. 1); and occurring as "an unintended by-product of some activity such as trial-and-error experimentation or interpersonal interaction" (Rowden, 2007, p. 7).

From these four particular definitions it would be fair to say that incidental learning is a spontaneous, unplanned byproduct of another activity. This is diametrically opposed to formally planned processes. Whichever view is taken, this form of learning is not planned. It just happens and, because of its unplanned nature, it defies the idea of control and subordination to deliberate generation and subsequent rules and guidelines.

In preparation for the realisation of such learning, Lankard (1996) states that "awareness of opportunities and the value of such learning may be brought to the learners' attention by emphasizing the outcomes they might anticipate through incidental learning" (p. 2) and from Mealman (1993); Kouzes and Posner (2011); and Choi and Jacobs (2011), these opportunities can include increased competence, increased self-knowledge, valuing of lifelong learning, improved life skills and development of self-confidence. These opportunities are certainly of great value to an individual but may also be of similar benefit to an organisation, community or industry.

An early example from my experience of the significance of incidental learning in the recreational diving industry was a by-product of reflecting on what was inspirational and what was not. After only a short period of using the traditional method of diver training during the latter part of 1979, I was concerned about two issues: why some student diver trainees were cancelling courses; and what excited

other students enough to continue. On reflection, these issues were interlinked. In the first instance, students were being put off by the relatively difficult prerequisite exercises of swimming and snorkelling before they were allowed to use SCUBA. In the second instance, once getting that far, nothing appeared more exciting than the realisation that one could actually breathe underwater. This provoked a change in marketing and training. Free introductory courses were offered as an enticement to try diving and, when potential customers signed on to the courses, the first element of training in the course was breathing on SCUBA instead of the more rigorous activities traditionally required. This quadrupled the annual number of student divers trained within the first year.

Today, this introductory course is a stand-alone program that enjoys a significant part of what the recreational diving industry offers by way of diving experiences. On personal review of an unpublished document entitled "*2008 Diver Certification Statistics for QLD*" (J. Hutchinson, personal communication, September 10, 2009) as produced by one major diver-training agency, the indication is that this form of diving experience represents 78% of all registered diving experiences resulting in some form of certification. In the incidental learning example detailed above, a solution to a problem now reflects a significant proportion of present day diving activities.

Although the instructor begins with formal training, this is soon replaced substantially by informal and incidental learning processes situated within his/her working environment. Figure 3-5 represents a situated learning environment where formal, informal and incidental learning processes are not seen as separate but are integrated into a three-dimensional situation indicating the possibility of simultaneous processes of learning occurring.

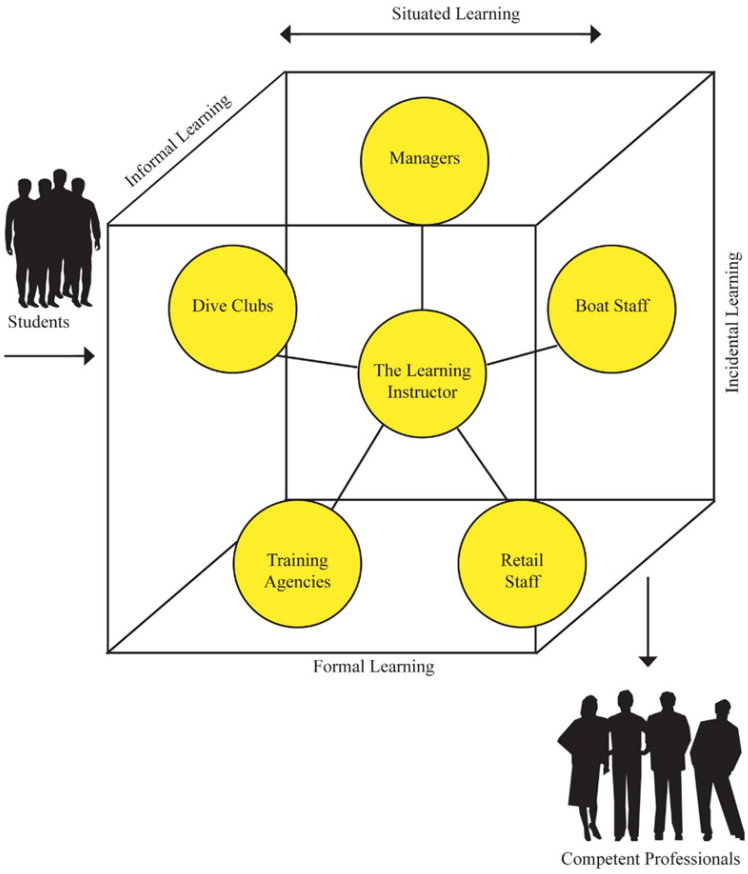

Figure 3-5 Situated learning environment – a learning 'cube'

Note: This learning 'cube' illustrates how the new instructor entering a community of practice is to commence working in an environment that offers formal, informal and incidental learning. Representing this situation as a cube also attempts to convey the idea that these methods of learning can be learned either individually or in conjunction with one another, offering a multiplicity of possibilities.

In Figure 3-5 we can see the new instructor now surrounded by a variety of groups comprising a community of practice all focusing on the common goal of producing a satisfied customer. In so doing, and as a simple example of the interplay of these learning processes, the instructor undergoes minimal formal learning such as the company's method for meeting and greeting customers, informal learning through observing peer demonstrations and incidental learning by spontaneously connecting issues not evidenced by either formal or informal methods. An example of this may be finding out what type of face mask may be best used with customers with certain facial abnormalities.

Situated learning may therefore be viewed as multi-dimensional. Critically for this conceptual framework, it allows the reviewer to distinguish among the different processes of learning: formal, informal and incidental, where and when each is most likely to occur and what distinguishes them from one another (Cross, 2007; Davies, 2008; Marsick & Watkins, 1990; Rowden, 2007). It allows for the recognition of certain formal processes undertaken to conform to established standards and codes of practice as evidenced in the units of competence prescribed by the NTIS; informal processes such as learning human interaction skills (Lave & Wenger, 1991); and the value of incidental learning (Mealman, 1993; Mattox, 2012).

It will also lay bare the limitations of these learning processes such as Hager and Halliday's (2009) criticism of formal processes for learning which they aver encourage restrictive vocationalism: their pandering to credentialism and not what is of value to human living, clearly demonstrated by the certification versus qualification, hence competence, divide. In this framework, learning through informal processes, which will appear as the most substantial of all learning processes, also can be seen to have weaknesses when practice of real-life activities such as diver rescue are poorly or infrequently practiced (Cross, 2007).

Even so, as will be seen in the data collected in this study, the enjoyment that can be experienced by the customer may also be reflected in the continuing pleasure and breadth of human interaction skills developed by instructors on providing training to their customers. This regular and varied interaction with customers begins also to define the value of social capital brought to, and often developed in, the workplace situation by both the instructor and the company to which he or she belongs.

3.5 Social capital

The definition and importance of social capital has come under increased study and debate, particularly during the past decade. Narayan (1999) states that "social capital is defined as the norms and social relations embedded in the social structures of society that enable people to co-ordinate action and to achieve desired goals" (p. 6). Lin (2001) expands on this, suggesting that "The premise behind the notion of social capital is rather simple: investment in social relations with expected returns in the marketplace" and hence is "capital captured through social relations"

becoming a "social asset by virtue of actors' connections and access to resources in the network or group of which they are members" (p. 19). This would in many respects explain not only what may be possible in terms of negotiating exchanges within a community of practice but also what, in the context of this thesis, new instructors and other trainees may already be able to contribute from the resources acquired from their previous life experiences towards the achievement of competence in their future work.

There are differences, however, in the way other theorists regard social capital and how it is seen to explain the ability of communities to solve the problems of collective action. Coleman (1990) identifies several forms of social capital, designating social capital as the conduit for gaining advantage through social structures: Bourdieu (1999) considers that the value of connections attributed to an individual can be converted to economic capital or resources resulting from social structure; Putnam (2000) shows concern regarding the linkages formed between individuals in reference to the wider community; and Burt (2000) uses the terms "brokerage" and "structural holes" to assist in understanding why an individual is able to have his or her ideas adopted and others may not. According to Burt (2000), "social capital is a metaphor for the advantages that individuals or groups have because of their location in social structure" (p. 84); Ferragina (2012) expands on this suggesting that social capital is a multidimensional concept distinguished by three separate dimensions: formal social networks, informal social networks and social trust (p. 19).

The advantages attained by both the instructors and the organisations to which they belong are reflected in the resources, networks and exchanges evident in the ongoing progress of the new instructors' involvement within the community of practice in which they are embedded. On the negative side of this, however, the data gained through this study indicate that the lack of social capital makes further training within the situated learning environment considerably frustrating for some. For instance, when asked how and when he learned what he thought was necessary to feel competent, Aaron, one of the instructors interviewed, stated "Probably a good eight months. You felt out of place and, because I was young, dealing with the owner and adults it took a while for them to take me seriously." Younger aged instructors are often employed for a variety of reasons: they are usually fitter and often exuding greater enthusiasm than "old hands". However, they lack a depth of experience that may not only make learning new skills harder but also mean that less trust is placed in their abilities by those to and for whom they have now become responsible.

3.5.1 Resources

Lin (2001) further clarifies "that there are two types of resources an individual can gain access to and use: personal and social resources" (p. 21), with personal resources being acquired by inheritance, acquisition and exchange, whilst social resources are essentially accessible through social connections. In the context of this study, personal resources could quite well be exemplified respectively by the inherent characteristics of personality and organisational traditions to uphold, such as using a particular training technique, gaining further qualifications such as a coxswain's license to make oneself more useful on board a diving vessel and acquiring diving equipment from employers or agents in exchange for greater representation of a particular product. On the other hand, social resources could be seen as the bonds and bridges developed within the various communities of which

the instructors are part and the linking to others such as alternative training agencies or organisations such as Training And Further Education (TAFE) Colleges that offer Diplomas in Outdoor Education or other related educational programs. In identifying these resources and their relative value, consideration can then be given to the nature and complexities of the social networks in which they are embedded (Lin, Burt, & Cook, 2001, p. 236).

3.5.2 Social networks

Grafton (2005) suggests that "Social networks can be divided into three categories: bonding, bridging and linking social capital. Bonding social capital involves linkages or 'strong ties' within groups of like-minded individuals" (p. 756), such as the camaraderie shared by dive instructors and trainees coordinating the usually fast- paced activities of a typical diving day. In contrast with this "Bridging social capital is concerned with linkages across similar, but different groups or social networks" that "may possibly [allow] for crucial roles in technological improvements" (p. 756).

An early example observed in this study is access through the Divers Alert Network (DAN) to online training available through Duke University in the United States for first aid theory, thus reducing traditionally required face-to-face contact with potential customers. Linking social capital may refer to engagement with disparate groups such as state and federal government agencies like the Department of Workplace Health and Safety that consults with the recreational diving industry in establishing basic

3.5.2.1 Codes of practice

From this it can be seen that there is a variety of possible social exchanges available through these networking alternatives that may offer either improved profitability from social capital positively employed or a loss from its neglect or mismanagement.

3.5.3 Social exchanges

Putnam (1993) states that "For a variety of reasons, life is easier in a community blessed with a substantial stock of social capital" and that "Such networks facilitate coordination and communication, amplify reputations, and thus allow dilemmas of collective action to be resolved" (p. 66). This would be the obvious ambition for any organisation because it would reflect a professionally managed business capable of providing a safe and enjoyable product for which the diving visitor would have little hesitation in offering a positive reference, making a return visit or both.

However, along with the positive attributes of social capital employed optimally as formerly suggested, Narayan (1999) observes that "sometimes the negative impacts of social capital are manifested in powerful, tightly knit social groups that are not accountable to citizens at large" (p. 8). Portes (1998) comments that these impacts can include the "exclusion of outsiders, excess claims on group members, restrictions on individual freedoms, and downward leveling norms" (p. 15). Nicholson and Hoye (2008) go one step further to state that, "Whereas bridging social capital is regarded as having a positive influence in society, organizations or communities that experience high levels of bonding social capital

can have a negative impact on wider society, such as extremist religious groups or neo-Nazi gangs" (p. 7). Although not reflecting the possibly insidious nature of a group with a more politically motivated agenda, a negative situation can nevertheless evolve in more apparently benign settings such as on a dive vessel at the Great Barrier Reef. A group of recreational diving instructors given autonomy in their roles and conduct on a diving vessel can quite easily fit this negative image. This scenario would be a possible explanation of certain observations noted in this study of an entirely male group of instructors working together as a gang which, though pleasant to the customers in their care, acted in an intimidating manner towards subordinate divemaster trainees. Though speculative, this may also have connections with the high turnover of instructional staff in one of the dive operations under study.

In this conceived framework it can be recognised from earlier associations with former social structures and existing social networks that the new instructor enters a community of practice with already acquired skills and knowledge that can be seen as values possessed that can be converted to economic capital (Bourdieu, 1999; Ferragina, 2012). An example of this could be catering abilities of a new instructor previously employed in the hospitality industry. This could be of particular value on board any vessel operated by a dive operation that requires back-up personnel to meet this type of need. A new instructor with this background can certainly add to the economic value of the company not only in offering insurance in fulfillment of the primary need for a catering resource but also as someone who can also be used to learn from should this event arise.

The social networking of individuals who are external to the situated learning environment also contributes to the growth of social capital and the achievement of competencies. These are exemplified by those instructors who are aligned with other dive operations through both direct or indirect association and influencing behaviour within their primary community of practice. The role of the linkages represented by these networks is described by Grafton (2005) and reflected in the data obtained from this study.

However, as suggested by Narayan (1999) and Nicholson and Hoye (2008), negative outcomes can be attributed to organisations that have more intolerant agendas towards certain sectors of the community such as the Indigenous population. Another serious limitation is the lack of acceptance and sensibility of those who should be able to recognise and utilise the value of social capital. An example from my recent experience with one particular dive operation was of an unpaid trainee divemaster holding a Master's degree in information technology with a specialisation in "point-of-sale" software. This particular young woman was performing the simple task of stocking shelves with diving masks when a discussion began between the two owners regarding this very subject at an antiquated cash register no further than two metres away from her. Witness to this situation and in knowledge of this young woman's background, I pointed out the relative value of what she was doing and as to what resources she had and was capable of offering. The response was negative with vulgar reference to women, youth and impracticalities on the apparent presumption that she would not understand what they needed. They did not ask for advice.

The above example fortunately belies the cooperative attitude now seen more prevalently towards many of the new instructors employed and the social capital they represent with steps being taken to integrate this into the community of practices into

which they become embedded. Consideration and critique of social exchanges within organisations is therefore necessary to describe their contribution towards achievement of competence.

3.6 Integrating social capital with communities of practice

Lesser and Prusak (1999), stating that the presence of social capital has a positive impact on knowledge creation, sharing and use, illustrate how communities play a critical role in fostering the development of social capital by explicating the structural, relational and cognitive dimensions of communities of practice and how these reflect on the production of social capital (p. 7). The structural dimension provides the opportunity for individuals to develop a network of others with similar interests within and without the community: the relational dimension fosters the interpersonal interactions necessary to build a sense of trust and obligations; and the cognitive dimension shapes the terminology used by group members and the generation and sharing of knowledge and artifacts (p. 8). In most instances, this was identified by the informal team building processes evidenced on board the diving boats when rotating work duties to ensure flexibility in instructor and trainee capabilities, learning from shadowing others' work and the use of checklists and rosters to ensure consistency and safety.

The cohesion observed by the various communities of practice surveyed during this study highlighted their value in the development of social capital but did render a mixed result, questioning the direction given during the development process. In other words, most observations indicated growth in potential and realised the positive definition for growth of social capital, but in one instance the 'dark side' of social capital as well explicated by Muller-Heidelberg's (2003) discourse about social exclusion was unfortunately evident.

3.7 The transitional process

This study essentially concerns how newcomers to, or student/learning instructors in, the dive industry become competent professionals through situated learning processes within communities of practice. Lave and Wenger (1991), in discussing the concept of situated learning, aver that "learning is [an] integral and inseparable aspect of social practice" and thus lies in the context of social relationships or communities of practice (p. 31). As an analogy, the theoretical aspects previously discussed may be considered analogous to the one-dimensional views of a house we would like to build: the floor plan and elevated views of sides and roof. The conceptual framework, the subject of this chapter, may be seen as the three-dimensional drawing of that house, enabling us to picture how these individual theories fit together and, in doing so, further portraying the relationships of and between each link in the situation under study: the student/learning instructor who can be seen to possess already a degree of social capital; situated learning that includes the formal, informal and incidental processes working within a community or communities of practitioners; and finally, what is ultimately desired, a competent professional who is capable in and qualified for a job in which he/she has previously been certified. In this manner, the reader will gain a broad overview of the situation under study and how it has been conceptualised.

This study is thus essentially concerned with how student/learning instructors, as newcomers to the dive industry, and drawing from the social capital they already possess, become competent professionals moving through situated learning processes within communities of practice (the situated learning environment). It is from the perspective of these three elements that this study is conceptualised; the student/learning instructor, the situated learning environment and what we wish to achieve as a final product: a competent recreational diving professional.

3.7.1 Key elements

Continuing with the same metaphorical device of house design where the elements discussed earlier are considered as the one-dimensional views and with the entire framework of the study being viewed in three dimensions to depict the whole construction, and in further reference to Figure 3-5, we can now see the student/learning instructor, already possessing certain social capital, entering a construction but eventually to depart from it transformed into a competent professional. We thus have three key elements within this section of our conceptualisation that would appear to be similar in many ways to a conventional manufacturing program; raw materials (the student/learning instructors) entering a process (situated learning environment) to become finished products (competent professionals). Each of these elements is given greater definition in the pages that follow.

3.7.2 Learning instructors about to enter the workplace

The learning instructor enters the learning process with certain already developed capabilities that are an advantage in subsequent learning activities. This conforms to Dewey's (1938) early assertion of continuity where what is learned "in the way of knowledge and skill in one situation becomes an instrument of understanding and dealing effectively with the situations which follow" (p. 44). This reflects the present "recognition of prior learning" scheme that is used to credit a student with already learned skills that impact on the time necessary to accomplish goals and may add incentive for entry into further, related learning processes required to achieve the ultimate goal of professional competency (Hargreaves, 2006). Prior learning should not be underestimated.

Prior learning by its very definition indicates that certain aspects of future activities may already be approached with established competencies. This understanding is an integral part of the constructivist approach to learning. This is the epistemology arguing that humans generate knowledge and meaning from their experiences and it is this viewpoint that indicates why it is important to take into account the background and culture of the learner throughout the learning process, as this background also helps to shape the knowledge and truth that the learner creates, discovers and attains in the learning process (Garbett, 2011; Hofstede & Hofstede, 2005; Visser, 2007; Wertsch, 1997). Elaboration of this approach is discussed in Chapter 4. Thus prior learning may impact on the learning processes necessary to produce the final outcome of a competent professional but Garrick (1998) suggests that it is more a matter of "uncovering the educative effects,

the informal 'meaning-making' that accompanies everyday practice, that offers a key for a better theory-practice relationship" (p. 151).

The data gathered from this research indicate a need for improvement in the training processes during the period dedicated to achieving subordinate diving qualifications, as indicated in Table 2-3. An Advanced Open Water course for instance, demands five dives for completion. One of these dives must be a deep dive, defined as a dive at a depth between 18 and 30 meters. After this, only one other deep dive is demanded during the further training prior to entry into an IDC. After completion of the final Instructor Examination, the newly certified instructor may teach other Advanced open water students to dive deep.

This may then imply that the existing IDC undertaken as a final instructor certification process immediately prior to entrance into the working situation is of such short duration as to have little effect on the abilities of an individual, compared with what he/she already knows, in order to improve significantly his/her skill level to achieve optimal workplace competencies: ability being the process for achievement, and competence being its product. Admittedly, within the prerequisite diver training courses (refer to Table 2-3) that must be undertaken prior to the final step of attending an IDC, there will be some cumulative impact on the individual's attitude towards the diving activity itself and those for whom the individual may eventually be responsible. However, even with this prior experience included, in comparison to life skills already learned, one must ask how much the diver training experience leading up to instructor certification and prior to employment within the industry contributes to any sound definition of competence given to a professional diving instructor. A brief review of prior diver training experience as referenced in Table 2-2 leads inexorably to the question of what further learning processes must be undertaken finally to achieve competence and invites an answer to my first research question, "How does a group of recreational diving instructors demonstrate their required competencies?" The starting point for this was to determine what latent skills newcomer instructors already possess and if it had been clearly indicated to them what their objectives are and how they must achieve them in situ to become competent in their newly chosen profession.

3.7.3 On entering the situated learning environment

The communities of practice that exist in each of the dive operations under study have members of these communities who also network or integrate with other, similar communities from other dive operations and not necessarily those contained within this study. Overlaying this multiplicity of possible communities with the differing methods of learning, and the job of working out specifically who learns what and where they learn it, can appear somewhat blurred. However, to tease apart this tangled web of situations, I have considered first what latent skills, and hence social capital, each individual may be presumed to bring to the new working environment, what learning methods are utilised and what are the most dominant links in each of these communities of practice in which new instructors find themselves. In this manner I have been able to achieve a clearer understanding of how learning is accomplished.

Each learning environment may thus be represented as a matrix of formal, informal and incidental learning elements that are embedded in one or several of the communities of practice (Rowden, 2007). As an example of this, diving instructors

are often involved in several learning processes with some communities of practice in common, as represented by Figure 3-6.

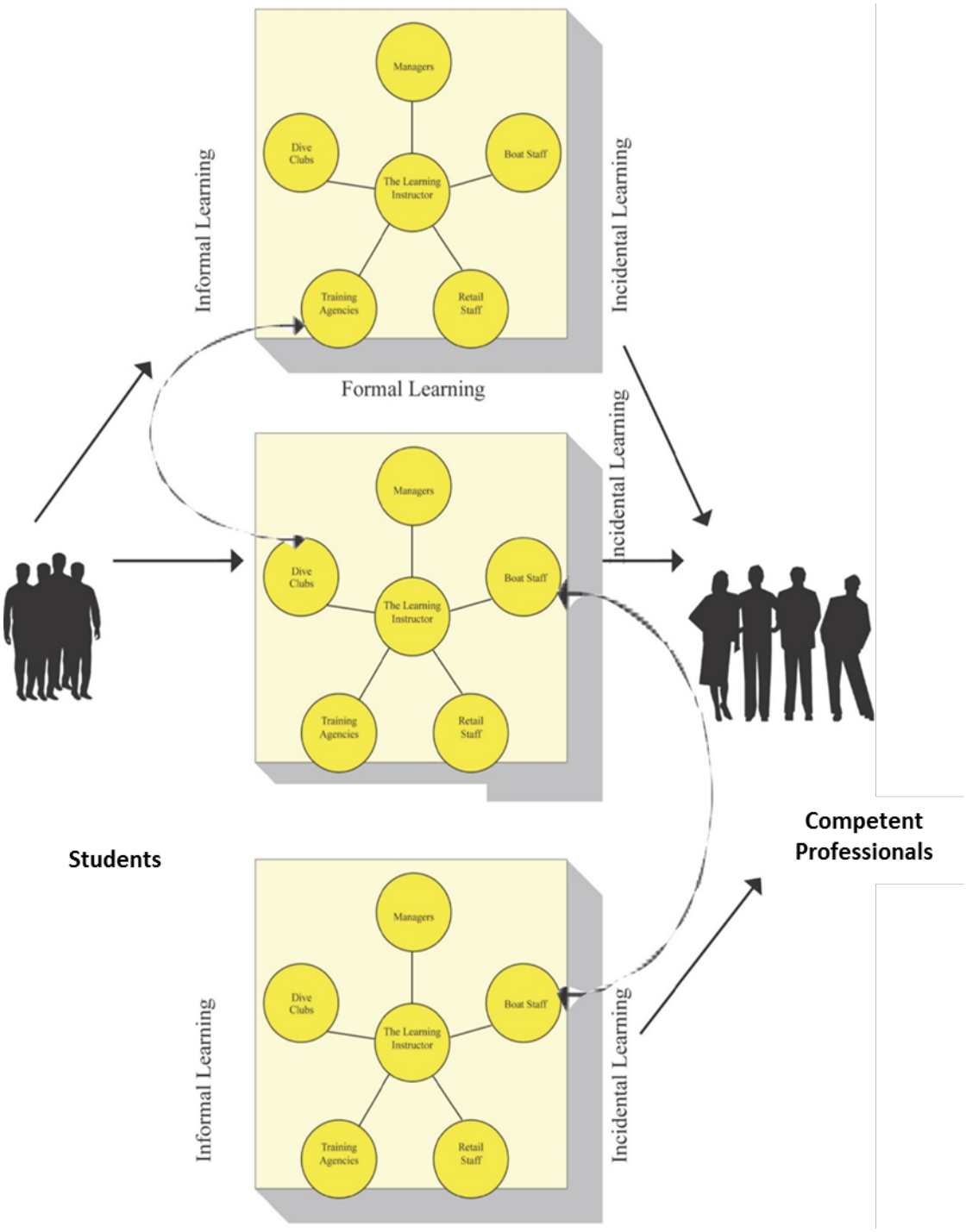

Figure 3-6 **Multiple 'learning cubes'**

Note: **Entry to multiple learning "cubes". This illustrates that the learner may enter more than one of the communities of practice associated with recreational diving: these can include groups from other dive operations in which work is also found, first aid training or on a marine vessel in a non-diving capacity.**

In Figure 3-6, the learning instructor is entering a network consisting of three communities of practice represented by cubes. The intention of this representation is to impress on the reader the multi-dimensionality of the learning process where learning can take place formally, informally or incidentally either separately or in

combination with one another. The three learning "cubes" could possibly be those related to diving, seamanship and first aid training, with some groups sharing common practices with others such as boat staff who are undergoing both seamanship and diver training or in some cases where individuals are being integrated into more than one diving operation and community cluster. This then leads to the second research question "In what ways do these recreational diving instructors engage in situated learning within a community of practice to demonstrate their required competencies?"

"Everyone belongs to multiple communities of practice" (Rowden, 2007, p. 66) and recreational diving instructors are no different, possibly even in their own workplace. Further to this they undergo multiple learning processes consisting of a blend of formal, informal and incidental learning as reflected in their new learning environment, essentially on board a vessel at sea. For instance, alongside learning practical methods of preparing student divers for entry into the water, the instructor will also work alongside marine staff in preparation of the vessel for mooring. This may be seen as a blend of formal and informal training in ropework and student supervision, together with incidentally learning what methods of mooring line retrieval works best for them while at the same time preparing student divers for their next dive.

In this environment, formal learning by way of traditional classroom exercises has given way to methods where students at all levels of diver training, including the recently certified diving instructor, are being encouraged to study independently (PADI Instructor Candidate Workbook, 2001-2004, pp. 3-4). Although some continuing education may still be delivered by way of limited classroom sessions such as specialty instructor or first aid instructor training, much more stress is being placed on informal learning. One example of this is the regularly scheduled exercise of search and recovery of a missing diver. A further, more individualised example could be where the new instructor has a practising professional instructor as a mentor. This agrees with the argument that informal learning is now becoming increasingly evident in the workplace (Cross, 2007; Garrick, 1998; Richardson & Wolfe, 2001; Rowden, 2007).

However, in both formal and informal learning situations, incidental learning may also take place. Rowden (2007) suggests that incidental learning "occurs as an unintended by-product of some other activity such as trial-and-error experimentation or interpersonal interaction" (p. 7). Examples include finding out by comparing what others do to determine the best diameter and type of rope to use for setting up a descent line for students and how a different method of handling students in poor underwater visibility may be learnt from anecdotal references overheard in a non-work, social community of peers. This concurs with Cross (2007), who states that "The emergent way of learning is more likely to involve community" (p. 41); even in deteriorating situations, regenerative growth is possible through the informal networks existing between resident overlapping communities (Forrest & Kearns, 1999) and in the industry under study some communities of practice do overlap. I have mentioned Forrest and Kearns's (1999) observation as I witnessed one episode that did present as a degenerative situation through bullying; progress for some was hindered briefly prior to intervention by other community members, thus endorsing Forrest and Kearns's thesis. Thus, what is of concern is which communities of practice offer support for learner development and which do not (Wenger, Dermott, & Snyder, 2002, pp. 140-146).

With reflection on who trains whom there appears to be one other principle at work: newly certified instructors may or may not be assisted by formal or informal supervision, but this may be overshadowed by the assistance given by older peers who have substantially more experience, and hence more social capital to draw from and refer to, when dealing with situations that have not previously entered a newly certified instructor's formal training. Such a situation could be dealing with hyper-sensitive individuals who themselves may require counselling or having explained to them other possible avenues of employment within the industry. Prior experience offers, without doubt, a substantial contribution to the overall learning process.

3.7.4 The desired final product – a competent diving professional

The competent professional is what is desired at the conclusion of the learning process and one definition of this, according to Harris et al. (1995), is one who must have "the attributes necessary for job performance to the appropriate standards" (p. 20). This present study reflected on what those perceived attributes are, and what performance means in this context to attain presently recognised standards. One concern arising from this study is whether these present standards are adequate and a true reflection of what is demanded by both the recreational diving industry and the customer seeking diving instruction. This would then require an answer to the final research question - that is, on the basis of the answers to the first two questions, "How can instruction be designed to promote an improvement to what is presently known about the industry?" In other words, we have now seen a learning instructor, possibly with latent skills, entering a matrix of learning processes to become eventually what we can consider to be a competent professional. But what actually is a competent professional and what, if necessary, can be done to improve the way this is achieved?

From prior research (Cardwell, 2005) the desired standards of competence regarded as necessary by all stakeholders in the training process appear to rely heavily on the existing attributes of the individual and the prior diving experience of the new instructor. The data gained from earlier study left little doubt that early diver training, and in some cases life experience prior to entry into the workplace, were less than optimal and part of any future learning process has to include those areas of knowledge and experience that are so lacking.

3.8 Summary

This chapter began with a basic review of competence, communities of practice, situated learning through formal, informal and incidental learning and the value of social capital and its integration within those communities of practice. It has then continued to develop a representation of the conceptual framework through a metaphorical device indicating how the student/learning instructor, possessing varying degrees of social capital, interacts with the learning environment through those situated learning processes and communities of practice to achieve what is expected of a competent professional. The writer's concerns leading from this are essentially what should be learned, when and how it should be learned and at what point is the result a competent diving professional.

Prior to entry into the industry and occupying a professionally employed position, the newcomer instructor has some prior training and life experience from which to draw. This is in many ways valuable. As discussed earlier in this chapter, indications are that skills learned in some areas of subordinate diver training may be less than optimal, but life skills already learned may offer more positive outcomes, and in some ways provide a foil to the lack of the diving specific skills desired.

This imbalance in knowledge levels and the way in which information is negotiated is what Lave and Wenger (1991) suggest is "the connecting issues of socio-cultural transformation with the changing relations between newcomers and old-timers in the context of a changing shared practice" (p. 49). In other words, learning may not go just one way. Old timers and newcomers can learn from each other. And this may well reflect Marquardt's (2002) discussion of the importance of community in the learning organisation with particular reference to the positive results of enhanced image in the community and the preparation of a future workforce (p. 125). The transitional process from the newly employed instructor entering a situated learning environment ultimately to become a competent diving professional appears to be a straightforward issue. However, a hint of its hidden complexities may be gained from reflecting on the social capital brought to the learning environment by the newly certified instructor, the overlapping matrices of learning processes - formal, informal, incidental - and the various communities of practice within and outside the dive operations under study consisting of different individuals who include boating and retail staff, divemasters, divemaster trainees, instructional peers and management.

Making sense of such complexity and how to answer the questions therefore demanded a careful and exacting design of the study and design of the research.

Chapter 4 Research Design

> ***For realists, explanation is constructed in terms of mechanisms. More than one mechanism may be involved in a particular situation, and whether or not a particular mechanism operates will depend on the context. (Robson, 2002, pp. 35-36)***
>
> ***Heuristic research is a search for the discovery of meaning and essence in significant human experience. It requires a subjective process of reflecting, exploring, sifting, and elucidating the nature of the phenomenon under investigation. (Douglass & Moustakas, 1985, p. 40)***

4.1 Overview

The previous chapter described the conceptual framework of this study, discussing workplace competence, communities of practice, and the situated learning environment offering formal, informal and incidental learning processes and the social capital that learning instructors bring to the workplace, enabling the achievement of instructional competence. It went on to describe the scenario through which the learning instructor begins his/her employment, becoming part of one or more communities of practice to achieve the desired competence, reviewing briefly how each part of the journey through this scenario aligns with each of the three research questions under study; briefly: How do instructors know what to be? How do they do it and what can be done to improve things, if anything?

This chapter consists of two parts. Part A describes the paradigm used, followed by a brief review of the epistemology, ontology and axiology in evidence, the role of the researcher and the case study method. Part B describes the research design and the associated plan of action, including data collection and analysis and indicating the manner in which trustworthiness is achieved as well as the study's limitations and ethical and political considerations.

4.2 Part A: The social constructivist paradigm

This study is all about people: what they have already learned, the social capital they bring to, and how they integrate into, a situated learning environment through membership of a community or communities of practice and what they further learn there to achieve competence. In observation of, and dialogue with, all of the individuals involved in this research it was important for me to be able to interpret how they constructed the meanings with which they learned their jobs. As such, this study follows a socially constructivist paradigm in such a manner as to inductively and holistically understand human experience in context-specific settings and where I as a researcher search for the unifying nature of particular settings. (Karatas-Ozkan & Murphy, 2010; Patton, 1990).

Crotty (1998) suggests that research arises from particular paradigms which inform their respective theoretical perspectives, in turn shaping the choice of methodology as a general "strategy or plan of action" (p. 7), and that the construction of meaning implies the construction of meaningful reality (p. 10). Meaning-making is referred to by Vygotsky (1978) in his work on the zone of proximal development: the difference between what a learner can do without help and what he or she can do with help. Lave and Wenger (1991) characterise this as "the distance between problem-solving abilities exhibited by a learner working alone and that learner's problem-solving abilities when assisted by or collaborating with more experienced people" (p. 48). This necessity of collaboration with others in reference to the elements of study chosen reflect the social constructivist paradigm where, as Neubauer, Hug, Hamon & Stewart (2010) put it "Community, or connectedness is the principle behind good teaching" (p. 10) and where "education is becoming a variety of 'just in case' knowledge management when the new paradigm will be based on abilities to find knowledge 'just in time'" (p. 12).

This emphasises the importance of the learner to become an active participant and not entirely reliant on the instructor development processes that may have preceded their present position. In addition to this injunction, however, Wertsch (1997) emphasises that:

> Social constructivism encourages the learner to arrive at his or her own version of the truth, influenced by his or her background, culture or embedded worldview. Historical developments and symbol systems, such as language, logic, and mathematical systems, are inherited by the learner as a member of a particular culture and these are learned throughout the learner's life. This also stresses the importance of the nature of the learner's social interaction with knowledgeable members of the society. Without the social interaction with other more knowledgeable people, it is impossible to acquire social meaning of important symbol systems and learn how to utilize them. Young children develop their thinking abilities by interacting with other children, adults and the physical world. From the social constructivist viewpoint, it is thus important to take into account the background and culture of the learner throughout the learning process, as this background also helps to shape the knowledge and truth that the learner creates, discovers and attains in the learning process. (p. 27)

This is particularly significant when considering how skills that have already been learned from previous occupations impact on their preparedness for, and acquisition of, the future skill sets necessary to become a competent recreational diving instructor. As examples, having been trained as a teacher would offer useful background skills when training beginner divers, while having been a deckhand on a fishing boat would be useful with the practical activities of mooring and operating deck equipment and ropes on board a diving vessel.

Regarding the acquisition of new skills, McMahon (1997) emphasises that "the social constructivist paradigm views the context in which the learning occurs as central to the learning itself" (p. 1). Brown, Collins, and Duguid, (1989) suggest that "people who use tools actively rather than just acquire them, by contrast, build an increasingly rich understanding of the world [context] in which they use the tools and the tools themselves" and where "learning and acting are interestingly indistinct, learning being a continuous, life-long process resulting from acting in situations" (p. 33). This resonates with the idea that certification, or the acquisition of a statement confirming certain abilities does not necessarily equate to the rich understanding that comes with relevant practice in the workplace setting. For example, knowing the standards for maximum numbers of students allowed in an open water environment does not give understanding of the concerns of dealing with them there. Concerns of this nature are addressed by application and, in this particular example, often by collaboration with peers in what is referred as cognitive apprenticeship: an effective constructivist model of learning through activity and social interaction in craft apprenticeship (Ackerman, 1996; Backus, Keegan, Gluck & Gulick, 2010).

Embedded also within this paradigm is what Jonassen (1994) refers to as "the implications of constructivism for instructional design" which has significant meaning to one of the key issues of this study: how to improve future training. Jonassen (1994) suggests the following principles to illustrate how knowledge construction can be facilitated:

1. Provide multiple representations of reality;
2. Represent the natural complexity of the real world;
3. Focus on knowledge construction, not reproduction;
4. Present authentic tasks;
5. Provide real-world, case-based learning environments, rather than pre-determined instructional sequences;
6. Foster reflective practice;
7. Enable context and content dependent knowledge construction;
8. Support collaborative construction of knowledge through social negotiation (p.35).

This gives further support to the preference for less classroom work and more purposeful experiential learning in the workplace, as is the situation in diving instruction.

This study was essentially about finding out what skills are necessary for beginner instructors to learn to achieve competency, how they achieve those skills and how to improve any skill learning process. To discover answers during this search and working within the constructivist paradigm, certain research questions were articulated and a proposed case for study was designed, bearing in mind that, "although early identification of the research question and possible constructs is helpful, it is equally important to recognise that both are tentative in this type of research" (Huberman & Miles, 2002, p. 11). This indicated the need for a flexible

and recursive approach to design where multiple data collection techniques were used.

As relationships between members of the communities of practice and comparisons between them emerged during this study, these relationships did not in any significant way indicate any need for alteration of the original research questions and strategies of data acquisition (Robson, 2002, p. 166). However, they did indicate that more attention needed to be given to the prior preparation and subordinate skills and knowledge of the learning instructors. The situated learning processes to which the new instructors were then employed appeared primarily to be compensatory devices for creating someone who is already believed to be, at this early stage of their employment, a competent diving professional. This dichotomy of belief alone where a certified instructor, employed on the basis of already being competent, yet being required to learn other skills to conform to another definition of competent, indicated the necessity for such an epistemological approach to uncover and define the ontological and axiological aspects of the study.

4.2.1 Epistemology

Epistemology is "the study of knowledge and justified belief" (Steup, 2005, p. 1) and in the situation under study it is clear from the research questions as to what type of knowledge is being sought: what competencies are desired, how they are achieved and how we use what we discover to improve the industry as a whole. The difficulty lies in justifying belief in the knowledge thus gained. In other words, what data do we have to prove how we identify the skills and abilities required to become a recreational diving instructor, in which environments are these skills and abilities realised and with whom, and how does this understanding impact on how future engagement with the learning processes is to be approached.

Major points underlying the constructivist epistemology include viewing phenomena holistically and as a loosely constructed model, where I as researcher operated in a natural setting, embedded in the instructors' workplace, thereby "attempting to make sense of, or interpret phenomena in terms of the meanings people bring to them" (Denzin & Lincoln, 1998, p. 3). The greatest importance was attributed to the perceptions of the research participants and *a priori* assumptions were largely avoided in favour of *post hoc* conclusions (Wiersma & Jurs, 2009, p. 233). Doing so allowed me to approach the study as an independent, unprejudiced and interested observer; to the extent that this is possible. Despite the fact I cannot lay claim to the idealistic position of objective lack of prejudice, as an experienced professional within the recreational diving industry, I do have a "firm grasp of the issues being examined" (Robson, 2002, p. 168). This situation therefore did instigate some internal conflict.

On one side there was the search for the meanings constructed by the individuals interviewed and observed, on the other side there was a substantial knowledge of the issues as understood by myself. The situation often saw me viewing issues presented as history repeating itself with certain suppositions already in mind. For example, there was the belief that the management of a company does not condone continuing education of their instructors, but in many situations it is the instructors who should be more aware than their supervisors of how this education can be incorporated and managed. This may be interpreted as employees knowing more about certain issues than their employers, indicating the need for a situated learning environment nurturing two-way communication between employers and

employees. Even so, this study as much as was practicable, followed a constructivist epistemology in an endeavour to uncover knowledge that also considered the ontological nature and the axiological challenges of the particular cases.

4.2.2 Ontology

The ontologolical issues raised derived much from what the participants considered to be the reason for wishing to remain in this industry, where: "Ontology as discipline is a method or activity of enquiry into philosophical problems about the concept or facts of existence" (Jacquette, 2002, p. 3). In my use of a constructivist approach to determine knowledge about issues as constructed in the minds of the individuals interviewed, and as observed in their performances, the ontological perspective that was identified reflected reality as seen by those individuals interviewed of the entire situation regarding involvement within the industry in general, and its effect on the individuals studied in particular, regardless of what appearances might offer to the contrary. For instance, belief in the constancy of employment as a diving instructor in some positions had not been objectively examined by the incumbent instructor nor was such a belief a true reflection of the real situation. Belief in what the occupation of a diving instructor entails is often found to be considerably different to reality. Personally for the individual, this may lead to disappointment; to the dive operation, a new instructional employee may not meet the operation's definition of competent thus requiring further in-house training and/or could result in an earlier than desired resignation.

According to Crotty (1998), realism in ontology and constructionism in epistemology are completely compatible (p. 11) and the reasons why knowledge has been constructed in a certain way, particularly those reasons initially directing individuals towards entry to the dive industry, have a significant bearing on the situation under study. For instance, some individuals have made the change from a more highly paying occupation to a more aesthetically appealing lifestyle that holds less remuneration but appears to offer greater rewards in other aspects of living. These can include a working environment that is seen as less stressful than the environment in which the new instructor had previously been engaged. The lifestyle change could also be derived from an environmental perspective and a desire to get closer to nature. Such is the appearance of the industry to many as evidenced in many of the interview exchanges. These changes may indeed offer the individual real and positive change or only a short-term, possibly delusional sojourn.

As will be seen from the data obtained, the nature of this reality is often sometimes somewhat removed from the value-driven knowledge or the axiological precepts that have been constructed in the learning instructors' minds. This reflects the situation where Sen (1984) states that "happiness or desire fulfilment represents only one aspect of human existence" (p. 512) and where he qualifies in his later (1992) work as "utility [happiness] can be easily swayed by mental conditioning or adaptive expectations" (p. 62).

4.2.3 Axiology

The term "axiology" is derived from the Greek stems of "axios" and "logos" which translate as 'the study of value" or "the logic of value" (Pomeroy, 2005, p. 173) and in this research relates to the decision in choice of this occupation. Earlier in this chapter I intimated two of the apparent reasons why some individuals choose recreational diving instruction for a change in career: less stress and closer proximity to nature. These factors could certainly be considered as contributing to or reflecting a change already made towards philosophical values favouring a generally more aesthetic outlook on life, and in consideration of this there are two aspects to consider in the context studied. Firstly, are those factors pertaining to the individuals comprising the instructional part of the industry, and secondly, what factors may pertain to the industry as a whole? In other words, what value do our new instructors attribute to this change in lifestyle and how does this reflect the ways in which they learn and apply that learning? Concurrently, what life values does the diving industry reflect in comparison to those values reflected by other industries? And to what extent are these perceived values real or imaginary?

The determination of the difference between "what is" and "what appears to be" is certainly a debate worth having in any context. The concern for discrimination between real value and perceived value links well with the ontological aspect of this study. With these factors in consideration, my study has been specifically designed to uncover the nature of the knowledge acquired, how it is acquired, the perceived values driving this acquisition of knowledge and how this may be used to improve the entire nature of training within the recreational diving industry: the very essence of my research questions.

To answer the research questions, I chose a case study limiting my inquiry to three diving operations consisting of approximately 30 instructors. I considered this sample size to be a small enough number to be manageable, yet large enough to give focus to the epistemological and ontological reflections and the axiological principles which, in the main, the individual instructors appeared to collectively agree upon. In so doing, this provided the basis for the conclusions drawn from the data gathered and analysed.

4.2.4 The role of the researcher

It was difficult to appear as a benign observer without sometimes causing changes in the attitudes and actions of the individuals being observed. A "Hawthorne effect" type of influence was sometimes recognised in response to the research questions and during observance of individual performance. The "Hawthorne effect" is one where individuals modify or improve their behaviour while being experimentally measured, where those improvements are as a result of being studied and not due to any experimental manipulation (Adair, 1984; Levitt & List, 2011). This effect could well skew data generated but, after several hours of benign observation, familiarity with my presence appeared to minimise or eliminate this effect.

Fortunately in this case study, I was well known to many of the participants, had endorsement from their management and had no apparent difficulty in obtaining or interpreting data. However, doubt still remains as to the influence that may have possibly been attributed to the "Hawthorne effect", that debatable phenomenon as described further by Wagner (2009) whereby "Individuals may change their behaviour due to the attention they are receiving from researchers rather than because of any manipulation of independent variables" (p. 1).

The participants in the study were quick to realise that my intentions were indeed not to be a "management informant" but derived from a genuine interest in them and their work, the nature of the research impressing on them the philosophical importance of what I was doing. Bateson (1972), states that: "all qualitative researchers are philosophers" in that "universal sense in which all human beings are guided by highly abstract principles" (p. 320). Thus the epistemological, ontological and methodological premises constituting the paradigm of the researcher are a "basic set of beliefs that guides action" (Guba, 1990, p. 17). In this regard, and with myself being seen as already embedded and well experienced within the industry under study, it was still difficult to dissociate myself from the knowledge of some existing problems already evident and some preconceived ideas held for possible solutions.

On the other hand, this depth of experience facilitated a deep insight into issues raised interpreting the qualitative data and the meanings that could be constructed from the interviews with the participants required frequent reflection. As Schön (1983) puts it "When a practitioner reflects in and on his practice, the possible objects of his reflection are as varied as the kinds of phenomena before him and the systems of knowing-in-practice which he brings to them" (p. 62). This gave rise to many concerns about whether I, as an active recreational diving instructor myself, was sufficiently reflexive in my view of what I saw and heard, and whether I was tending to record only data that converged with my own practice and/or personal agenda. Denzin and Lincoln (2008) further cautions that "Many studies that use unstructured interviews are not reflexive enough about the interpreting process. Common "platitudes" proclaim that the data speak for themselves and that the researcher is neutral, unbiased, and "invisible" (p. 140). I could not be invisible in my research and I do hold some biased views. One such view is regarding the marginalisation of female instructional staff by way of low employment levels and bullying in this geographical area. This I hold to be a less than optimal business or ethical situation.

However, an advantage I had in this study is that this form of heuristic inquiry conducted by myself as researcher was informed by my "personal experience with and intense interest in the phenomenon under study" that was shared similarly by the participants who must also "share an intensity of experience with the phenomenon" (Patton, 1990, p. 71). Even so, management of my own assumptions and beliefs required me to approach all aspects of this study systematically, sceptically and ethically (Robson, 2002, p. 18).

With the established understanding that I was already a member deeply embedded within the industry being studied, being seen as a "complicit component of the research project, rather than a detached, objective observer" (Danaher, 2001, p. 69), it was essential that this study maintained integrity with regard to the comments provided by the participants. To achieve this, I attempted to be a "faithful reporter", encouraging the research participants to speak for themselves and present their points of view. According to Blaikie (2003), "this means that the researcher is required to remain faithful to the phenomenon under investigation by only producing reports in which the social actors can recognise themselves and others" (p. 52). To assist with the fidelity of these intentions, the final transcription of each interview was presented to the respective participants for his/her critique. In no situation was there any request for alteration of the transcribed interviews but rather it clearly reinforced the integrity of the epistemological research being undertaken and the shared beliefs highlighted by the acquired data (Merriam, 2002, p. 26).

4.2.5 Case Study

I chose the case study method for this research, as the phenomenon questioned required an in-depth, longitudinal examination of a situation in its real life context and is averred by Tellis (1997) as being "a reliable methodology when executed with due care" (p. 16). The working relationships within the recreational diving industry and its member professionals are viewed as an implicit economic benefit to the state of Queensland as described earlier in Chapter 1, pp. 7-8 – an industry already rich in anecdotal references within its vernacular of both success and disappointments, but deficient in documented reference to the characteristics and problems regarding how instructors become competent and/or what factors retain them within the industry long enough to achieve competence. I identified no comparable research to inform these issues and could see that the only satisfactory method to employ in this endeavor was to embed myself further within the situation to be studied and to acquire data directly within the framework of a comprehensive case study.

The *case study* is defined by Yin (2009) as "an empirical inquiry about a contemporary phenomenon (e.g. a "case"), set within its real-world context – especially when the boundaries between phenomenon and context are not clearly evident" (p. 18), and furthermore, inquiry "is not limited to a single source of data, as in the use of questionnaires for carrying out a survey. In fact, good case studies benefit from multiple sources of evidence" (Yin, 2012, p. 10).

In the case under study, recreational diving instructors working in three different organisations were found to be performing a variety of different functions, including: training beginner divers, supervising deck operations, leading certified divers on dives and ensuring comprehensive and accurate completion of all artifacts relating to each of these functions and specific to each of the respective organisation. Results pertaining to any action of any instructor within any one organisation thus enabled trustworthy data production from the triangulated methods used: observation, interview and review of artifact production.

Triangulation as defined by Cohen and Manion (2000) is an "attempt to map out, or explain more fully, the richness and complexity of human behaviour by studying it from more than one standpoint" (p. 254). The need for triangulation arises from the ethical need to confirm the trustworthiness of the processes used in case studies and can be done by using multiple sources of data (Yin, 2012). Denzin (2006) identified four types of triangulation: data source triangulation, when the researcher looks for the data to remain the same in different contexts; investigator triangulation, when several investigators examine the same phenomenon; theory triangulation, when investigators with different viewpoints interpret the same results; and methodological triangulation, when one approach is followed by another, to increase confidence in the interpretation.

The methods adopted in this study were a combination of data source and methodological triangulation; data were obtained from different sources and in different contexts; the methodology of performing individual interviews was followed up by workplace observation and review of artifacts used in workplace orientation and training. By means of this bricolage of analytic lenses - observation, interviews and review of artifacts - insight into the technical operations of the dive organisations under study indicated the emergence of convergent themes. (Refer to Appendices B and C.)

However, in criticism of triangulation, Robson (2002) although stating that "Triangulation can help to counter all of the threats to validity", also warns that "It opens up the possibilities of discrepancies and disagreements among the different sources. Thus interviews and documents may be contradictory" (p. 175). Hammersley and Atkinson (1995) also suggest that "One should not, therefore, adopt a naively 'optimistic' view that the aggregation of data from different sources will unproblematically add up to produce a more complete picture" (p. 232). Convergence of results may suggest both unbiased and true representations of a situation, or that all results are equally biased and not representative of the true situation. This awareness provoked me to continuously reflect on data production in this case study on a daily basis and to apply good judgment, as Jick (1983) states "To view the researcher [myself] as builder and creator, piecing together many pieces of a complex puzzle into a coherent whole p. 144).

In earlier work, Yin (1993) identified three specific types of case studies: *exploratory, explanatory* and *descriptive. Exploratory* cases are sometimes considered a prelude to social research in which a pilot study, of which my earlier work on instructional competence (Cardwell, 2005) could be described as an example, is conducted. *Explanatory* case studies may be used for doing causal investigations where pattern matching can be used to investigate certain phenomena in complex and multiple cases. *Descriptive* cases that require a descriptive theory to be developed before starting the project could, in part, be represented by the description offered by the conceptual framework guiding a case under study.

These descriptions identify the type of study but more precise definition is required to identify classification of purpose. Stake (1995) describes three distinct purposes of case study: the *intrinsic*, the *instrumental* and the *collective*. In an *intrinsic* case study the main interest is in the case itself. For instance, there is no apparent literature written regarding this type of situation: diving instructors working in a specific environment, how they do their jobs and what influences them. So what

information can be gained from studying this? In an *instrumental* case study, a small group of participants is chosen to examine patterns of behaviour; such as how instructors learn to deal with difficult customers or what process is followed by them to graduate from assisting certified divers in teaching an entire diving course. A *collective* case study is when a group of cases are studied; the scope of this research could be described as considering the commonalities and differences of each case, and why they are so. An example is the daily timetables common to all cases and why, for instance, one particular organisation (case) uses one training agency for some of their guiding principles as opposed to another agency.

The approach I chose to follow was an *explanatory* and *descriptive* multiple case study design which in all respects also aligned itself with Stake's (1995) descriptors: *intrinsic* – I have a very deep interest in the subject, having been involved in the industry for longer than 30 years; *instrumental* – I wished to understand what goes beyond the obvious and gain data that go beyond *a priori* assumptions; and *a collective* - data were gained through triangulation of different sources from the three dive operations chosen for this research.

On the negative side, however, Yin (2003) suggests three main criticisms of the case study method. These are: lack of rigour, where material may be deliberately altered to support a particular point of view; a minimal basis for scientific generalisation; and the fact that case studies often take too long to conduct (p. 10). In an effort to reduce these weaknesses, this study was performed with participants from three competing diving operations. These operations were chosen as representative of the many dive operators competing in a high intensity market. Each operation employs approximately 10 to 12 professional diving instructors and instructors in training on dive vessels of approximately the same size and passenger loading. From this pool of potential participants, approximately 10 were chosen from each operation. This is the maximum number of active instructors usually employed in an instructional capacity at any one time by any of the dive operations under study. Further to this, as the instructional activity performed by these operations uses competing diver-training agencies, data gained were non-partisan with regard to preference of training agency.

These three operations were considered as three individual cases representing a collective case study, with the instructors being the units of analysis. As such, "Data will be gathered to learn as much about the contextual variables as possible" (Merriam, 1988, p. 134) and "By comparing sites or cases, one can establish the range of generality of a finding or explanation, and at the same time, pin down the conditions under which that finding will occur" (p. 134). In so doing, "An interpretation based on evidence from several cases can be more compelling to a reader than results based on a single instance" (Miles & Huberman, 1984, p. 151) or as Baxter and Jack (2008) put it: "a better understanding of the phenomenon will be gained through conducting a multiple case study"(p. 549). This study therefore benefited from data collected from three competing operations, thereby giving not only a large data base but also one in which a comparative analysis could be made between the data obtained from each operation.

4.3 Part B: Research design

This research design followed a *qualitative orientation* using a *case study method* and *data gathering techniques* of observation, review of artifacts, semi-structured interviews, survey questionnaires and documentation to give *trustworthy results*. A wide range of methods was combined to develop a bricolage of activities defined as "making do by applying combinations of the resources at hand to new problems and opportunities" (Baker & Nelson, 2005, p. 329). This was then applied using a constructivist paradigm to investigate the formal, informal and incidental learning of diving instructors employed within the medium to large dive operations selected and the communities of practice in which those instructors interacted.

4.3.1 The research process

This study investigated the multiple constructions of meaning that occurred through participation within the communities of practice operating in the workplace. It is implicit that from the multiple constructions of meaning multiple sources of evidence must be gained to enable the convergence of ideas. Drawing on the work of Simons (1980), and Stake (1995), who have suggested techniques for organising and conducting successful research, Soy (1997, p. 1) proposes a six-step method that can be used:

- Determine and define the research questions.
- Select the cases and determine data gathering and analysis techniques.
- Prepare to collect the data.
- Collect data in the field.
- Evaluate and analyze the data.
- Prepare the report.

This methodology aligns well with Silverman's (2012) recommendations regarding research projects, but with the further suggestion of considering relevance of the research problem for other scholars and for "society" (p. 64). Choice of case to be studied and the related research questions I wished to have answered resulted from my long association with the recreational diver training industry and my concerns regarding the manner in which instructors are trained, together with how this training can be improved.

The method of data collection chosen was to use a bricolage of analytic lenses in the field by using semi-structured interviews and survey questionnaires, complemented where possible by voice recordings and observations, the latter being of work related tasks such as briefings to divers and/or other staff. These interview data were transcribed from digital recordings and catalogued using a simple computational filing procedure utilising coding schemes to enable a descriptive and intensive analysis of the data and easily accessible storage, retrieval and management of those data. Analysis was then conducted to identify and catalogue themes and patterns. This assisted with the identification and compilation of emerging themes and patterns that formed a more comprehensive and trustworthy picture of what "competence" means to the instructors, how they saw themselves learning their jobs and how they engaged with and related to those from whom they learn.

4.3.2 Gathering the data

Initially, permission was sought and received from the three dive operations to undertake research by way of observation and interviewing their respective instructional staff together with the ability to review any artifacts also used in common workday usage. The protocol thus followed was to observe, document and record exact statements from interviews undertaken. These were performed over a six-month period for each dive operation setting aside at least one day per instructor. Doing so required a minimum of 30 days at sea for observations and intensive, focused interviewing complemented by further, individual interviews with each of the participants performed on land.

These land-based interviews were conducted primarily because of the obvious disruption that on-site interviews posed; the total number of interviews obtained were from 29 recreational diving instructors and their three supervisors from three different diving organisations. These interviews were transcribed and forwarded to the participants for review to ensure accuracy of transcription. Owing possibly to the more transient nature of instructional staff from two of the dive operations, it was unfortunate that all participants did not complete this review process. Even so, sufficient data were obtained to give confirmation of the themes appearing from the interviews and observations.

4.3.3 Research techniques

The techniques used required "prolonged engagement, persistent observation, triangulation and member checking" (Lincoln & Guba, 1985, p. 301). Engagement in this context extended over a six-month period for each of the three diving organisations where the culture of each organisation was studied alongside the phenomenon under investigation. Organisational culture can be defined as "the shared values, norms and expectations that govern the way people approach their work and interact with each other" (Gourley, 2002. p. 1) and as such critical insights were gained reflecting on the way respondents felt and were disposed to act (Mezirow, 2000, p. 193). Persistent observations enabled me to "identify those characteristics and elements in the situation that are most relevant to the problem or issue being pursued and focussing on them in detail" (Lincoln & Guba, 1985, p. 304). The technique of data triangulation was used to counter the threat to credibility of results by "inadequate descriptions of events, poor interpretation and not considering alternative explanations or understandings of the phenomena being studied" (Robson, 2002, p. 172). In order to conform to data triangulation, multiple methods of data collection were employed by way of interviews, questionnaires, voice recordings, direct observations and review of artifacts used by the instructional staff.

Member checks were undertaken by having participants review my transcriptions and assumptions. This gave an opportunity for participants to approve interpretation of the data (Doyle, 2007; Merriam, 1998) and a "way of finding out whether the data analysis was congruent with the participants' experiences" (Curtin & Fossey, 2007, p. 92).

These checks, together with the data obtained, culminated in a thick description of the cases in the study, provide an audit trail of all documented components of the study: field observation notes, interview notes, journals, records, calendars and various drafts of interpretation (Carlson, 2010, p. 1103). This case study can then be seen to be of a flexible research design that, extending over three six-month periods, employed multiple techniques of data collection to ensure the widest possible range of data to address the research questions.

Postgraduate study has already been performed by myself in this area and strong relationships with the dive operational staff were well established to ensure future success during the research process (Cardwell, 2005). Therefore for all three of the six-month periods in this study I was able to devote myself to full-scale data gathering. Minimal time was necessary for assimilation, and the development of cordial relationships with the participants under study was expeditious. Study participants checked data obtained for accuracy of interpretation and confirmability established by comprehensive documentation of records sufficient to permit a solid auditing process. The substantial relationships among the triangulated techniques of interviews, observation, artifact review and participant confirmation of data ensured a solid basis for data analysis but require further description of how each method was followed.

4.3.4 Interviews

The three main types of interviews used in qualitative research may be generally described as: highly structured where specific questions are asked and determined ahead of time; semi-structured that may contain both highly structured questions requesting specific information and non-specific questions regarding the issues to be explored; and unstructured where the topic areas are known but the order and questions asked are not predetermined (Merriam, 2002; Silverman, 2011; Yin, 2003).

The type of interview chosen for this study were essentially semi-structured interviews where I could ask predetermined, specific questions and use the answers to these as a basis for further, exploratory questions to tease out other issues bearing on particular topics or issues raised. An example of this would be the primary question of “What do you think your job is supposed to involve in the position you are holding now?”, which may have been followed by further probing questions such as “Why do you think so?”, “Are the skills you have brought to this job of any value to you in this position?” or “What other things do you think you may have learned?”

The first six interviews were performed at the actual work site, which was a dive boat either en-route to, or at a dive location on, the Great Barrier Reef. These six interviews were conducted before a decision was made to reconvene the interviews on land and away from this working environment. The difficulty that presented was gaining enough time at sea to enable a complete and uninterrupted flow of communication between each interviewee and myself. The noise of engines, customers and staff, even when I was able to obtain a relatively isolated space for the interviews, still managed to disrupt attention from the purpose of the interview. This was also exacerbated by the frequent requests for the interviewees to assist with certain tasks, even though permission had been granted by each boat captain for the interviewee to be uninterrupted during the period given for their interview. The

attempt to interview in such a manner was repeated on all three dive operators' boats but the situation was frustrating for both the interviewees and myself; the data being generated appeared repetitive and limited owing to the necessity of reviewing where the interview started and what had been said before.

The decision was then made to continue with these and any further interviews on land in situations that offered more comfortable surroundings and with less chance of interruption. My time on the dive boats was then almost exclusively devoted to observation of instructional activities. The only disadvantage that presented with the new protocol for collection of interview data was that a group of instructors from one of the dive operations was reluctant to make themselves available to be interviewed. Fortunately, after approaching the owner of the operation, I was able to secure the interviews necessary to conclude my work of data collection. This approach to the interviewees' superior did not appear to produce reluctance to answer questions asked or raise issues and contribute ideas and suggestions for future discussion.

Each interview was conducted face-to-face and approximately one hour in length, recorded on two separate and simple recording devices – a Sony TCM-343 cassette-recorder and a TASCAM DR-1 portable digital recorder. The intention in using two devices was to minimise the likelihood of data loss from failure of a single recording device. Further to this, notes were taken at each interview to complement the data recorded. The taped and digital data retrieved were transcribed onto separate discs for easy and convenient retrieval and stored securely. All data were duplicated, with the second copy being stored and secured at a remote location. The data were recorded during the years 2008 and 2009 throughout the same period that data were collected by direct observation of individual instructor behaviour on the dive boats.

4.3.5 Direct observational

In traditional, observation-based research, Angrosino (2005) suggests there are three distinct observational methods used:

a) Participant observation, grounded in the considerable rapport between the researcher and those participating in the everyday life of the community;
b) Reactive observation, associated with controlled settings and based on the assumption that the people being studied are aware of being observed and are amenable to interacting with the researcher only in response to elements in the research design; and
c) Unobtrusive (nonreactive) observation conducted with people who are unaware of being studied. (p. 732)

An overlapping of all three of these methods was employed in this study where my role varied from unobtrusive observer (virtually) unknown to some of those being observed to active participant. In the latter instance, an occasion presented where it was necessary for me to discuss a situation with a group of instructors regarding inappropriate behaviour verging on bullying.

These observations were conducted on each of the three dive operators' boats to observe the actual work in progress that the diving instructors were involved with: what they did, how they did it and who else was involved in its performance. Although in many situations jobs were seen to be conducted in a rote and mechanical

fashion, it was also important for me to assess the manner and attitudes that were present in the conduct of these jobs. For instance, were the instructors elated or dour? Did they care? How did they interact with their co-workers and customers? What was the reaction to the manner in which they conducted their work?

These attitudinal observations were important in that these attitudes appear to influence significantly an instructor's tenure and consequent ability to achieve competence. Specific to this method of data collection, "observational data represent a first-hand encounter with the phenomenon of interest rather than a second hand account obtained in an interview" (Merriam, 2002, p. 13). Data so gathered can equally conflict or accord with activity descriptions recounted in a relatively sterile interviewing environment where an interviewee's mind is capable of adjusting imperfect memories.

Interviews gave the advantage of a neutral environment with few distractions when eliciting data that confirmed and elaborated the data gained by observation. Artifact review confirmed certain elements of the instructors' work performances and in many cases reflected the attitudes adopted by some of the participants when addressing particular issues.

Further to this, there appeared to be varying degrees of success in dealing with introductory[5] divers. This was measured by reactions observed on return from this dive and recorded as a fraction - those smiling and giving a positive indication of enjoyment versus the total number trained by that particular instructor. For example, three out of four indicating a positive experience would be represented by 3/4.

4.3.6 Artifacts

The artifacts reviewed, many of which were observed in use by the instructional staff throughout their daily activities, were: the AS 4005.1—2000: *Training and certification of recreational divers, Part 1: Minimum entry-level SCUBA diving, and the Queensland Code of Practice 2005, now replaced by the current Recreational Diving, Recreational Technical Diving and Snorkelling Code of Practice 2011;* the relevant training agencies' instructor manuals; and the specific company's procedures manuals. Other artifacts used by myself were my field notes which served to qualify otherwise unclear statements transcribed from the tape and digital recordings.

These artifacts were used to confirm details regarding the various day-to-day issues that arose. An example of this is that the Australian Standards (2000) were consulted for confirmation of relevant equipment necessary for instructors to dive with or the documentation they should possess themselves while employed in diver training. To someone reading this thesis, it would appear that instructors should know the answers to these questions without the need for referencing, but for new

[5] Introductory divers may be taught in various environments. These can either be in a swimming pool or on a platform or in a possibly less stable manner working from the back deck of a diving vessel at sea, where weather conditions are not always clement. In the context of this study the latter method is used. The process of training begins with a briefing on basic rules of diving such as never to hold one's breath and how to equalise the changing pressure in air spaces followed by basic practical skills such as clearing a mask partially flooded with water and how to retrieve and clear a regulator (breathing device) of water should it come out of the mouth while underwater. The student is then towed (usually in this region) over a set distance generally at dive sites that offer memorable sights such as coral reef formations populated by interesting invertebrates and fish.

instructors these facts are not well remembered and it is often necessary for supervisors to remind the instructors. The *Code of Practice 2005* was often referred to for confirmation of minimum ages and the need for parental supervision or guardianship during training. These local requirements often differ from the standard requirements of the training agency which is used to issue certifications. The local *Code* stipulates a minimum age of 12 years of age for diver training; PADI has a minimum age of 10 years of age but also has a caveat to their standards of training giving primacy to local codes of practice or legislation.

Complexities also occur with regard to the maximum permissible number of students at these relatively young ages who may be trained in one group. Training agency manuals are more often referred to for confirmation of specific course requirements such as the skills required in an underwater naturalist dive for the Advanced open water course. However, the company's procedure manual is referred to more frequently and for a much greater variety of reasons. One of the most important reasons appeared to be a check of tasks that should be performed at specific times of day, either to confirm what instructors had been asked to do or as a check on the day's progress: were they ahead of or behind schedule?

As part of the orientation process, each of the company's procedures manuals has sections in common and appears to be hybrids of other copies; origin unknown. One addendum to these manuals takes the form of a condensed handbook produced for each new staff member, whether working in an instructional capacity or not, and requests he/she answer specific questions after each section. The answered questions are then scrutinised and reviewed by the training or operations manager and then held as proof the new staff member has partly fulfilled an orientation to the company and advice has been given regarding legislative requirements. Examples can include knowledge regarding risk management procedures.

Included in the company procedures manuals is a section that gives examples of the daily rosters and the specific tasks expected of each of the instructional staff, together with an outline of the briefings to be given at each particular activity. For instance:

0800 – 0900	On way to reef	Instructors to do morning briefing. Collect forms, code and formalise dive groups.
0900 – 0930	Conduct dive briefs	In this latter time frame, a briefing may be given to the passengers exactly as written in the handbook and procedures manual but generally read from a laminated form. These artifacts offer confirmation of the tasks instructional staff perform during their day-to-day procedures. They are indicators of with whom they interact and in general how they should interact.

4.3.7 Analysing the Data

In the early stages of data gathering I commenced making copies of all text materials, including field notes, interviews, questionnaires, documents and written artifacts (Patton, 1987, p. 146). The data collected were classified into predetermined categories: this follows Silverman's (2011, p. 58) primary rule of data collection: getting "down to analysis as early as possible". This process assisted in avoiding the dilemma that Merriam (2002) describes as:

> To wait until all data are collected is to lose the opportunity to gather more reliable and valid data; to wait until the end is also to court disaster, as many a qualitative researcher has found himself or herself facing hundreds of pages of transcripts or field notes without a clue where to begin. (p. 14)

Expeditiously, I had each taped interview transcribed by professional secretarial services and catalogued on my computer's hard drive along with those interviews transcribed from digital recordings. These were then duplicated and placed in safe, secure storage, with the duplicates being placed in a similar but remote storage area in case of theft or other catastrophic loss.

From the electronic data I then produced a paper-based copy so that I could more readily scan the information visually. This was particularly useful when in areas remote from any power source and where the use of battery-powered laptops or other electronic device was unwise. An example is a remote freshwater dive site location. The electronic data were screened and all answers to interview questions were collated to give a condensed group of answers that focused on all of the specific issues raised. The procedure worked well as a method of early categorisation that made themes, patterns and structures within the responses begin to become apparent (LeCompte & Schensul, 1999; Silverman, 2011)

Hard data gained from the artifacts regarding, among other items, desired competencies, necessary work functions, and on-site deck and diving supervision were used to triangulate information produced by interviews and direct observations.

The protocols required in almost every situation were already in a documented format contained in the respective dive operators' operations manuals. These manuals could readily be accessed and were useful in confirming data obtained from interviews and direct observations. However, the interviews and direct observations required coding and filtering to ensure that chunks of information could also be readily accessed to relate to, and assist in, the interpretation of data which addressed the three research questions. An indication of this coding and its recording is illustrated in Table 4-1.

As a baseline for information regarding the participants and to ensure anonymity and create easily referenced demographics, each participant was given a pseudonym and code number. They were tabulated by age range, original occupation, years working as a diving instructor and years in the present position as a diving instructor. I could then relate their comments and activities to former experience and evidence of the social capital that was reflected in their performance, maturity and development as a diving instructor. For instance, the first instructor interviewed from the first dive operation was given the pseudonym Clive and #0101, a landscaper, age range 22-25, one year as an instructor but 2.5 years with that dive operation. The fourth person interviewed from the second dive operation was given the pseudonym Dennis and #0204, an English teacher, three years as a diving instructor and one year with the dive operation.

From the interview transcripts, I created three files, A – C, one for each research question. Each file contains answers to the sub-set of questions used to give sufficient data to answer each of the three research questions. For instance, for File

A: "How does a group of recreational diving instructors understand what their required competencies are?" the first question in the sub-set of questions is "What do you think your job is supposed to involve in the position you are holding now?"

The answers related to this are tabulated as follows:

0104: Being the senior instructor on the boat I'm expected to sort out all the paperwork for the rest of the day. General running of the boat, introductory dives, open water course, advanced. Instructing only for five months it's quite a big role to take on.

0105: Various. Check the gear, meet and greet, sign them on, guiding certified divers, intro briefing. Gearing up divers, getting them in the water.

Answers to this particular question give clear comparisons as to what all of the instructors do with their day and link well with whom they interact and how. Direct observation was also tabulated in a similar manner, giving chunks of information that reflected on the day's activities for the instructors in each of their respective dive operations. Much of this was consistent with the day's agenda as prescribed in each of the respective dive operator's manuals. However, the attitudes and behaviours of the individual instructors did vary and were worth noting, particularly with their effect on peers and customers. In particular, one tangible measure of performance was the success rate of the different instructors in producing introductory divers who appeared pleased with their experience and in many cases completed another dive. These data were noted and later coded to condense the information, giving a clearer picture of how the individual instructors approached their work and interacted with others. For instance, the simple action of taking certified divers for their first dive, as outlined in Table 4-1, was qualified by coding to describe the less than positive manner that in the example tabled Bruce, instructor #0106, performed the task, with a less than pleasant reaction from the divers put in his charge. The coding device I used to identify the instructor is the same as the coding device I used for the interviews.

Date	Dive Operation	Instructor #	Action	Peers / customer involved	Behaviour
24/05/2008	DO1	0106	CD	3C	-

Table 4-1 Section of observation schedule

Note: This indicates the date of observation, dive operation and instructor by the code already established; CD represents certified divers; 3C represents the number of customers and the negative sign represents the negative behaviour of the instructor.

Converging themes appeared from this triangulated method of data collection to produce results that appeared trustworthy. One such theme was the relationship between a certain demographic of instructor and introductory diver success. But trustworthiness is a debatable issue and as stated by Lincoln and Guba (1985) provokes the question as to whether the inquiry's findings are "worth paying attention to" (p. 290).

4.4 Trustworthiness

The most fundamental question regarding trustworthiness in the evaluation of this form of inquiry is "How can an inquirer persuade his or her audience that the findings of an inquiry are worth paying attention to, worth taking account of?" (Lincoln & Guba, 1985, p. 301). How, for instance, can the acquisition of competence by a recreational diving instructor in this region compare credibly with what occurs in another region? In this situation under study are the findings a credible gauge of what occurs more broadly? Eisner (1991) believes that inquirers will specifically be considering the following three features of qualitative research:

Coherence	Does the story make sense? How have the conclusions been supported? To what extent have multiple data sources been used to give credence to the interpretation that has been made? (p. 53)
Consensus	The condition in which the readers of a work concur that the findings and/or interpretations reported by the investigator are consistent with their own experience or with the evidence presented. (p. 56)
Instrumental Utility	The most important test of any qualitative study is its usefulness. A good qualitative study can help us understand a situation that would otherwise be enigmatic or confusing. (p. 58)

Can this study direct us appropriately in the manner where the "Guides call our attention to aspects of the situation or place we might otherwise miss" (p. 59)? Are the guidelines and criteria used in this research therefore indicating trustworthiness?

Most quantitative and some qualitative research use the criteria of validity and reliability to establish the trustworthiness of results. However, Lincoln and Guba (1985) state that these criteria are used with the expectation that results are isomorphic with the reality they purport to describe (p. 218) and where the study produces results that are stable and replicable (p. 219). They argue that in the social constructivist paradigm, in which this case study is embedded, reality is multiple and intangible, designs are emergent and different investigators may carry out the same study along different lines (p. 219). It is from this apparent contradiction that they recommend the use of the alternative criteria of credibility, transferability, dependability and confirmability (p. 219). A comparison of Lincoln and Guba's proposed criteria with the analogous criteria of quantitative is listed in Table 4-2.

Traditional criteria for judging quantitative research	Alternative criteria for judging qualitative research
Internal validity	Creditability
External validity	Transferability
Reliability	Dependability
Objectivity	Confirmability

Table 4-2 Comparison of criteria for judging the quality of quantitative versus qualitative research

Note: This illustrates the comparative expressions used in qualitative and quantitative research (adapted from Hoepfl, 1997, p. 8).

The situation studied is variable, with many participants exhibiting among other factors - differing skill levels and learning abilities, exhibiting a multiplicity of actions and holding and expressing an equal variety of desires and ambitions. It can hardly be considered a stable framework from which other similar investigations into the phenomena studied and using quantitative criteria of judgment will draw exactly the same conclusions. To answer the research questions asked in this thesis, and to establish any measure of trustworthiness in the conclusions this study produces, more flexible criteria for judgment must be used. It is therefore to the alternative criteria recommended by Lincoln and Guba (1985) that this study conforms: credibility, transferability, dependability and confirmability.

4.4.1 Credibility

Lincoln and Guba (1985) argue that credibility is an evaluation of whether or not the research findings represent a "credible" conceptual interpretation of the data drawn from the participants' original data (p. 296). Elements of a study that indicate important factors in avoiding threats to the establishment of the credibility of a study's findings are suggested by Maxwell (1996), Miles and Huberman (1994) and Robson (2002). Paraphrasing from Shenton (2004), recommendations are:

1. The adoption of research methods well established in qualitative investigation in general [where] the specific procedures employed, such as the line of questioning pursued in the data gathering sessions and the methods of data analysis, should be derived, where possible, from those that have been successfully used in previous comparable projects.
2. The development of an early familiarity with the culture of participating organisations.
3. Triangulation – as earlier described on page 158.
4. Tactics to help ensure honesty in any participants contributing data. [The information and consent forms as evidenced in Appendix A outline the neutrality of the research with regard to non-disclosure of information given and the voluntary nature of their participation.]
5. Background, qualifications and experience of the investigator.
6. Member checks where participants are asked to read transcripts made from data gathered during interviews and observations to ensure accuracy of interpretation.
7. Prolonged involvement assisting in the reduction of both reactivity and respondent bias. (pp. 2-6) [The time taken within each dive operation was sufficient to permit the development of trusting relationships where the respondents were less likely to offer biased information.
8. On the other hand, although extended involvement could produce *researcher bias*, the periods of study in each dive operation were deliberately limited to assist in preventing this occurrence.]

These factors should offer a high degree of credibility of the data gained and reported on. In an endeavour to produce results that could be transferred to a more generalised population, three separate dive operations were chosen for this study.

4.4.2 Transferability

Lincoln and Guba (1985) comment that generalisability is "an appealing concept", because it allows a semblance of prediction and control over situations (pp. 110-111), but that the existence of local conditions "makes it impossible to generalize" (p. 124) unless, as Bassey (1981) suggests, practitioners believe their situations are similar to that described in the study, and therefore they may relate the findings to their own positions. (p. 74). I was keenly aware that during the course of this research one criticism of its findings was that it would be considered relevant only to bustling tourist destinations and not to more tranquil, less populated areas or more urban settings with supposedly different customer demographics. However, certain aspects of this study may have global commonalities such as the formula for training a non- diver through the various certification levels to becoming an instructor, what these certification levels represent and customer demographics. These aspects alone suggest that there are certain elements of the study that are generalisable or transferrable, but even so, as Lincoln and Guba (1985) state, "transferability is the degree to which the findings of the research can be applied or transferred beyond the boundaries of the research project" (p. 316).

My job was to produce information that described the study undertaken in context and with sufficient contextual information about the fieldwork to enable the reader to make such a transfer. From here, it is the reader's judgment which determines how transferrable that information is in relation to his or her own particular contexts.

Shenton (2004) has suggested the contextual issues that have been defined to indicate the boundaries of this type of study are the:

1. Number of organisations taking part in the study and where they are based.
2. Restrictions in the type of people who contributed data.
3. Number of participants involved in the fieldwork.
4. Data collection methods that were employed.
5. Number and length of the data collection sessions.
6. Time period over which the data were collected (p. 70).

These issues have been described previously in earlier chapters to provide "solid descriptive data" or "thick description" to improve the transferability of an analysis (Patton, 1990, p. 375). From this, the transfer of ideas to other contextual settings should also be viewed as dependable.

4.4.3 Dependability

Consideration and use of any ideas generated from this research should be able to provide any reviewer with evidence that, if it were reproduced with the same or similar respondents in a similar context, its findings would equally be similar. Lincoln and Guba (1985) state that dependability is an assessment of the quality of the integrated processes of data collection, the data, findings, interpretations and

recommendations (p. 316) and propose the use of an inquiry audit to enhance the dependability of the research project. With this performed, reviewers may examine both the process and the product of the research for consistency (p. 317). In the production of a research audit trail, this research project conformed to Lincoln and Guba's (1985) suggestion of giving priority to six categories of information:

1. Raw data in the form of written field notes, audio and digital recordings.
2. Data summaries and theme identification.
3. Data reconstruction and clustering of themes into categories, interpretations and final report.
4. Process notes by way of methodological notes.
5. Information about intentions and disposition: the research proposal and personal notes.
6. Instrument development information: questionnaire design and semi-structured interview questions (p. 114). (Refer Appendix A).

Further to this participants were invited to, and in many cases did (n = 22), review their interview statements and the interpretation given to them to assist with confirming the trustworthiness of the data gathered and analysed in this study.

4.4.4 Confirmability

Lincoln and Guba (1985) regard confirmability as a measure of how well the project's findings are grounded in the data collected (p. 318) while Guba and Lincoln (1989) later suggest, "data, interpretations, and outcomes of inquiries are rooted in contexts and persons apart from the evaluator are not simply figments of the evaluator's imagination" (pp. 242-243). One accepted strategy that contributes to confirmability as much as it does to dependability is a comprehensive and transparent audit trail to ensure, as much as is possible, that the data used in the research are true representations of the participants' intentions and the researcher's biases are minimised. With access to both data and participants from this environment, reviewers are able to check that descriptions, explanations or theories about the data contain the typical and atypical elements of the data, deliberately try to discount or disprove a conclusion drawn from the data and obtain validation from the participants themselves (Davis, 1997; Silverman, 2011).

Further to this, concern was also given to the ethical and political implications that may be cause for doubt regarding any bias or prejudice I may have, and could contribute to distortion of both data and findings. In an effort to avoid this dilemma, I have performed this research with no financial assistance from any of the dive organisations or training agencies involved in this project and used exactly the same strategies for data production in each operation studied.

Because of the choice of a qualitative paradigm for this study, the data interpreted from the participants' actions and voices offer multiple realities, providing the propensity for alternative interpretation by alternative researchers. In the endeavour to ensure trustworthy findings, efforts have been made to conform to the established strategies for this form of inquiry as listed in Table 4-3 and to maintain vigilant avoidance of those influences that may lead to distraction, prejudice or bias in the data so obtained.

Quality Criterion	Provision made by researcher
Credibility	Adoption of appropriate, well recognised research methods Development of early familiarity with culture of participating organisations. Tactics to ensure comprehensive disclosure by informants Description of background, qualifications and experience of the researcher. Member checks of data collected. Thick description of phenomenon under scrutiny. Examination of previous research to frame findings.
Transferability	Provision of background data to establish context of study and detailed descriptions of phenomenon in question to allow comparisons to be made.
Dependability	Employment of "overlapping methods" (p. 71). In-depth methodological description to allow study to be repeated, in as much as it is possible to do so.
Confirmability	Triangulation to reduce effect of investigator bias. Admission of researcher's belief's and assumptions Recognition of shortcomings in the study's methods and their potential effects. Use of diagrams to demonstrate "audit trail" (p. 72).

Table 4-3 Provisions to address Lincoln and Guba's (1985) four criteria of trustworthiness

Note: This illustrates the methods adopted to conform to the quality criteria as suggested by Guba (1985). Adapted from Shenton (2004, p. 73).

4.5 Ethical and political considerations

One of the main aims of this thesis has been to produce trustworthy findings which can further understanding and offer positive suggestions for improvement of the recreational diving industry through better negotiations with its members. This objective is unlikely to be achieved through falsification, deceit, bias and prejudice but rather through transparency of purpose and agenda and with the researcher and participants in the study as completely aware as possible of all factors affecting their engagement with the project.

To achieve these ideals the specific areas of concern considered, and acted upon in the design and conduct of this project, were those of: voluntary participation; prevention or avoidance of psychological harm; confidentiality, the researcher's identity; and the accuracy of analysis and reporting. Political considerations were reviewed with regard to the substance and the use of the research findings.

4.5.1 Ethical considerations

Blaikie (2000) states that "The major ethical issue in most social research is the treatment of human respondents or participants" (p. 20) and it is the researcher's responsibility to "exercise great caution to minimise risks" (Stake, 2000, p. 448). It is owing to this injunction that I observed what Kvale (1996) termed the ethical issues of the seven research stages as listed below:

Thematising	The purpose of an interview should, beyond the scientific value of the knowledge sought, also be considered with regard to improvement of the human situation investigated.
Designing	Ethical issues of design involve obtaining the subjects' informed consent to participate in the study, securing confidentiality, and considering the possible consequences of the study for the subjects.
Interview Situation	Here the confidentiality of the subjects' reports needs to be clarified and the consequences of the interview interaction for the subjects to be taken into account, such as stress during the interview and changes in self-image. Also the potential closeness of the research interview to the therapeutic interview should be considered.
Transcription	Here again is the issue of confidentiality, as well as the question of what is accurate written transcription of an interviewee's oral statement.
Analysis	Ethical issues in analysis involve the question of how deeply and critically the interviews can be analysed and of whether the subjects should have a say in how their statements are interpreted.
Verification	It is the ethical responsibility of the researcher to report knowledge that is as secured and verified as possible.
Reporting	Here again it is the issue of confidentiality when reporting the interviews, as well as the question of consequences of the published report for the interviewees as well as for the group or institution they represent. (p. 111)

Concern for the free and voluntary participation of the respondents was the first issue dealt with by producing an information sheet and consent form (Appendix A), initially approved by the Ethics Committee of the University of Southern Queensland's Office of Research and Higher Degrees (Appendix G), and then tendered to the principals of the three dive operations approached for inclusion in the study. These forms made it patently clear what the purpose of my research was and that any interview performed or answers to any questions asked were to be offered voluntarily with no coercion from either myself or their management.

One slight deviation from this was when one particular group who did, on an individual basis, agree to be interviewed but consistently either failed to turn up at the appointed time and/or gave excuses for breaking appointments. To me, it appeared to be a case of deliberate frustration. I also had lingering doubts that there had been some politically motivated and external coercion exerted to prevent any discussion with me. The reason I suspected this was that the training agency to whose standards I adhere is in direct competition with the training agency adhered to by those participants with whom I had difficulty in arranging interviews. Although my affiliation was made clear, I suspected myself to be a victim of what Punch (1994) observes "In much fieldwork there seems to be no way around the

predicament that informed consent - divulging one's identity and research purpose to all and sundry – will kill many a project stone dead" (p. 90).

On presentation of the facts regarding the situation to the operations manager of this particular dive operation, and despite emphasising that I would forgo any interview if this was their decision, his insistence on their co-operation saw my next request for interviews responded to promptly, courteously and enthusiastically. This change of attitude was clearly a result of his intervention and although the result was appreciated I was initially concerned that the answers to my questions from this group would be sycophantic regarding their management or restricted and undertaken with care not to make any otherwise offensive or critical comments. Their answers reflected no such obsequiousness or reluctance.

There was no real concern regarding physical harm to the participants during their participation other than what they may have encountered during their everyday working experiences. Nevertheless, risks of harm do not necessarily relate to distress owing to inappropriate physical action: they can instead result from lack of consideration in the transfer of, or perceived transfer of, information collected through either observation or interview. A simple example would be of an interviewee expressing distaste for certain company protocols but in hindsight being fearful of dismissal or retribution if this opinion was relayed to that person's supervisor. It is in order to alleviate this type of concern that individuals involved were clearly made aware of the nature of the project, how the research procedures might affect them, how their anonymity would be assured, how their information was to be treated in confidence and their right to withdraw from the study at any time (Blaikie, 2000, p. 20). A consent form providing this information is found in Appendix A.

Privacy and confidentiality were safeguarded by shielding all participants from any public disclosure of information through the use of pseudonyms in the first instance and with original documentation and subsequent transcripts being stored at a secure location. However, as Christians (2005) comments:

> Despite the signature status of privacy protection, watertight confidentiality has proved to be impossible. Pseudonyms and disguised locations often are recognised by insiders. What researchers consider innocent is perceived by participants as misleading or even betrayal. What appears to be neutral on paper is often conflictual in practice. (p. 145)

No doubt the former concern is quite true: "insiders", or those associated with this study in this limited geographical area, will be aware of others involved, and possibly recognise some statements that are reproduced in this thesis as belonging to particular people. As to the latter concern, it may be that the question posed by Christians (2005) "and who is blameworthy if aggressive media carry the research further?" (p. 145) becomes an issue at some later date. I do not think that this research will remain unread by members of the diving fraternity and there is always the possibility that there will be those who would wish to "cherry pick" statements or phrases to suit their own individual agendas.

The steps taken with regard to accuracy took into account not only the integrity of reporting data directly from transcribed interviews but also my role as the researcher and any possibly undue influences that may have been surmised as a result of this alone. A sufficient audit trail has been established to prove to any reader that what has been recorded is true and accurate. This included reflections by many of the participants and the opportunity to change any of the statements made as transcribed from the original interviews. However, as intimated earlier, there appeared to be a concern regarding my association with one particular training agency when questioning participants adhering to the standards of another training agency. This highlighted one of the concerns that could create a limitation on the integrity of the research. With reference to this and other concerns regarding my role as researcher, I refer to Patton's (1990) work that suggests there are four ways in which a researcher might unduly influence the data of a qualitative inquiry:

1. Reactions of program participants to the presence of the evaluator;
2. Changes in the evaluator (the measuring instrument) during the course of the evaluation – that is, instrumentation effects;
3. The predispositions or biases of the evaluator; and
4. Evaluator incompetence (including lack of sufficient training or preparation) (p. 474)

These factors can be summarised as the evaluator's presence, different researcher, evaluator effects and professional incompetence.

It was important, as Stake (2006) suggests, to "identify affiliations and ideological commitments that might influence [our] interpretation – not only for the contracting parties but for the readers of reports, and, of course, for ourselves" (p. 87). This was one of the first issues that I made transparent together with what Patton (1990) suggests as a method to minimise any undue influence created *by the evaluator's presence*: to allow an appropriate period of time for the researcher and participants to "get used to each other" (p. 473). The abbreviated time I spent with the participants from the dive operation presenting reluctance initially to co-operate with interviews was probably indicative of not following this suggestion. With this lesson learned, more time was spent developing trusting relationships with the participants before continuing with the interviews and requesting information further to what I could gain from observation. Patton (1990) also draws attention to a situation that could become a concern if the evaluator were to undergo a prolonged period of participation within the research domain and "go native" (p. 474): becoming part of the culture being studied and thus changing the researcher and biasing the data. On the other hand, Tresch (2001) suggests that:

> Processes of learning, including hermeneutic research, take one by stages along a continuum between one's familiar worldview and an alien one. I suggest that the endpoint of such a continuum, that of "going native," is the merely ideal although logically necessary point from which to understand both of these objects of study. (p. 314)

As I stand towards the end of this continuum owing to the fact that I have been immersed in the diver training industry for 30 years, I must have already "gone

native" and should be considered as not likely to have changed my attitude to the situation during this research process.

It is also for this very reason that having successfully continued in this industry for this period of time it is reasonable to expect from me a high degree of professional competence in the conduct of this study. During my tenure in the industry I have trained more than 2000 instructors, established several instructor training facilities (principally in Australia and New Zealand) and gained many awards for outstanding contribution towards instructor development. Living and working in the geographical region in which this study has taken place and writing regular articles for the *Dive Pacific* magazine have also made me a well-known and recognised individual; I have a reputation for being a highly competent professional and there is no reason to doubt I would approach this research in a different fashion from that.

It has been noted earlier that I adhere to the standards of one training agency whereas one of the dive operations adheres to another. This did cause a temporary pause in gaining data from interviews as it is clear that certain values between the two agencies are in conflict with each other. These conflicting values, however, are neutral in relation to the main thrust of this research and this fact was emphasised at each interview. I was keenly aware of Patton's (1990) observation regarding *evaluator effects*: that a qualitative researcher may have unknowingly imposed his or her values, beliefs or biases onto the participants and may have thus unduly influenced the data, and that this is perhaps the most common criticism of any qualitative inquiry (p. 475). To obviate this issue I not only emphasised the neutrality of the project regarding training agency differences but also informed each participant about my relevant experience and the fact that all interview transcripts and notes would be available for audit and/or alteration by all participants prior to commencement of final data analysis.

4.5.2 Political considerations

Political influences on research could include its focus, access, publication of findings and use made by a sponsor of the findings. The case study in question was ethical, feasible and self-funded by the researcher. This did not create an obligation to any training agency, diver retail organisation or equipment manufacturer that may affect the credibility of the findings of the research. It may, however, allow the dive organisations in the study the possibility of using the results to their best advantage. On the other hand, access to company employees may not, in certain situations, have been granted by an organisation to the researcher owing to fear of exposure, general dislike or distrust of research and/or researchers (Robson, 2002, p. 74). However, as strong relationships had already been forged, and with more than six organisations in the local area already indicating their desire for involvement in this study, it was my expectation that this situation would not arise and my experience that it did not.

4.6 Summary

This chapter has discussed the study's qualitative orientation and its social constructivist paradigm with reference to its epistemology, ontology and axiology, elements that very much hinge on the perceptions and beliefs of the participants. The case study approach used in this research was described and, with the role of the researcher defined, an explanation of the research process has been covered,

including data gathering and analysis, culminating in a discussion of and justification for using the criteria for trustworthiness and the ethical and political limitations that may affect a study of this nature.

The first four chapters have now set the stage for a discussion of the data gained during the progression of this study and as to how those data answers the research questions posed. Chapter 5 now proceeds to describe the data gathered and analysed to answer the first of the research questions: “How does a group of recreational diving instructors understand and demonstrate what their required competencies are?”

Chapter 5 Instructional Competence

The pathway to competence is characterised mainly by the ability to recognise features of practical situations and to discriminate between them, to carry out routine procedures under pressure and to plan ahead. Competence is the climax of rule-guided learning and discovering how to cope in crowded, pressurised contexts. (Eraut, 1994, p. 125)

Competence is a combination of skill, attitude, knowledge, behaviour, confidence, and experience. As with the perception of risk, each adventurer has a perception of personal competence that may or may not be accurate. We can never know actual values of risk and competence with absolute certainty. At best, we may only estimate them. (Priest & Gass, 2005, p. 19)

5.1 Overview

In this chapter I commence by reviewing how recreational diving instructors understand and display basic understanding of their required competencies through the respective artifacts in use within the community of practice in which they are embedded. I then present my data and its subsequent analysis. This analysis is undertaken reflecting on the literature review as presented in Chapter 2 as well as the conceptual and methodological frameworks and study design as established in Chapter 3 and Chapter 4 respectively. This chapter looks specifically at those elements that are concerned with answering the first research question: How does a group of recreational diving instructors understand and display what their required competences are? In this regard, based on my analysis of the relevant data, the expression "competences" represents the individual capabilities that make up the sum total of what I express as "instructional competence" and which I have defined earlier in Chapter 3 as "compliance with accepted instructional and organisational standards simultaneously reflecting both exemplary diving and human interaction skills".

The data analysis conducted to address the first research question indicates that diving instructors understand their competencies in several ways: reflecting on the skills learned during formal training en-route to certification as instructors (such as how to demonstrate mask clearing whilst underwater or rescuing a distressed diver at the surface); role model performances as demonstrated within the community of practice in which they are embedded by the instructors with whom they are working and/or by whom they are being mentored during the early part of their employment; learning boating procedures to enable the smooth flow of deck and diving activities; and learning government regulations, local codes of practice and company protocols and in particular how this impacts on already presumed understandings and how to interact and communicate with an eclectic group of both colleagues and customers.

From observation and the interview data as presented in this chapter, this presents competence as requiring the exercise of considerably more than the passive application of low level knowledge and skills but rather the employment of capabilities composed more substantially of "social competencies connected with communicational skills, social competencies connected with co-operational skills, professional competencies, personal competencies and intercultural competencies" (Szabo & Csepregi, 2011, p. 51).

Diving skill competency is demonstrated during the process of training or assisting in training introductory divers, or reviewing dive skills with certified divers. The process of how and where these skills are conducted with introductory or certified divers is learned by watching the role model examples of colleagues, then performing the process under guidance. Government regulations and local codes of practice are first reviewed at the head office of each dive operation but are available on board the respective vessels for ready reference: the impact of these documents is greater restrictions on certain elements of diver training compared with training agency standards, a perfect example, as mentioned earlier, being the minimum age allowed to learn to dive. For instance, the PADI training agency standards have a permissible age of 10 years old to commence open water training but the local Code of Practice limits the age to 12 years old. It is notable that all training agencies also have an overriding statement in their general standards to the effect that local government regulations and by-laws take precedence over training agency standards. Diving instructors must be cognisant of this information and that pertaining to company protocols, and be able to apply this knowledge.

This knowledge is demonstrated by the manner in which customer documentation is reviewed, particularly in relation to medical statements, and acted upon accordingly. For instance, if a customer indicates she is taking one of the many commonly used medications, the instructor should be able to determine as to whether the customer is fit or unfit to dive; or whether medical advice is required before a decision is to be made. For instance, taking progestin (an oral contraceptive drug) is not a contraindication to diving unless possibly used in conjunction with other drugs, whereas albuterol, used for an asthmatic condition certainly is. This exercise of judgment is dependent on the instructor's knowledge of relevant medical conditions and can vary from a definite yes/no decision to one that must be confirmed after advice from a medical authority. The essence of whether or not an instructor is competent in this context is the ability to produce a safe and sensible decision.

However, one competency to be learned and demonstrated appears to encompass and affect all other acquired competencies: effective inter-personal communication skills. This is a crucial finding of this study and is mirrored by the work of Szabo and Csepregi (2011) in their analysis of the principal components and variables of competencies found important for knowledge sharing (p 51). It is significant that five of the seven key components they identify concern social, personal and intercultural competencies. Indications of how this learning takes place are very difficult to discern and this is most probably learned alongside other skills in more visible learning situations. For instance, in readying customers for an introductory dive experience, there are inevitably some customers who are apprehensive. Competent instructors speak to these customers in calm, quiet, measured and reassuring terms. The new instructor should see from this type of

experience that compliance and trust are more easily gained using this method than by a more dictatorial and demanding approach.

Evidence of learning by new instructors is displayed not only by imitating (or incorporating) the physical methods employed by experienced instructors in the conduct of activities, but also by using communication skills that they have seen applied. This may even be contrary to their presumptions about learning from prior occupational backgrounds. For example, some schools teach using the yell and point intimidation method; students passing through these high schools may come to believe this is a valid teaching method (Linsin, 2011, p. 1). An old colleague and now navy diving instructor uses the penalty of 20 pushups for incorrect performance (I. Dobo, personal communication, November 24, 2011). Arguably, neither method of training is acceptable in the recreational arena.

Competency acquisition in this context is thus a complex mix of formal, informal and incidental learning displaying practical dive and boating skills, the application of regulatory and company protocols and the development of human interaction skills. These processes invariably occur simultaneously, underscoring the achievement of competencies as a complex and contextualised product of engagement in the situated learning environment. Further to this, it is generally expected by all stakeholders that competence is achieved in a relatively short time frame and maintained by consistent auditing through observation and documented proof of knowledge currency. For instance, instructors must complete certain recertification programs such as cardio-pulmonary resuscitation (CPR) each year and take part in frequent contrived and often spontaneous rescue exercises to challenge skills and knowledge.

Poor performance or neglect in completion of required recertification programs will result in an assessment of “not yet competent” and disallow the instructor from continuation of instructional work until the deficiencies are remedied. Although all instructional staff should be conscious of the necessity of certification currency and take steps themselves to maintain currency of certification, it is common practice for an employer to give employees adequate warning of certification renewal dates. Therefore, employees who cannot fulfil certification requirements by the required date will be considered incompetent by their employer (whether this is due to a lack of ability or simply to laziness) and almost certainly and immediately replaced with someone who can provide proof of his or her competency. Table 5-1 represents an explication of the data generated in answer to the first research question.

Section	Component	Rationale
5.2	Definition of competence	Production of a clear and specific definition integrating ideal factors necessary for achievement.
5.3	Skill expectations as defined by training agencies; instructors; dive operations indicating the three principal tasks delegated to instructors – teaching introductory diving, beginner classes and deck (dive team) supervision; and of government agencies	Description of the skill requirements as defined by key stakeholders in the recreational diving industry
5.4	Bridging the gap between theory and practice	Clarifying the distinction between explicit and implicit understandings of instructional competencies
5.5	Instructors as individuals	Presenting the participants of the study demographically and indicating the eclectic mix of backgrounds and potential strengths and limitations
5.6	Competencies displayed through compliance with instructional standards; organizational standards; exemplary diving skills; and human interaction skills.	Description of competence observed and/or achieved

Table 5-1 Explicating instructional competence

Note: Each component and its rationale is described in the following subsections 5.2 to 5.6

Starting with a working definition of competence that can be applied specifically to the recreational diving instructor this chapter continues with an outline of the particular skills that are required and expected by training agencies, instructors, dive operations and government agencies. It then reviews the transition from theory into practice, the demographic data recognising whom the participants in the study are, and how they, as individuals within the respective dive operations, display their competencies.

5.2 A working definition of competence

As was discussed in Chapter 2 and Chapter 3, there are many definitions given to competence that may or may not be specific to particular disciplines (Bowden & Masters, 1993; Burgoyne, 1993; Hoffman, 1999; Sternberg & Kolligian, 1990; Tovey & Lawler, 2008) but competency is barely referenced with respect to the recreational diving industry. Harris et al. (1995) cite the National Training Board (1992) that gives the following definition:

> The concept of competency focuses on what is expected of an employee in the workplace rather than on the learning process; and embodies the ability to transfer and apply skills and knowledge to new situations and environments. This is a broad concept of competency in that all aspects of work performance, and not only narrow task skills, are included. It encompasses the:

- Requirement to perform individual tasks (task skills);
- Requirement to manage a number of different tasks within the job (task management skills);
- Requirement to respond to irregularities and breakdowns in routine (contingency management skills);
- Requirement to deal with the responsibilities and expectations of work environments (job/role environment skills), including working with others. (p. 20)

Where practical application of this concept fails in the recreational diving instructor learning process is that in the formal segment of training only brief mention is given to the "management skills" necessary to support the process of diver training or what competencies are required to "respond to irregularities and breakdowns in routine" and the issue of "working with others" (National Training Board, 1992, as cited in Harris, et al., 1995, p. 20). Examples of these instances would be the correct processing of paperwork prior to and post training of beginner divers, and how to deal with difficult customers/learners/colleagues. Deficiencies in these and other areas are compensated for partly by the information contained in the various operations manuals and other artifacts provided by the respective dive organisations. Further compensation may also be afforded by the informal and incidental learning processes experienced when in the company of colleagues and in the communities of practice in which new instructors find themselves.

Ultimately, and from experience within these communities of practice, competence may be described as "an essential ingredient of being capable" (Hase & Davis, 1999, p. 3) where, as specifically expressed by Cairns and Stephenson (2009): "Capability is often associated with personal qualities such as risk taking, intuition, flexibility, initiative, sharing, personal responsibility and courage whereas competence is associated with content in relation to work related knowledge skills and attitude" (p. 3). In other words, competence may be defined as the result of getting things done, whereas capability defines the manner in which they get done. For instance, a diving instructor may show competence by adhering to training standards and taking what he/she considers to be a manageable group into the water to evaluate open water diving skills and getting the job done, but how capable was he/she of determining the size of the group? Lack of capability in this situation could result in taking a larger group than the instructor could actually manage.

Given the many and varied definitions given to competence and the capability required of an individual to fulfil a particular role, one that may be compactly applied to the recreational diving situation for the purposes of this study is that to be competent a recreational diving instructor should ultimately be compliant with accepted instructional and organisational standards simultaneously reflecting both exemplary diving and human interaction skills.

In accordance with this definition, it is therefore clear that once employment is commenced, a significant element in the formula leading to the achievement of this level of competence is potentially through practical involvement within the communities of practice located in the immediate workplace. A certain competence with human interaction skills, though presumed of all beginner employees, is barely discussed in the theory leading up to instructor certification but should assuredly be developed in practice.

5.3 Skill expectations

Regardless of what is to be learned during their future employment, there are basic skills that new instructors are expected to have as a result of their prior diver training. It is more often than not presumed by both the newly certified instructor and the employer that these skills are already developed sufficiently to operate as an instructor with little further learning to do other than learn specific company procedures. These expectations are augmented by the skills and capabilities listed in Government Standards and local codes of practice as laid out by the OWH and S. For instance, OWH and S impose more specific requirements regarding certain skills learned during earlier diver training - such as the obligations demanded when accounting for snorkelers and divers. However, skill expectations and required competencies are not necessarily mutual. Skill means "an ability that has been acquired by training and makes use of the implicit memory, to apply knowledge to standard situations, and to use know-how to complete standard tasks, and to solve standard problems" (Hoffman & Nagel, 2002, p. 2), and may well be described in detail in a company's operation manual. Skills however, should be considered a subset of competency where:

> A competency is more than just knowledge and skills. It involves the ability to meet complex demands, by drawing on and mobilising psychosocial resources (including skills and attitudes) in a particular context. For example, the ability to communicate effectively is a competency that may draw on an individual's knowledge of language, practical IT skills and attitudes towards those with whom he or she is communicating (OECD, 2005, p. 4)

Competencies thus incorporate the basic learned skills in which any diving instructor is presently formally trained but there is considerably more knowledge to be learned, most of which is learned in an informal manner. In reference to the present Australian VET policy of competency based training, this indicates one of its key weaknesses where there is a focus on criteria but minimal, if any, description as to how to enable effective communication of desired performance standards (Smith, 2010). This reflects the apparent deficiencies of early training in core concerns such as communication and interpersonal skills, as was stressed earlier in Chapter 2 (Barnlund, 2008; Berko, Aitken & Wolvin, 2010; Bodie, 2011; Clarke, 2010; Hargie, 2011; Iverson, 2008). It is effective communication that lies at the very heart of how instructors develop the competencies they require and leads us to what these competencies should be and how they are developed and, ultimately, displayed.

The elements at the core of the first research question, "How does a group of recreational diving instructors understand and display what their required competencies are?" are in two parts. The first part questions how instructors understand what competencies they should have or, in other words, what criteria they use to ascertain the abilities and skills they should possess. The second part concerns how instructors display their competence when they perform those skills. For instance, if they are required to be competent at mooring the stern of a dive vessel, they must first learn that a rope called a hawser is used to fasten the boat to a mooring that has a float attached to it marking its location. Then they must learn how to catch the float and haul the hawser in, and that the fastening method used to connect the mooring to the vessel should be performed in such a way as to ensure the vessel is securely attached and that the hawser will not bind and be difficult to release when they wish to depart from the site. This requires knowledge of terminology and rope handling that is informally learned under guidance. Instructors therefore eventually display this competency after learning each of the critical attributes of the skill via a senior instructor and then by gradually being allowed to accomplish each step of the process until they are allowed to complete the entire task independently.

The key competencies that require skills such as the above example and that have been observed during this study are summarised in Table 5-2 to give a partial snapshot of the extent to which further, informal learning has to be accomplished compared with the earlier, formal learning processes leading up to final instructor certification. This table has therefore been constructed with reference to competencies as listed by the PADI diver training agency, government legislation, codes of practice and dive operation manuals and through observation of the skills required of the study participants within the situated learning environment.

Key Competencies	Description
Formal Training	
Basic diving skills	Ability to self-rescue from limited depths and familiarisation with all entry-level skills of which customer divers should also be capable.
Rescue diver skills	Ability to assist as a safety diver and enact rescues in both supervisory and team playing roles. Competence in first aid and emergency management. First aid certification prerequisite for this course.
Divemaster skills	Able to assist with all instructional activities. High level of fitness through successfully achieving a series of stamina testing exercises to attain this level of certification.
Open Water Scuba	Ability to teach in a classroom, confined and open water situations that are calm, clear and relatively shallow (less than 30 metres of depth). The skill range includes that required for the above three levels of certification.

Key Competencies	Description
Marine qualifications	Coxswains certificate, Elements of Shipboard Safety and Marine Radio Operators Certificate. These are optional certifications that are recommended but not required of instructional staff.
Informal Learning	
Interpretation of Government Standards and Code of Practice	Australian Standards 2299 and 4005 govern the organisation, training, conduct and description of inclusion within commercial diving operations. The Code of Practice, essentially designed by Workplace, Health and Safety Queensland outlines in more specific detail the requirements to which the dive operators in this geographic region must conform. The diving instructor should be familiar with these standards and be able to interpret and conform to their intent.
Conduct of diver training	Organisation and delivery of smoothly flowing training procedures through planning and preparation incorporating contingency plans to ensure skill achievement and course completion.
Clerical skills	Completion of all necessary paperwork generated during the working day inclusive of dealing with challenges generated by medical statements of customers, generation of roster sheets, recording of dive profiles and completion of certification forms.
Retail sales	Assistance in a retail store and/or on board the dive vessel selling a range of items from dive equipment to chocolate bars and T-shirts.
Boatmanship skills	Organisation of deck equipment and ropework, including assistance with vessel mooring, and, when trained, use of a tender (small boat) for transfer of passengers to and from other vessels or mooring platforms.
Equipment maintenance	At a very basic level and limited to repair of mask, snorkels and replacement of cylinder o'rings (the rubber seal between essential parts of SCUBA equipment).
Incidental Learning	
Communication and human interaction skills	Often coming to this job with certain preformed ideas of how to communicate, the methods employed by experienced hands show new instructors how to maximise the communicative effectiveness and compliance of customers who may be apprehensive.

Table 5-2 Key competencies and training context required by diving instructional employees

Note: This table identifies the required competencies and basic descriptions of what each entails, distinguishing also the manner in which the respective competencies are learned.

It is significant that at the end of formal training an instructor is certified, considered already competent by many, and yet may have many more competencies to achieve as evidenced in the observations undertaken in this study and according to the Recreational Diving, Recreational Technical Diving and Snorkelling Code of Practice 2011. For example, in very practical situations, some new instructors are deficient in the most basic of boat handling skills required preparatory for diver training and the communications that must be made with the customers in their care.

Table 5.2 lists in brief the areas of employment in which the new diving instructor is required to achieve competency. These areas are categorised by the manner in which these competencies are achieved: formal training, informal learning and incidental learning. The formal learning processes used in achieving competency in basic diving skills and how to convey information by prescribed teaching methods are those that take place prior to instructor certification with the respective training agencies but this does not cover the entire range of competencies necessitated in the working environment. (Marine qualifications listed are optional and are not discussed in depth here.)

The informal and incidental learning processes listed in Table 5-2 are mentioned during formal training but are rarely experienced unless new dive instructors are employed in a position where they are often mentored, albeit briefly by experienced instructors in both the practical aspects of the job and the communication methods employed to obtain compliance and give assurance to colleagues and customers respectively. Whereas the practical aspects are informally discussed, observed and duplicated, there was no instance that I observed or heard referred to of discussion or reflection between instructors, old and new, regarding how people are spoken to, where and why.

During the formal training process, for instance, the learning instructor is expected to be capable of teaching basic diving skills such as mask removal underwater, replacement and clearing the mask of water. The critical attributes comprising this skill are distinct and easily recognised. Specifically, in this exercise, these attributes could be considered as pausing to take a breath before commencing the skill, mask removal, gentle exhalation through the nose, holding the mask to ensure correct orientation, gentle replacement, hair removal (if necessary) to ensure correct sealing of the mask on the face, looking up and exhaling through the nose to clear the water from the mask. Informal learning gained through this same exercise could be ensuring that other masks are available, possibly a few with corrective lenses and some perhaps for those who may have purchased or chosen incorrectly fitting masks. Incidental learning could include recognising face shapes and the suitability of one mask versus another to improve student comfort. Concern for those who wear contact lenses and have a fear of losing them is soon developed if this were to happen, but more complicated situations may arise where students may find it extremely difficult to achieve the simple task of breathing out of their nose to eliminate water from the mask. Some people are habitual mouth breathers and their manner of respiration needs retraining; the methods by which many teaching skills are eventually learned are not found in a textbook and not often conveyed from mentor to student as there are so many different techniques that can be developed for a wide range of situations.

Competence in successful accomplishment of skill teaching and learning is therefore a blend of formal training in the presentation of a structured skill where the attributes of skill accomplishment may be addressed one attribute at a time but with informal learning guiding the mechanics of delivery (for instance, positioning and contingency plans such as spare equipment) and incidental learning giving the insight as to what method (for instance, to relieve apprehension and get people underwater) is best to use and how it is to be delivered. I now describe in more detail exactly what those competencies entail and in so doing give a clearer picture as to how they are

demonstrated. This description reviews: the instructor skills as defined by the diver training agencies; the instructor skills identified from their own understanding; and the instructor skills as required by the diving operations with whom they are employed or expect to be employed.

5.3.1 Instructor skills – as defined by diver training agencies

At a basic level, typical skills that a diving instructor should be able to perform at role model standard[6] are as listed in the 2010 PADI Instructor manual:

1. Equipment assembly, adjustment, preparation, donning and disassembly.
2. Pre-dive safety check.
3. Deep-water entry
4. Buoyancy check at surface
5. Snorkel-regulator/regulator-snorkel exchange
6. Five-point descent
7. Regulator recovery and clearing
8. Mask removal, replacement and clearing
9. Air depletion exercise and alternate air source use (stationary)
10. Alternate air source-assisted ascent
11. Free-flowing regulator breathing
12. Fin pivot (neutral buoyancy)
13. Five-point ascent
14. Controlled emergency swimming ascent (CESA)
15. Hover motionless for 30 seconds
16. Underwater swim without a mask
17. Remove and replace weight system underwater
18. Remove and replace scuba unit underwater
19. Remove and replace scuba unit on the surface
20. Remove and replace weight system on the surface. (pp. 93-94)

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[6] The expression "role model" in this particular context is used to define the precise actions required to give clear, slow and deliberate in-water demonstration of each of the critical attributes making up the performance of an entire skill. For instance, in point 2 above, the Pre-dive safety check is made up of five key attributes: checking a diver's buddy and that his/her buoyancy control device is attached well and it inflates and deflates properly, the weight belt is on and the belt buckle is capable of free and easy right handed release, all releases are viable, the SCUBA cylinder is full of air and finally the diver's buddy has all items well secured and is dressed and ready for safe entry into the water. As an instructor, each attribute of each skill, when performed, must be exacting and to a level of expertise that would be appropriate for a student to watch and learn from.

Further to this are rescue skills demonstrations at which an instructor should also be able to give role model performances. These are dealing with a/an:

1. Tired diver
2. Panicked diver
3. Response from shore, boat or dock (responsive diver)
4. Distressed diver underwater
5. Missing diver
6. Surfacing an unresponsive diver
7. Unresponsive diver at the surface
8. Exiting an unresponsive diver
9. First aid for pressure-related injuries and oxygen administration
10. Response from shore/boat to an unresponsive (non-breathing) diver at the surface. (pp. 78-82)

These skills should also be able to be used successfully in combination in a series of practical scenarios.

Together with these practical skills are certain exercises challenging stamina and fitness and a set of other experiential activities, including what is essentially attendance at, and assistance with, an open water diver (beginner) course and supplementary dives with certified divers, introductory divers and the setting up of specialty dive scenarios, such as a deep diving specialty. These latter exercises and challenges are incorporated into a Divemaster course (or equivalent), which is immediately subordinate to the IDC and subsequent Instructor Examination (IE) (or equivalent).

At an IDC, and as listed in the PADI Course Director manual (2011, pp. SP 14-16), an instructor candidate is to attend a series of knowledge development presentations and, in turn, present classroom, confined water (pool) and open water presentations that meet target scores. Further to this he/she must also successfully complete a set of diving oriented academic examinations covering physics, physiology, skills and the environment, equipment and the Recreational Dive Planner (RDP). This is all conducted in a time period of eight to ten days, usually followed by the IE, a two-day summative assessment of these capabilities performed by an independent examiner who is either a full-time employee of the diver training organisation, such as PADI, or a contract examiner who is not employed by any other diving establishment but is employed in an occupation involved directly with professional training. The intention of this is to use examiners who have no hidden agendas that may contribute to bias in grading the IE candidate's performance. The details above are those used by PADI, but other training organisations such as SSI and Scuba Diving International (SDI) expect very similar abilities of those who present for instructor certification.

Once this examination is successfully completed and shortly after receipt of his or her certificate, the newly certified instructor may commence diver training in either an employed or an independent position according to the training organisation with which he/she is affiliated. From this point on, as long as instructors complete appropriate paperwork related to the certification of divers whom they train and that there are no ethical issues to answer, the only other demand required of instructors on an annual basis is that they complete a renewal of registration form which may demand little more than an affirmation that they have read and implemented all standards related changes in the previous year.

There is no designated auditor of further instructional activities related to the courses in which that instructor has been examined other than what the employer (if not self- employed) organises within the dive operation's workplace schedule. One example of such an assessment observed during this study and performed by all three dive operations, was a simulated missing diver scenario. The interesting conclusion to each scenario was a self-congratulatory debrief by both deck supervisor and boat captain but in each case the exercise was flawed. The time taken from sounding the alarm to finding and bringing the victim to the surface to commence mouth-to-mouth resuscitation averaged about eight minutes. Although I would consider this a fair result, it should be understood that after four to six minutes brain cells begin to die (Lippmann & Natoli, 2011).

Further to this, and in each of the exercises, the search was performed at the surface using snorkelers who waited at the surface marking the location for scuba divers to reach them, descend and recover the lost diver who was simulating unconsciousness. This waiting time took approximately three minutes. However, at each of the sites chosen, and typical of all sites visited by these operations, the depth of water is such that the instructional staff performing the snorkel search should have been easily capable of recovering an unconscious diver, should the situation ever occur.

After these observations and from incidental conversation after each exercise, the buddy pairs acting as snorkel searchers from each of two of the operations admitted to being unable to descend to the depth where the lost diver was located, and the buddy pair from the third operation admitted not even considering this as an option. If, after locating the lost diver, the snorkel divers had descended themselves to recover the unconscious diver, the time for commencing resuscitation would have been reduced considerably, increasing the chance of patient recovery. The depth of all three of these exercises did not exceed nine metres and it takes only a little practice for a snorkel diver to reach this depth easily. It is a concern that dive professionals such as those taking part in these in-water rescue exercises are unable to make this short descent.

A further possible auditing situation may be experienced by the spontaneous arrival of a Workplace, Health and Safety officer. Observing only two officers during the 12 months of observations, with neither entering the water at any time to assess diving skills, strengthens the argument that the paperwork ensuring diving staff members are appropriately certified is of more concern to these officers than reviewing in-water competencies. These officers generally appear to be more concerned with appropriate paperwork being held by working divers such as up-to-date medical certificates of fitness to dive, current registration and insurance,

occupational first aid and oxygen first aid provider certification, rather than actual diving skills.

5.3.2 Instructor skills – as defined by instructors

As has been described, there are many different skills and practices with which the diving instructor must become proficient. Those listed above are relatively easy to measure, but observation and interview reveal other competence requirements that are not as clearly defined. From the interviews recorded, the following statements indicate an addendum to what has been previously discussed and what the instructors consider to be of prime importance in their daily activities. To the question of "What do you think your job is supposed to involve in the position that you are holding now?" the following responses were recorded:

> As an open water course instructor, apart from being a teacher and a leader as far as PADI standards go, I have to satisfy the requirements of the course and make sure my students are happy and in a happy learning environment and that they are thoroughly understanding what I'm teaching them. Making sure there is a safe and healthy environment around me [in] the class, the pool and the ocean. At the end of the day, as long as I'm satisfied with what I've done and what the students are learning and what they are doing in the water, everyone is kept happy. (Harry, DO1, 15/05/08)

> The job is so far good. The plan is organised beforehand safely, provide experience to the people and hopefully more stuff to sell them. However, I don't have much stuff to sell them. Make the experience as good, safe first then good, then to be able to sell them the third introduction dive. (Steve, DO2, 15/09/08)

Harry and Steve concerned themselves with safety as a priority whereas others appeared to have teaching alongside their passion for diving as of prime importance to their daily work:

> Well, I love teaching. With [this operation] I prefer teaching than working on the boat. I like spending more time with students. It's a more personalised sharing experience. I like being able to transfer my passion to somebody else and see satisfaction. (Florian, DO1, 10/10/08)

> Teaching people how to dive or introducing them to diving. Giving them a sense of comfort in the water and looking after them. (Calvin, DO3, 27/03/09)

> I think it's leaving the customers with a memorable experience and taking them introductory diving or whatever it might be. So teaching them a bit about diving itself and what it's like, the whole experience of it. Basically just being able to take people for a memorable experience. (John, DO2, 17/09/08)

By contrast, others such as Aaron, Leila and Ruth attached more priority to selling, general customer service and maintenance activities:

> Skills? Obviously a sales technique of some sort. They wouldn't employ us if we didn't sell stuff. Problem solving skills. (Aaron, DO3, 15/02/09).

> Help people enjoy their holiday. Do all jobs; [supervising] intros [introductory dives], certs [certified divers], gear assembly, tank fills. (Leila, DO2, 22/09/08).

> Customer service/entertainer. (Ruth, DO2, 09/12/08).

The main themes that emerged from these interviews, and from the complementary observations of instructors' working days, were those of teaching, providing a safe, comfortable and happy environment for customers, multi-tasking by way of paperwork completion, tank-filling, gear assembly and flexibility in dealing with the various types of diving required, and the sale of extra dives and other, unspecified products: possible items could include T-shirts, confectionery, photos and helicopter flights. In a nutshell, this could be summarised as providing a pleasurable experience, sales and multi-tasking.

Much of the latter can be seen as additional to what has already been learned in subordinate diver training; diving skills are implicit, whereas some practical skills mentioned require less formal situational learning whilst working within the diving organisation. The considerable interaction with colleagues and customers once more indicates the necessity for earlier core training in competencies relating to topics such as the psychosocial aspects related to customer interaction and as explicated in more detail in Chapter 2 (Ewart & Garvey, 2007).

5.3.3 Instructor skills – as defined by diving operations

Prior to employment even in a trial capacity, each of the three diving organisations insists that new employees read, review and complete a written test on that organisations' procedures manual, including a review of any specific skill requirements necessary prior to acting in the capacity in which they are expected to be employed. For instance, use of a tender (small boat) attached to the main operating vessel requires an employee to hold at least a restricted coxswain qualification as well as being given an orientation to the operation of that tender by the vessel's captain.

There is a presumption that basic diving skills have been mastered and there usually exists a high degree of confidence in instructor diving competence by both instructors and the organisation that employs them. New instructors now have to contend with an array of further skills to master specific to the particular diving organisation in which they are employed. As can be seen from the comments by the participants, these skills vary from mundane clerical work to the more demanding requirements of performing introductory dives, training open water (beginner) divers or deck supervision organising multiple diving activities and assisting with dive vessel operations. Figure 5-1, Figure 5-2 and Figure 5-3 illustrate typical working

days, indicating the daily routine of these three functions. These figures illustrate the exact format of one of the dive operations but is not dissimilar to those used by the other two operations. This has been presented to give the reader a better understanding of what these three major activities encompass and what specific duties to be fulfilled are time and peer dependent and why that is so. The competencies displayed in these activities can therefore be seen as collaborative and cooperative, where several staff members often share the same tasks to expedite completion and assist in the training of new employees.

Observation Schedule		Date:	Trainer: ID Instructor
Time	**Activity**	**Site**	**Description of context, setting, action and directed to whom**
0730	Set up equipment	Back deck	Check all tanks filled
0745	Transport	Reef fleet terminal	Check in customers, collect reef tax etc.
0800			
0815			
0830	Welcome	Vessel entrance	General briefing for all customers
0845			
0900	Paperwork	The bridge	Ensure all medicals are correctly check and doctor called if any anomalies
0915			
0930	Briefing	Top cabin	Introductory diver briefing and making sure all paperwork accurate prior to dive.
0945			
1000			
1015			
1030	ID	GBR	Introductory diving and repeat of dives with new customers. (This could repeat to include up to four divers within this time frame)
1045			
1100			
1115			
1130			
1145			
1200			
1215			
1230			
1245			
1300	Move to second location	GBR	Have Lunch! Introductory Diver Groups (at least two)
1315			
1330			
1345			
1400			
1415			
1430			
1445	Out of water	GBR / Vessel	Fill tanks, collect money from customers for extra dives, wet suit hire etc.
1500			
1515			
1530			
1545	Depart GBR		
1600			
1615			
1630	Paperwork	The bridge	Count all monies received, complete paperwork & certificates.
1645			
1700	Farewell and cleanup	Reef fleet terminal	Farewell customers, handout ID, Certificates & clean vessels.
1715			
1730			

Figure 5-1 Observation schedule

Note: Typical daily routine of an instructor conducting introductory dives (IDs). Each activity is described briefly and conducted at a specific location. The time frame for each individual activity extends from the time of first mention until the next activity

listed. The only significant break in the day is the short time allotted to lunch. This occurs at approximately 1300hrs with little more than 15 minutes allocated. GBR = Great Barrier Reef.

Observation Schedule		Date:	Trainer: Open Water Scuba Instructor (OWSI)
Time	**Activity**	**Site**	**Description of context, setting, action and directed to whom**
0730	Student	Cairns city	Collect students from accommodation
0745			
0800			
0815	Transfer students	Reef terminal	Take students directly to boat
0830	Weclome	Boat entrance	General briefing for all customers. Briefing for Dive One.
0845			
0900			
0915			
0930			
0945	Dive	Back deck	Preparing for Dive One / Gearing Up.
1000	Diving	GBR	Dive One Skills
1015			
1030			
1045	Exit water	Back deck	Sign out students and fill tanks for Dive Two
1100			
1115	Debrief students	Top deck	Debrief and comment on dive skills / log dive
1130	Briefing Dive		Briefing on Dive Two skills and next reef
1145			
1200	Lunch	Galley	Assist deck supervisor filling tanks and other duties required prior to departure to next reef.
1215			
1230			
1245	Head count	Entire vessel	Review manifest and perform head count / start getting studens dressed for Dive Two
1300			
1315	Diving	GBR	Surface swim to second dive site and complete Dive Two skills
1330			
1345			
1400			
1415	Exit water	Back deck	Sign out studnets and fill tanks. Get boat ready for departure.
1430			Departure
1445	Head count	Entire vessel	Review manifest and perform head count / leave second location and assist with wet suit / fins etc.
1500			
1515			Cleanup
1530			
1545	Debrief students	Top deck	Debrief on Dive Two skills / log dive
1600	Paperwork		Complete student record files / mingle with customers
1615			
1630			
1645			
1700	Transfer students	Cairns city	Transfer students back to accommodation and return van to office.
1715			
1730			

Figure 5-2 Observation schedule (Open Water Scuba Instructor (OWSI))

Note: Typical daily routine of an instructor conducting open water (beginner) training dives. Each activity is described briefly and conducted at a specific location. The time frame for each individual activity extends from the time of first mention until the next activity listed. The breaks that appear in this day are spent either assisting peers or counseling students where, and if, necessary.

Observation Schedule		Date:	Trainer: Deck Supervisor
Time	**Activity**	**Site**	**Description of context, setting, action and directed to whom**
0730	Equipment set-up	Vessel	Check air/tank area/equipment availability
0745	Customer check-in	Reef terminal	Check in customers, collect reef tax, fees
0800			
0815			
0830	Welcome	Boat entrance	General briefing for all customers, check paperwork medicals and doctor contacted regarding anomalies
0845			
0900			
0915			
0930	Crew assignments	Bridge / back deck	Assign duties to instructional crew
0945	Dive preparation	Back deck	Organising back deck for certfiied divers and students in training.
1000			
1015	Arrive and tie up	GBR / back deck	Tie stern line, organise first two groups of introductory divers, belted and sitting on entry step in water.
1030			
1045			
1100			
1115	Signing in/out	Back deck	Signing divers in and out of water, filling tanks, supervising and rotating lunch breaks for crew.
1130			
1145			
1200			
1215			
1230			
1245	Head count	Entire vessel	Assigning crew to review manifest and perform
1300			
1315	Arrive and tie up	GBR / back deck	Arrive at second site and time up.
1330			
1345	Dive preparation	Back deck	Organising back deck for certfiied divers and introductory divers.
1400			
1415	Signing in/out	Back deck	Sign out students and fill tanks. Get boat ready.
1430			Departure
1445	Head count	Entire vessel	Review manifest and perform head count / leave second location and assist with wet suit / fins etc.
1500			Clean up
1515			
1530			
1545	Depart GBR		Organise collection of money owed by customers.
1600	Duty List		Write up clean up roster for instructional crew and DMT's and assign rope work details.
1615			
1630			
1645			
1700	Farewell customers	Vessel	Clean up vessel and all dive equipment used.
1715	Clean up		Transfer paperwork to office.
1730			

Figure 5-3 Observation schedule (Trainer: Deck Supervisor)

Note: Typical daily routine of a deck supervisor (senior instructor). Each activity is described briefly and conducted at a specific location. The time frame for each individual activity extends from the time of first mention until the next activity listed. The breaks that appear in this day are spent either assisting peers or counseling crew and DMTs where, and if, necessary.

Figure 5-1, Figure 5-2 and Figure 5-3, outlining the daily routines of an introductory diving (ID) instructor, open water scuba instructor and deck supervisor respectively indicate and demand significantly different responsibilities requiring different competences to be achieved and demonstrated. These different competencies are explained in the following three subsections.

5.3.3.1 Introductory Diving (ID) instructor

At the commencement of employment as a diving instructor with any of the three operations in the study, the first few days are often spent learning the routine of the operation in general but with a specific introduction given to introductory diving which is often the first substantial job in which the new instructor is placed. After watching and assisting on several ID sessions with an experienced instructor, the newly appointed instructor is left to continue in a similar fashion to the way that he/she has been shown. At the commencement of the day, if the customer has not already decided to try out a scuba dive at the reef, an initial briefing to all passengers on the vessel will indicate the availability of the experience and attempt to solicit more customers to participate.

The job for the ID instructor then often continues with a more specific briefing to all interested customers en-route to the reef explaining basic rules of diving, how the SCUBA equipment is to be used and what is expected of them. Each customer has by then completed a form that includes a waiver of liability statement and a medical declaration. The latter in particular is scrutinised carefully to ensure the customer's fitness to dive. Any contraindication to diving must be addressed and medical professionals on land are contacted for advice. This is where the new instructor may be faced with the difficulty of confronting certain customers with the fact that they cannot continue on medical grounds. Once the customers' documentation has been reviewed, they are placed in groups of four, the maximum allowable number of participants who may be taken for this experience by any one instructor, according to the Code of Practice.

At the reef the ID instructor, now in the water, has trainee divemasters under the guidance of another experienced instructor preparing these groups by dressing the participants in scuba equipment, and placing them in the water at the stern (rear) of the vessel ready for the instructor to commence basic skill training. The participants commence with positive buoyancy and the skills reviewed in the earlier briefing. These are then put into practice after submerging whilst holding onto a shallow platform. Prior to submergence the ID instructor uses language that should be calm and reassuring with slow and deliberate movements providing for the fact that the participants are generally apprehensive with many needing constant reassurance. It is this stage of the job that can be considered a litmus test of the ID instructors' communication skills and, consequently, their success with their students.

On successful submergence and the achievement of basic skills, the group of participants is then taken on a short underwater tour where the ID instructors' primary concern is never to leave or lose sight of those participants in his/her charge. An often-used technique is to lock arms with one student on each side of the ID instructor, with another student in turn locking arms with the first attached student on each side of the ID instructor.

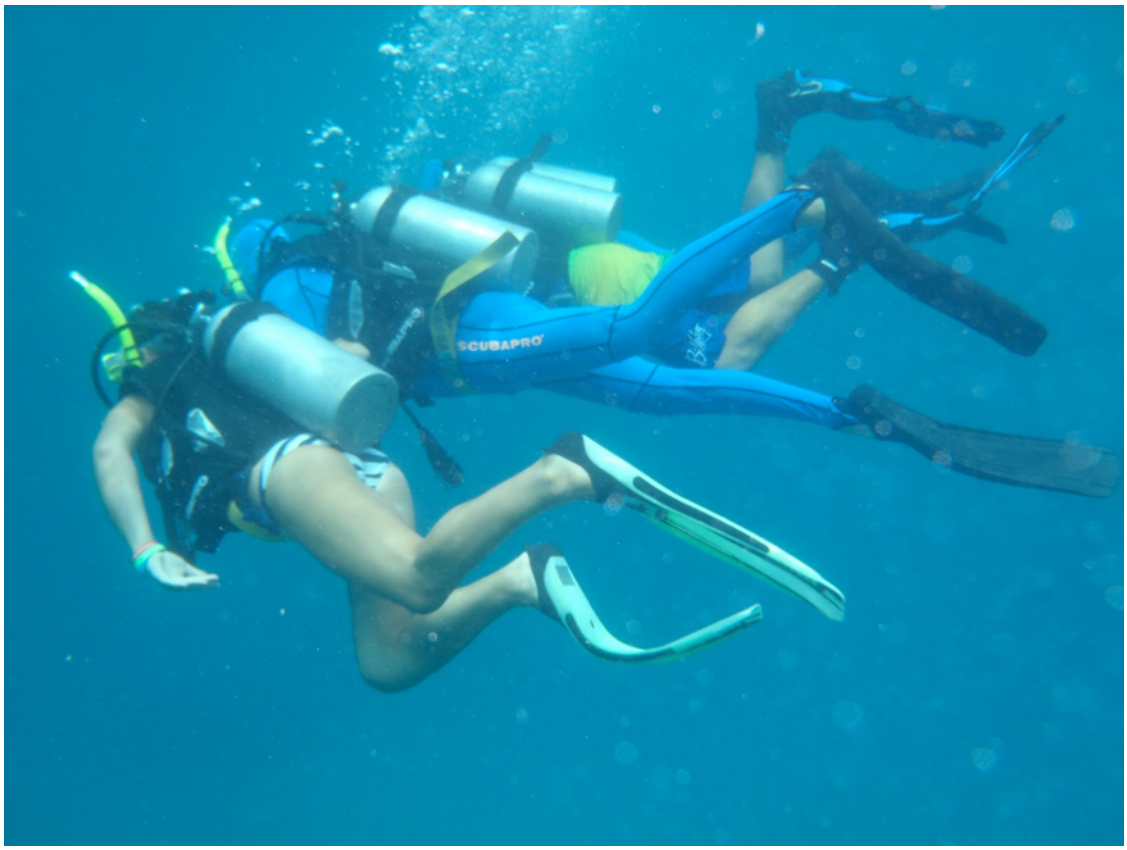

Figure 5-4 **Introductory diving experience as observed on 09/10/2010**

Note: **The introductory instructor (dressed in a blue wetsuit) is guiding three divers; each diver is locking arms with the instructor and one another, thereby effecting positive control over movement and direction. This is a demonstration of instructional competence.**

Once the underwater tour is completed, there will be another group waiting for the ID instructor to repeat the activity and so on until all groups have had their experience. These busy schedules demand that any interaction taking place between customers and peers be functional and positive, and that it follows required obligations in both the diving and the non-diving activities essential to meet the demands of government, the local code of practice and the standards of the respective training agencies.

5.3.3.2 Open water scuba instructor (OWSI)

This position is often acquired by one of two methods. The first is where the newly employed instructor is already an experienced instructor coming from another dive operation. The second method is promotion of an incumbent instructor who has been working as an ID instructor for a certain time already with that operation and who could also have already been rotated through the position of deck supervisor. Although the role of open water scuba instructor is considered a role of higher rank than that of an ID instructor, this latter role is in many ways the more difficult job and would make sense to have more experienced instructors doing it.

Whichever method is employed, when considering the suitability of an instructor to teach a full open water diver course[7], or a referral program[8], instructors will be reviewed on their ability to deal with customers and crew, both in general and also specifically on their ability to train ID participants. There appears to be a preference to promote internally as the incumbent ID instructors are also usually well aware of the company's other protocols that may have an impact on their changing status and thus make for a smoother transition. Once it appears that an instructor has achieved a degree of competency with the process of training and guiding ID participants, the deck supervisor will report to the operations manager indicating that individual's suitability or otherwise for training open water divers.

The job of teaching a full open water diver course commences on land where students are often picked up from their accommodation at the beginning of the day, taken to the land-based premises of the dive operation and then taken through a series of classroom and pool sessions for two days. On the third and fourth day the open water dives are completed and, if successful, the student is certified as an open water diver. With referral students, the instructor usually receives them on board the vessel where referral documents are reviewed to ensure that prerequisite skills and other requirements, such as a medical examination form indicating fitness to dive, have been completed and are current. The process of evaluating skills on the final open water dives is then exactly the same as for students undertaking the full open water diver course with that dive operation.

This job may be considered to be more complex than that of an ID instructor as in introductory diving it is quite easy to eliminate customers indicating extreme apprehension and to continue the underwater experience with those who are already confident in the water. On the other hand, in the conduct of an open water diver course there is more time available for eliminating any apprehensions students may have and retaining them on the course. In this instance also, it increases the possibility of selling products (masks, snorkels and fins) to students both to increase the students' comfort level and safety using their own equipment and also to increase the dive operation's profits. With this positive increase in potential for both parties, the customer and the dive operation, it is curious that there is little, if any, formal or informal training in retail sales other than order taking and the operation of a till.

5.3.3.3 Deck supervisor

This position is one often attained after working for a relatively longer period with the respective dive operation. This person has usually spent at least a number of months working as an ID instructor and also has a working familiarity with both the dive operation and the running of the dive vessel. The attributes of this job demand above average communication skills beyond the initial organisation and delegation of deck and instructional duties: this person often meets with a barrage of questions and challenges from the very relevant to the virtually insane and has to maintain a calm demeanour throughout the entire day.

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[7] The difference between the training of an ID experience and a full open water diver course is that the former is a quick, one-off dive in very shallow water guided by a dive professional. An open water course, on the other hand is often a four-day course, at the successful end of which a student is certified to dive independently.

[8] A referral program is one where a student has already completed the classroom and poolwork necessary to complete their training in open water

Impressions of how this role is conducted can be seen from the following comments by two experienced instructors:

> Being the senior instructor on the boat I'm expected to sort out all the paperwork for the rest of the day. General running of the boat, introductory dives, open water course, advanced. Instructing only for five months it's quite a big role to take on. (Sven, DO1, 23/05/08)

> Okay, my jobs on the boat are a little bit more than just a dive instructor. I'm senior supervisor on the boat. So that means I'm in charge of the servicing of all the equipment, making sure all the equipment is working, getting it off the boat to get fixed if it's broken. Counting it, making sure it's all there and nothing's disappeared. Making sure the O2 is in date, making sure the defibrillator is going, checking expiry dates on pretty much anything to do with diving and then I get back to David who's the operations manager. (Dale, DO3, 17/01/09)

Compared with other commercial activities, it is of significance that, after such a relatively short employment period, Sven has already been promoted to the position of deck supervisor. This accentuates the fact that competency acquisition in the role of a diving instructor can be, and in most cases has to be, rapid when transferred or promoted to other employment positions where different skills have to be learned.

At the commencement of the day, the deck supervisor organises a duty roster and ensures that dive plans are also in place for students undergoing open water diver training, certified divers and those wishing to have ID experiences. As the diving day continues, these rosters are constantly scrutinised to ensure that divers are keeping to required depths and times and that instructors are conforming to the guidelines as demanded by both training organisation standards and the local code of practice. When the vessel moves from reef to reef and before finally returning to land, head counts are undertaken and double checked to ensure that no-one is left behind.

If any diving emergency occurs, it is the deck supervisor who both organises any rescue and/or first aid necessary and also alerts authorities where necessary. Next to the captain of the vessel, this job is one of considerable responsibility and relies on the holder to be cognisant of what every other job related to diving and diver training on the vessel entails. It is a person who is thoroughly versed in company protocols, legislation and local codes of practice.

5.3.4 Instructor skills – as defined by Government Standards and Code of Practice

The various government organisations such as the Queensland Department of Justice and Attorney-General and the Queensland Department of Environment and Resource Management that have influenced the production of codes of practice and legislation regarding commercially oriented diving activities outline other specific skill requirements on the presumption that divemasters and instructors already possess the practical diving skills referred to earlier. For instance, from the *Recreational Diving, Recreational Technical Diving and Snorkelling Code of Practice 2011* as produced by the Department of Justice and Attorney-General that is

adhered to by each of the diving organisations studied, among a detailed list of items, the diving instructor is expected to: be cognisant of risk management specific to the dive operation; be capable of ensuring no persons are left behind; be aware of specific emergency plans and able to rescue a person either diving or snorkelling; have current first aid and oxygen first aid provider qualifications; be aware of necessary first aid routines for jellyfish stings and of dive site supervisory rules for both scuba divers and snorkelers; have the ability to assess diver competence; have knowledge of equipment requirements (both the necessary equipment and the required quality of that equipment); and be capable of decompression management.

Many of the skill requirements listed in the *Code of Practice* reflect on those skills covered during the training of a diver leading to an instructor certification. However, this training offers no more than a fleeting glimpse of many of the skills and knowledge demanded in the current working environment. For instance, risk management is covered in Chapter 4 of the PADI Divemaster manual (2010) and further emphasised in a knowledge development session during the Instructor Development Course (IDC) but little more than a few brief questions are asked of the diver at either level of training and neither are such questions necessarily related to a practical hands-on situation that the diver may be expected to encounter in a work situation. In other words, familiarity with this subject is essentially theoretical and, although it possibly relates well to the reality, it does not offer real life application until the new instructor is working in that role.

What can be seen thus far is an array of skill expectations from instructors themselves, employers and governmental codes of practice and regulation. What is also evident is the fact that many of the instructors studied indicated versatility in being able to perform the many different tasks that are outlined in their particular procedures manual. However, what is still invisible other than through observation is how skill sets such as positive and productive customer interaction and sales abilities are developed. This, it would appear, is a product of interaction with their peer groups and, to a limited extent, with the leadership of the organisation. It can be seen that, in the three main jobs in which instructional staff are employed, there is an apparent layering of competencies that relies not so much on diving skills but on the management of individuals through an increasing knowledge of how to deal with people and a greater intimacy with company protocols, legislation and codes of practice.

The ID instructor has a routine of relatively quick underwater tours where difficult participants can be dispensed with early. This may be for reasons of undue apprehension evidenced in the participant, auguring possible stress and panic later. Early removal is often easy but it may also be a way of disguising the fact that the ID instructors themselves may not yet possess competent communication skills. However, doing this job assists in improving those possible deficiencies and in turn allows for the instructor's later graduation to the more demanding positions of deck supervisor or open water scuba instructor where greater acuity is required with people management. In this regard, the instructors at whatever level of employment see the necessity of competency acquisition that goes beyond subordinate diving skills learned during formal training and it is the realisation and display of these competencies that provide for promotion to positions of greater authority. Skill expectations include those then that are specific to diving such as putting dive equipment together and clearing a mask of water: related skills such as teaching diving, making people happy and selling retail products; and employers' demands for

certain conduct and competencies related to their own specific organisations and in conformity to regulations and local codes of practice.

5.4 Bridging the gap between theory and practice

The pejorative expression often encountered in many professions, "Now you have your degree, we'll show you how the job really gets done", is probably not foreign to the reader's own experience. This is usually a statement made by old hands to new employees and it highlights the divide often experienced between what is learned formally in the classroom and other prior learning activities and the capabilities now expected in the workplace. Even so, in the context studied, certain skills and knowledge are already expected of newly graduated diving instructors without further need for revision. These are principally that they are capable of diving well, know some basic physical and physiological facts to support their abilities and actions, are capable of planning, leading and directing diving activities and are capable of performing and/or assisting in diver rescue situations. Other implicit capabilities are that they have a basic idea of how the business of diving works, including an appreciation of the importance and impact of marketing efforts and retail sales. It also presumes certain life skills enabling positive interactions with colleagues and customers.

The implicit capabilities presumed are, however, often either visibly absent or deficient, in particular with some younger male instructors who, ironically, presume themselves to be as capable as their older peers. Statements supporting this are in the answers given to the question "Do you feel competent in the job you are now doing?", which was posed to virtually all of the instructors doing the same job on different boats. This was usually a monosyllabic response with an unqualified and emphatic "Yes", with only two responses offering more detail. The first instructor giving a more detailed response was 41-year old Stuart, who said, "Absolutely. I didn't at first and it took a while. I would say a good year [at ABC Dive] before I felt really comfortable taking introductory divers" (DO3, 20/01/09). The second instructor was 22-year old Leila, who stated, "Absolutely. But it took me months. The boat stuff was new to me. With intros I've only got two arms and four people. That's difficult" (DO2, 22/09/08). These latter two responses reflected a more conservative and measured concern for what it took to learn how to manage the job competently.

With observation of these two individuals and how they dealt with difficulties such as leaky masks and apprehensive customers, it was no surprise to observe that their attention to detail and interactions with customers were more empathetic and successful at solving such problems. It is also significant that females, older male instructors and individuals displaying these personal attributes were very much in a minority in these positions. It could be argued that this situation is a result of the time it appears to take for these individuals to display such capable performance in their job: more expedient, less perfect performance appearing to be the norm. It could be that perhaps employers expect faster, less proficient mastery of the roles that instructional staff occupy; hence those who approach mastery with more deliberation, and thus take more time, are marginalised and perhaps displaced, along with those who truly are incompetent. Leila was one individual whom I observed having difficulty not with either her skill or her ability to communicate with customers but rather with the frustration of being harried by her supervisors who expected her to work faster than could reasonably be expected. It was my impression

that her tenure was due to her patience with her supervisors who allowed her to remain in the position she held as much as the patience she displayed with the customers.

On the other hand, the truly incompetent are identified by their less than desired regard for safety, relatively poor diving skills, inability to become a team player and/or lack of basic communication skills. This was observed twice when new, potential employees were given trial days under the supervision of senior instructors and on the basis of their poor performance at communicating with both customers and staff were quickly dismissed. The method of dismissal is by the senior instructor advising the potential employee at the end of the trial period that he/she will be contacted by the operations manager regarding whether his/her performance was acceptable and whether or not there was a position available. The potential employee would then be advised of his or her lack of success in gaining a position.

Even so, success at the particular job of dealing with introductory divers may be measured in two distinct ways: firstly, by how many customers are taken for an introductory dive in a day's work and possibly take a repeat dive, and hence the level of immediate business income; and secondly, by how many come back from a dive with smiles on their faces and want a repeat experience, either now or later. Reflecting on these two measures, the comparison between measures of economic performance and societal well-being in a much broader sense can be seen in the executive summary of the *Report by the Commission on the Measurement of Economic Performance and Social Progress* by Stiglitz, Sen and Fitoussi (2009):

> The commonly used statistics may not be capturing some phenomena, which have an increasing impact on the well-being of citizens. For example, traffic jams may increase GDP as a result of the increased use of gasoline, but obviously not the quality of life. Moreover, if citizens are concerned about the quality of air, and air pollution is increasing, then statistical measures which ignore air pollution will provide an inaccurate estimate of what is happening to citizens' well-being. (p. 8)

Certainly, it can be argued that making customers feel happy is all well and good, but the primary goal of business is to make money, and it is also a fact that it is more economic to retain and sell more to a happy customer than to create a new one:

> Every management authority on the circuit says that loyal customers and their repeat purchases are the cornerstone of your long-term successful business. The reason is obvious: it is less costly to get your existing customers to buy more than it is to find new ones. The lower cost of sale leads gives you higher operating margins, which you can then invest in other business building activities, and so it goes. (Lemberg, 2012, p. 1)

Similarly, although it may appear economically sound to produce large numbers of introductory divers in a day's work, hence increasing immediate business income, how many of these introductory divers have completed their dive more thankful for their survival than for their enjoyment? How many will be inspired to look for further diving experiences and how many will merely be glad to say they have "been there and done that – but never again thank you"? Are speed and high turnover of customers generating one-off high returns the best measure of

introductory diver success if this generates customers who will not return? Care for the happiness or satisfaction of the customer as much as for the delivery of the product could possibly then be considered as one measure of instructional capability.

Although concern for the care and safety of the customer must be considered implicit by both the dive operation's risk management protocols and the required conformity to training agency standards, the introductory diving experience is one undertaken voluntarily by customers and it could be argued that they undertake it with the expectation of excitement and enjoyment under the guidance of competent instructors. However, if, as was indicated by Table 5-3, the success rate of delivery with respect to perceived enjoyment by the customer is low compared with the total number of customers undertaking the experience, it could be further argued that the instructor is failing to deliver as expected, and hence is not as capable as desired. Despite demonstrating capability in performance of the motor skills required for the task at hand, their performance may not completely fulfil the definition of competence as desired in this context where more exemplary ability is required at interpersonal communication and the corresponding empathy that it reflects.

In the search for the skills and knowledge regarding such empathy that may assist in defining a competent instructor and for how the gap between theory and practice is bridged, it is necessary to look at what capabilities and social capital new instructors may already possess even prior to becoming open water scuba instructors. It is important to consider what is required of them as instructors prior to employment and what further skills and knowledge are expected of them in order to achieve what may be defined as overall competence at their job.

5.5 Instructors as individuals

Recreational diving instructors come from all walks of life. Those under study had backgrounds ranging from undergraduate student to graduate environmental engineer, ages ranging from 19 to 46 and years of dive instructional experience ranging from less than one year to more than 16 years. All had their own stories to tell, expressing their views on what skills they presume to have already achieved, their levels of competence, how they have learned and/or learn and what can be done to improve the learning process both in general and in the specific situations they find themselves in. Drawing from these stories, certain themes have been identified that reflect certain associations of importance in answering the first research question in this study.

A large number of the participants indicated possession of certain necessary skills such as dealing with customers and general business acuity and the capability of transferring these skills to their new occupation as diving instructors. Being placed in a situation together with individuals from other, differing backgrounds offers the opportunity for sharing knowledge and from this eclectic group creating the possibility of learning better or different approaches to situations in their new working environment.

However, in some instances when younger beginner instructors are to be employed in the workplace, negative expectations of their present capabilities are often expressed. One experienced instructor, Jeremy, put it this way:

> So next month they're off to do their instructor course, they do their IDC [Instructor Development Course], they do their IE [Instructor Examination], they get awarded an instructor ticket and then a week later on they're out on the boat and teaching people, maybe twice their

age, how to dive, with little or no experience actually in the real world whatsoever. (DO2, 30/09/08).

The implication drawn from this comment is that the life experience of some new instructors employed shortly after graduation as diving instructors is not considered by some "old hands" as adequate to cope with the customers whom they are soon to be managing. On the other hand, there are instructors with more substantial life experience such as Stuart, whose prior working life included five years as a soldier in the New Zealand Army and who, from my personal observation, reflected the epitome of excellence in diver training in his command of both technical and interpersonal communication skills. This is reflected in his comment that "You have to be fair and look after everyone, and more than that, you have to make an effort to let people know that you care about them" (DO3, 20/01/09) implying the need for empathy and the ability to communicate well with all customers as much as being capable of performing technical skills.

From these two extremes of backgrounds it can be considered that new instructors are entering their new occupation at different starting points in the learning process – a learning process directed at achieving instructional competency. As a starting point in appreciation of the eclectic group of people observed in this study, I have constructed Table 5-3 tabulating the basic demographics relating to the elements of age, previous occupation and tenure as an instructor. Reference to this table is useful when reflecting on the data obtained from both interviews and observations.

5.5.1 Demographics

The learning of skills ultimately required to become a competent recreational diving instructor may be accelerated as a result of prior learning, age, experience and the community of practice within which an instructor is working. To give an indication as to how these factors may relate to the observations and comments of the various participants and to certain associations recognised, I have tabulated in Table 5-3 the cohort of participants with basic identifiers: gender (implied by pseudonym), age range, general work experience, experience specific to the diving industry and the identifier "ID". This latter identifier refers to those participants who had teaching introductory diving as a major part of their job during the observational sessions. This identifier appeared to have some merit as a performance measurement device with relation to gender, age and experience as an instructor and, although the identifiers ultimately offer insufficient data to reach any robust conclusions at this time, they do suggest the potential for future study.

#	Pseudonym	Age 18-22	Age 23-27	Age 28-32	Age 33+	Original Occupation	Years As OWSI	Years in present position	ID success
0101	Clive	x				Landscaper	1	1	7/16
0102	Harry				x	Bank manager	4	4	
0103	Don		x			Photographer	5	3	8/14
0104	Sven	x				Student	2	2	8/16
0105	Dietrich		x			Hospitality	2	2	
0106	Bruce		x			Dive shop NZ	7	<1	

#	Pseudonym	Age 18-22	Age 23-27	Age 28-32	Age 33+	Original Occupation	Years As OWSI	Years in present position	ID success
0107	Sharon	x				Never worked	2	2	10/20
0108	Artie	x				Student	2	<1	8/15
0109	Charlie	x				Tax accountant	2	<1	
0110	Brian	x				Student	1	<1	5/15
0111	Florian				x	Environmental	2	2	
0201	Doug		x			Engineer / Electrician	2	<1	10/17
0202	Jake	x				Volunteered at dive	2	<1	11/16
0203	Steve		x			Software developer	4	<1	/19
0204	Dennis				x	English teacher in	3	<1	13/20
0205	John	x				Japan Student	1	<1	8/12
0206	Leila	x				Student	3	<1	17/21
0207	Jeremy				x	Plumber/Gas fitter	12	12	
0208	Arthur			x		Dive instructor	9	4.5	
0209	Ruth		x			Sales	11	<1	
0301	Stuart				x	Soldier	4	3	20/24
0302	Rachel		x			Hospitality	4	1.5	10/12
0303	Aaron		x			Student	6	1	14/20
0304	Dale		x			Pastry chef	6	3	
0305	Radek		x			Divemaster	4	2	8/15
0306	Geoff				x	Equipment servicing	16	1	
0307	Calvin			x		Chef	2.5	2.5	
0308	Tim				x	Divemaster	16	8	
0309	Bruno			x		Panelbeater	12	8	

Table 5-3 Demographics of participants in the study 2008 – 2010

Note: This table lists the number and pseudonym by which each of the participants was catalogued, indicating their age group, previous occupations, tenure as an open water scuba instructor (OWSI), years employed in their present position and where applicable their success rate with introductory divers as signified by the column titled ID success. ID success relates to those who, after a first dive, indicate a wish to have a repeat experience.

Before how these individuals as a group specifically display their competencies is described, there are some basic indicators of interest:

a. The majority of participants (19/29) are in the age range of 18-27 representing a relatively young working group - eight of whom indicated their original occupation as student (at best), implying minimal commercially oriented work experience. This also implies the value of a more formally structured programme inclusive of older, more experienced colleagues to consult with.

b. Of the 10 remaining participants, those in the age range group of 28-33+, although employed as, and used in the capacity of diving instructors, their principal occupations in their respective dive operations are as: instructors (five), chef (one), videographer (one) and boat captain (three) each being used as a mentor to the remainder of the instructional crew.

c. Female employees are in a significant minority (4/29). This figure is not commensurate with participation in diving as represented in PADI Worldwide's ***Diving certifications by gender*** chart for 2012. This indicates a participation figure of 34% by females and if related to this study, would equate to 10/29.

5.6 Competences displayed

Instructional competence, defined earlier as "compliance with accepted instructional and organisational standards simultaneously reflecting both exemplary diving and human interaction skills", may be considered to have four identifiable subsets of competence requirements: compliance with instructional standards, compliance with organisational standards, exemplary diving skills and exemplary human interaction skills. Each of these subsets of competence is understood by the beginner instructor and realised through involvement in formal, informal and incidental learning processes as outlined in Table 5-1 - competencies and training context required by diving instructional employees. How beginner instructors demonstrate and display competence in each of these subsets of competence begins with basic skill learning in the recreation of scuba diving and learning the value of instructional standards.

5.6.1 Compliance with instructional standards

Instructional standards are outlined in the respective training agencies' manuals. In this geographic location, further reference is also found in the *Recreational diving, recreational technical diving and recreational snorkelling code of practice (2011)* and in the Australian Standard 4005.1—2000: Training and certification of recreational divers, Part 1: Minimum entry-level SCUBA diving. Training agency standards are always considered subordinate to government regulation.

At the conclusion of formal instructor development, training agencies such as PADI will conduct a formal two-day summative evaluation to assess the beginning instructor's competence in areas that they consider of greatest importance. This final evaluation phase, or Instructor Examination (IE), has the following curriculum and objectives:

Dive Theory Examination.	This is a written examination consisting of five areas of knowledge: physics, physiology, equipment, skills and environment, and recreational dive planner. Each area of knowledge must receive a minimum pass mark.

Systems, Standards & Procedures Examination.	This is an open-book examination requiring not only knowledge regarding topics such as minimum ages, maximum depths and student to instructor ratios but also a comprehensive understanding of the procedures involved in maintaining the instructional and legal integrity of the courses to which instructors are expected to teach. For instance, though it is important to know that, in open water (beginner) courses, the minimum age of a learner must be no less than 12 years of age with no more than eight students in a class descending to a maximum depth of 18 metres, appropriate procedural work must also be performed. This consists of obtaining consent forms, medical certificates evidencing fitness to dive and proof by signed statement of a clear understanding of the legal relationship that exists between student and instructor/dive operation. Further to this, it is important to indicate understanding of the need to follow correct educational methodology as prescribed to maintain educational validity.
Confined Water Presentation.	This evaluation has two phases. The first phase consists of having the instructor candidate demonstrate five basic skills chosen at random from a list of 24 possible skills. The purpose of this is to validate the candidate's ability to give role model demonstrations of basic skills indicating all of the critical attributes of each individual skill in an overt and clearly visible manner. The second phase is the presentation of a skill to the candidate's peers acting the part of student divers. This presentation must follow a standard protocol and not only include role model demonstration but also be clearly replicable by the students. Student performance must also be evaluated and any problems identified or insufficient performance rectified.
Knowledge Development Presentation.	This entails a classroom presentation of approximately 10 to 15 minutes' duration adhering to a standard presentation protocol indicating appropriate use of training aids and student involvement.
Open Water Presentation	This tests a candidate's ability to conduct the evaluation of two skills with a stress on organisation and supervision.
Rescue Evaluation	This is an evaluation of a candidate's ability in an unconscious diver situation to maintain buoyancy and render airway protection, mouth-to-mouth or mouth-to-pocket mask resuscitation, equipment removal and transportation.
General skills	This is a general observation of familiarity with and competence in diving skills from the PADI system of training during the confined and open water sessions.
Professionalism	This area of evaluation is not concerned with how professionalism is displayed but with whether unprofessional conduct is displayed: "Attendance at the IE is at the discretion of the Instructor Examiner. If your behaviour, attitude or actions are considered unprofessional, inappropriate or distracting to other candidates, you may be required to leave (PADI Course Director's manual, 2011, p. A-65)."

All of these requirements for certification are outlined in an "IE Candidate Statement of Understanding" that is presented, read and initialed by each candidate at the orientation session of the Instructor Examination. Also contained in this statement are the required scores (usually 75%) and notice of which areas of evaluation allow a second attempt at successful completion.

During the confined water and open water evaluations, the examiner assigns problems to those acting as student divers to evaluate the candidates' problem identification and solving ability. The problems given are typical of those commonly presented by students in training. However, after successful completion of an instructor examination there is no further skill evaluation or practical auditing by any training agency. The training agency examiner is therefore the principal decision maker as to whether an instructor has displayed adequate competency sufficient to gain certification. Any further challenge is, as evidenced in this study, from sources such as the routine rescue exercises performed by each of the relevant dive operations and in line with their organisational standards. However, ignorance of perceptions of personal competence (Deci & Ryan, 1991/1995; Fuller, 2011) as evidenced in the aforementioned rescue exercises can lead to flawed conclusions by those instructional staff taking part, resulting from a lack of ability in dealing with certain situations.

5.6.2 Compliance with organisational standards

At the very onset of employment, the instructional employee is expected to read and review the respective organisation's operations manual. These manuals include policies regarding the issues of workplace health and safety, sexual harassment, anti- discrimination, hygiene and privacy rules. Further inclusions in these manuals are typical daily schedules, job descriptions and guidelines, housekeeping, cleaning and stock control schedules, standard briefings, environmental considerations (such as fish feeding), and emergency and risk assessment procedures. Also completed at this time is a review of the *"Recreational diving, recreational technical diving and recreational snorkelling code of practice (2011)"*. Completion of this review is then followed by a 50 to 70 question test to ensure the employee understands the basic infrastructure and protocols of the dive organisation: this final test is then evaluated by the operations manager, who gives immediate counseling on any areas indicating a need for improvement. From here employees then undergo a relatively brief internship on board the vessel on which they will be working. This internship may be of an even more abbreviated nature should the employee have graduated earlier from a divemaster internship with the same company. In such a case, much of the orientation to the dive operation's protocols has already been completed, together with an induction phase directed at the dive vessel operation. Appendix D — Induction record — outlines this phase of the induction process. The competencies displayed during this phase of the induction process are supervised and evaluated by the dive vessel's captain.

The new instructor is now oriented to the duties required by his or her employment and as indicated in Figure 5-1, Figure 5-2 and Figure 5-3. These duties display the instructor's diving and, in part, human interaction skills. Performance of these duties indicates whether further training is necessary to achieve other desired

competencies such as the organisation of duties for subordinate personnel and the manner in which communication between staff and customers is conducted.

5.6.3 Exemplary diving skills

During the transition from beginner diver to beginner instructor, each certification level achieved en-route has required the demonstration of skills built on those skills learned in subordinate levels of training. This allows for the improvement and refining of skills under further instructional supervision. Some of these skills are assessed at the final IE and as described earlier.

However, although final evaluation by the respective training agencies is arguably positioned in situations typical of learning environments in which beginner instructors will be practising their future profession, it could be further argued that this evaluation is of a contrived nature and does not challenge skills that provoke the critical thinking that may be required in real life situations. One example of this, as earlier described, was observed in the routine rescue scenarios demonstrated by each of the dive operations where those involved in the location of the missing diver indicated both an inability to descend the relatively shallow depth necessary to effect a recovery and a lack of the critical thinking skills required to consider this as an optional recovery method.

During an IE, instructor candidates are evaluated on their ability to rescue an unconscious diver at the surface and success at this exercise is considered representative of those candidate's rescue skills: they are thence considered competent. However, the examples of rescue scenarios observed in more realistic situations with only a slightly more complex nature belie this assumption. This raises the question of whether in fact sufficient challenge is made of all basic skills in the first place prior to certification or whether more diligent auditing of skills should be made post-certification to ensure continued competence, as is the case with the present on-going requirement regarding first aid training.

When referring to diving skills, one may intuitively relate this to purely psychomotor skills as indicated by the substance of the previous discussed rescue scenario, but the range of skills that are diving oriented to which an instructor must become competent also includes those in the cognitive and affective domains (Bloom, 1956; Lynch, Russell, Evans & Sutterer, 2009). Within the specific domain of diving skills only, the cognitive areas of competence displayed by the instructor can be readily seen as performed at an IE. For instance, those areas include diving knowledge as displayed by completion of dive theory examination and the acronyms used to recall basic and essential dive checks such as descent procedures.

However, display and recognition of competencies lying in the affective domain of learning in which the instructor is required to display exemplary skills such as communication and human interaction are somewhat more hidden from view and the data indicate that these competencies are evaluated more by their deficiency than their display. For instance, under the Professionalism section of the IE statement of understanding, it appears that judgment is not made according to the personal merit that the candidate has displayed, but on the contrary, according to any negative aspects of professionalism and human interaction displayed that are considered inappropriate and/or may have interfered with the success of other candidates. In contrast to this position and in answer to the question of what she thought may improve her workplace competence, Sharon (DO1/29/06/08) stated, "Big believer in

praising people. It makes them happier around you. They are then more willing to learn. Better communication between instructors and management." Perhaps framing the requirements of professionalism could dwell more on positive reinforcement as explicated in Skinner's (1957) early Stimulus-Response theory further reinforced by Domjan's (2010) more recent work on elicited behaviour.

5.6.4 Exemplary human interaction skills

Aside from the more easily identifiable psychomotor and cognitive skills, data analysis highlights the need for a benchmark for performance in the affective aspect of instructional behaviour as displayed in communication and human interaction skills. Drawing from the data in Table 5-3 it can be seen that the participants in this study are an eclectic group with a wide range of ages and from a variety of backgrounds and experience. All can and do contribute to their respective communities of practice through their own unique perspectives and understandings of what their competencies are. It would be reasonable to assume the advantage that the older participants would have through their relatively greater experience and the social capital this engenders and therefore through this further capital can be, and is, gained by the younger members of their instructional community of practice. Indications of this include the statements of Sven (DO1/23/05/08) that assistance comes best from "The skipper [who] helps a lot. They're [He is] quite knowledgeable. Used to be a diving instructor himself. He has a fairly good grasp of all aspects of the boat and dive instruction. If not I'd turn to the other senior instructors" and of John (DO2/17/09/08) that "Usually if I do have a question or I'm unsure of something I would ask a colleague or a more senior instructor than me. Someone who has been doing it a bit longer."

Although it is difficult to tease out all of the advantages each participant can and does offer the community of practitioners, it is evident from the interviews recorded that there was a general humility and understanding that age and experience mattered when it came to learning new skills and achieving other competencies required such as those outlined in what are essentially training agency and organisational standards. What may be implicit in this observation and the specific comments from Sven and John as stated above is that requests for advice could also be similarly made regarding how better to communicate effectively with both colleagues and customers.

However, although there existed no explicit evidence of time set aside by senior instructors or mentors specifically to discuss the value and importance of positively applied communication and well developed human interaction skills as desired competencies to gain, there were examples of implicit learning. One striking example was during the morning boat briefings where advice was given to all passengers by senior staff about the running of the boat, what is available for the passengers (such as cameras for hire and introductory dives), what is expected of them (no entering the water after consuming alcohol) and the safety drills to know in case of an emergency (man overboard procedures). These briefings often utilise humour to smooth discussion of the awkward and often embarrassing experience of seasickness. This humour is then usually replicated by staff members who watch the briefing a number of times before performing it themselves.

It is fair to note, however, that in the process of diving skill acquisition through the various levels of training leading to final instructor examination, there are sections of the formal coursework devoted to stress recognition and recommendations for dealing with it, albeit all too briefly, as can be ascertained by review of the manuals provided for training. However, in the situated learning environment, predominantly on the respective dive vessels, there is no clear evidence of either formal or informal mentoring protocols or time allocation to individual counselling with regard to topics such as stress recognition in passengers.

Further to this apparent deficiency where little, if any, specific guidance is offered by those enabled to do so, there are other issues that may give limitation to achieving of competences, particularly in this regard simply by lack of adequate exposure to skills enabling competency and short tenure of employees which in turn restricts the time required for some competencies to be gained.

5.7 Summary

This chapter has considered some of the observational and interview data to answer the first research question: How does a group of recreational diving instructors understand and display what their required competencies are? It has reviewed the skill expectations of the training agencies, the instructor, the diving organisation and government agencies, then transitioning from theory to practice it has considered the instructors as individuals: initially tabulating their demographics and identifying the participants as an eclectic group indicating a wide range of age and experience. Further analysis was then made of how instructors display their competencies, when this occurs and who is the arbiter of these decisions.

This first research question is made up of two parts: how do recreational instructors understand what competencies they are expected to achieve, and how do they then display those competencies in their work? Instructors understand the range of diving skills they are required to master by the standards as listed by the various training agencies, through involvement with the communities of practice in which they are embedded and thus via a blend of informal and incidental learning, the specific organisational/employee requirements as tabulated in the respective company artifacts, government standards and local codes of practice.

Competencies are displayed in four key areas as identified in the definition "compliance with accepted instructional and organisational standards simultaneously reflecting both exemplary diving and human interaction skills"- compliance with instructional standards, compliance with organisational standards, exemplary diving skills and exemplary human interaction skills. These competencies are further validated by observation of the key roles undertaken of introductory diving (ID) instructor, open water scuba instructor (OWSI) and deck supervisor as outlined in Figure 5-1, Figure 5-2 and Figure 5-3.

Chapter 6 now deals with how skills are learned to the point of competency, how this occurs within the communities of practice within which the new instructor finds him or herself, and how these competencies are determined.

Chapter 6 Situated learning within a community of practice.

Because skilled practice is not conformity to pre-existing formulas, rules or plans, then transmission of skills from one generation to the next cannot depend on the teaching/learning of formulas and rules. Transmission depends on the sensuous engagement of the novice with materials in structured environments ("socially scaffolded contexts") where he or she can learn, through trial and error, the "feel" that is the basis of accomplished practice. (Schiffer, 2001, p. 4)

Nature does not show us any isolated building blocks, but rather appears as a complex web of relationships between various parts of a unified whole. (Capra, 1996, p. 30)

6.1 Overview

The previous chapter described the skill expectations of the newly employed instructor arising from their employers, government regulations and codes of practice and the effects of leadership with regard to training management. In doing so, this answered the first research question and established how recreational diving instructors evolve from expectation to understanding what is desired for future competent application to their jobs.

This chapter concerns itself with answering the second research question: "In what ways do recreational diving instructors engage in situated learning within a community of practice to demonstrate their required competencies?" With regard to the conceptual framework as described in Chapter 3, the situated learning environment can be briefly defined as a learning process reliant on the interaction of authentic activity, context and culture (Brown, Collins & Duguid, 1989; Sammons, 2008). In this context the new instructors find themselves entering a multidimensional environment that can be represented by a "learning cube", or a matrix of formal, informal and incidental learning processes facilitating the acquisition of competence.

In a practical sense, this is where the instructors find employment in a diving operation working at sea on a diving vessel taking both diving and non-diving customers to the Great Barrier Reef. In this situation, skills are learned formally, informally and incidentally through and within a community of practice consisting essentially of a group of instructors, divemasters, trainee divemasters and marine personnel as "groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly" (Wenger, 2006, p. 1). This passion and regular interaction should therefore ensure enjoyable experiences for the customers in their charge and commercially profitable results for the dive operation by way of on-selling introductory diving, certified diving experiences, equipment rental and sales of ancillary products such as t-shirts and confectionery.

This may appear to be a clear-cut delineation of the three basic elements of situated learning, communities of practice and competences, but there are further complexities that affect the entire learning process, and these complexities must be considered. For instance, the primary community of practice in which the new instructors find themselves embedded is not necessarily the only community of practice in which they may be involved and it is the weak linkages to other, related communities of practice that may have a weighted effect on those instructors' early, or retarded, achievement of competency.

Following this is a dialogic inquiry into the induction process prior to full engagement in their instructors' occupation; the preparedness of the new instructors post induction; initial tasks given; further formal and informal training; its relevance; and the involvement by the now competent instructors in the training of others. The dialogic inquiry, explicated more fully in Section 6.3, is "An active processing through which meanings are created and learning occurs" (Wells & Ball, 2008, p. 168). This form of inquiry thus offers a lens through which recurring themes of concern have been recognised and provides a background to the structural elements of the respective communities of practice identified and how they contribute to the learning process. This is followed by reflection on the common bonds apparent between those communities and the strength of weak linkages in the network of relationships developed.

What appear to be in evidence are relatively short induction programs that offer little by way of preparation for the initial and subsequent tasks in which the new instructors are employed. This can be deemed as partially acceptable for those who may already have had the advantage of completing a divemaster internship and particularly if this were completed with the dive operation in which they have now assumed a professional role. This relatively short induction process is also somewhat presumptive of the prior learning of other, less familiar employees new to the operation.

Once past the induction phase and commencing work relatively independently, further formal training is now relegated to first aid and vessel operation whereas informal learning becomes the predominant learning process until the new instructor becomes considered competent. This point appears to be reached when that person recognises the importance of, and is capable of handling "real life" emergency (worst case scenario) situations and begins the training of others.

In Section 6.2 I describe the key elements of the situated learning environment, learning processes and communities of practice in which the instructors are involved, as listed in Table 6-1. Section 6.3 then uses data obtained by dialogic inquiry in the manner illustrated by Figure 6-2 to describe and discuss how the instructors are inducted into their jobs, and in particular, their initial tasks; formal and informal training that is experienced; the relevance of that training; involvement with others and the encouragement (or otherwise) by the dive operation in support of the situated learning process.

6.2 Synthesis of elements within the situated learning environment

Table 6-1 makes clear the distinction among the situated learning environments, the learning processes and the communities of practice in which the competencies are learned (those competencies having been described in detail in Chapter 5). Table 6-1 has been constructed from my analysis of the data relating to the second research question and identifies the various elements contributing to how new instructional staff engage in situated learning and display their competencies. It identifies the three key environments in which the new instructors will find themselves, the learning processes attributed to these environments and the communities of practice in which they achieve their competencies.

Key Elements	Description
Situated Learning Environments	
Dive operation head office	This is the place where new instructors are initially employed and oriented to the dive operations' employment contract obligations and procedures manual, and given a suite of suitable working attire and their schedule.
Dive vessel	This is the common denominator situation for virtually all new instructional employees. Time is spent here learning the positions of introductory instructor, deck supervisor and all skills related to these functions. It is from this pool of instructors that a diving school instructor would be chosen.
Diving school	Only one of the dive operations studied has a formal, land-based diving school that offers open water (OW) scuba (beginner) training. This is a situation where only experienced instructors are employed after overall competency acquisition is recognised. Even so, anyone promoted to this position is first oriented to it by an incumbent trainer performing the same function. The two other operations studied offer only referral training or more advanced training taking place exclusively at sea.
Learning processes	
Formal	Study and review of the company operations manual and completion of occupational first aid courses are obligatory in fulfilling employment requirements. Maritime courses such as coxswain and engineering are optional where learning is essentially formal in nature.
Informal	Apprenticeship type positions, essentially in the company of peers; new instructors are rapidly inducted into the functions of overseeing snorkelers, conducting introductory dives and supervising deck duties.
Incidental	Human interaction and communication skills are learned by close association and cooperation with experienced instructors and customers.
Directed non-formal	Operations managers from the different operations give differing levels of direction as to how they wish jobs to be performed. This has significant impact on the acquisition of competence.
Communities of Practice (COP)	
Primary COP	New instructors are part of a team of employees comprising experienced instructors, divemasters, divemaster trainees and marine personnel.

Key Elements	Description
Secondary COPs	Association with employees from other dive operations is conducted at meeting places after the day's work is completed. Here experiences are shared and links made with other similarly structured and focused communities of practice.

Table 6-1 Key Elements of the situated learning environment

Note: Referral training is completion of an already commenced diving course and may be from any level of training, but is usually relegated to only open water diver (beginner) courses.

The key elements of the situated learning environment as listed in Table 6-1 indicate the manner in which the entire situated learning environment is divided into three significant sections, and how the learning processes take place in their respective communities of practice.

6.2.1 Situated learning environments

En-route to becoming a diving instructor, a diver must successfully complete a series of courses and show evidence of the completion of a certain number of dives and diving experience. This combination of coursework and experience may take place entirely either with dive operations such as those researched in this study, or in a variety of situations with instructors who are entirely independent of any commercially oriented dive operation. However, it is to the former situation where there appear three distinct situated learning environments, each contributing to the overall acquisition of competence to which I restrict my comments at this time: the dive operation head office; the diving school; and the dive vessel.

6.2.1.1 Dive operation head office

Initially, when the new instructor is offered employment, he/she is expected to read, review and agree to certain conditions of employment and then be oriented to the company protocols via a further review of the company's operation manual. This is followed by a formal written test and a discussion with the operations manager regarding the requirements of the position. The new instructor is then given a uniform and roster for the following week's work. The following day, this person is introduced to the vessel staff by whom he/she is to be supervised. Except for requests for alteration in future schedules, visits to the head office of the respective companies are infrequent except for spontaneous demand for those employees who have already proven skills from prior work experience. Such a demand could be for electrical work by an employee who may have been an electrician and is still registered as such. This type of activity may not necessarily assist in achieving instructional competency unless indirectly relating to that function in a manner that enabled proficiency at the efficient use of electrical equipment required for classroom training.

6.2.1.2 The dive vessel

After initial employment, most of the interaction between peers and customers takes place on the dive vessel. Work often commences between 0630 and 0700 on board preparing for the day's schedules as described in Chapter 5. It is within this environment that the majority of time is spent acquiring the skills to be learned to enable instructional competency. Commencement of work in this new environment was summarised by Florian, who commented:

> It was: "Welcome, these are the rules, this is the uniform, see you on the boat tomorrow. This is what you have to do. This is the person who is going to look after you today and it was one of the instructors on the boat." They gave me my duties for the day and from then it was everyday I'd learn something new but again it was just running operations on the boat. You basically had to start from zero. You had no experience so you had better fill tanks. Stay on the back deck and things like that. Do all the things on the boat like a divemaster role. That's fair enough. You learn from experience. (DO1, 10/10/08)

Ultimately, after sufficient experience has been gained, including the early in-water experience of training introductory divers, and when competency by the instructor is considered achieved by both peers and operational management, instructors may then be promoted to a position performing open water diver training, referral courses and/or advanced training on the dive vessel itself.

6.2.1.3 Diving school

Only one of the dive operations in this study has a program that teaches all levels of diving leading up to and including final instructor development training. This operation also has continuous beginner (open water diver) courses commencing on a regular basis several times a week at, as it is often referred to, a dive "school". As these courses require leadership by highly experienced instructors, preference is given to those instructors who have worked in a variety of roles on their operation's dive vessel and, by virtue of this experience, require little, if any, orientation as to how to coordinate and complete the training of beginner students.

Many of those who do graduate to "school" instructor in this manner have, after all, already acquired and performed competency at taking introductory divers for their first (probably) diving experience. It is very unusual for this operation to employ anyone as a school instructor who has not been through a lengthy period of time in its employ in one position or another. Even so, all employed in this task are first expected to follow the routine of an incumbent school instructor for at least one full open water diver course of five days in duration to become familiar with the operation's protocol. Here the learning process is similar to what has already been intimated as the predominant methods: informal and incidental learning.

6.2.2 Learning processes

The learning processes used include limited formal training occurring via further reference to and greater scrutiny of company operation manuals whilst on board the dive vessel and first aid certification courses undergone on land at various venues. Some instructional staff also pursue optional marine qualifications which are a mix of formal and informal learning. Informal learning is the dominant method of learning and is experienced in the company of peers and customers where practical skills are learned alongside those skills related to human interaction and communication which are more incidentally acquired. Further learning takes place under the direct guidance of operations management who attempt to ensure certain guidelines are adhered to, such as how introductory dives are to be conducted, together with correct preparation of the vessel at dive sites and correct clerical procedures. Becoming a competent instructor can therefore be seen as a mix of formal, informal and incidental learning processes.

6.2.2.1 Formal learning processes and related connections

Up to this point the new instructors have completed a relatively formal set of tasks to achieve their present status. There are many scholars who would argue that this form of learning is far less effective for both organisational and individual development than informal learning (Boud & Falchikov, 2006; Cross, 2007; Hager & Halliday, 2009; Marsick & Watkins, 2001; Rowden, 2007; Senge, 1994). However, formal instruction does have its place. In many instances, following clearly prescribed processes, rather than learning from trial and error, achieves optimal results more quickly and safely. As a crude example, a person given precisely written instructions describing how to add certain chemicals to a swimming pool to produce desired clarity and hygiene is far more likely to have success than if she were given free rein to mix any chemicals she fancied in any quantities in the hope of producing the same result.

With the broad range of new instructors commencing work in the training environment, some find themselves less than well equipped to deal with the actual training processes that they are expected to be or become competent in executing and will certainly need to start with a precise set of instructions that they can refer to in the working environment.

As many newly employed instructors have never run their own courses and need a period of time to ‘fit in’ with their new colleagues, brief periods are provided for an induction phase, in one form or another. To begin with, two of the three dive operations studied in this case study gave new employees their own copy of an edited operations manual with which to learn basic protocols and certain lines of communication as outlined in Figure 3-3. It is from these relationships that the new instructors, regardless of background, must find the new and practical knowledge to achieve competency at their job by establishing productive connections. In contrast to earlier formal training undertaken leading up to certification as instructors, this new and practical knowledge conforms well to Cross’s (2007) comment:

> Learning things in advance, “just in case”, is a losing game. Until the case arrives, the worker suspects the subject matter is irrelevant. And when the case does come along, the knowledge acquired in advance is

> probably long gone but learning something at the moment of need couples learning and application and has more lasting effects. (p. 39)

This implies that it is more necessary to learn what is immediately relevant than to remember what may have been learned earlier. This may be a fair assumption regarding technical skills that instructors may easily develop and achieve, but it is not quite as applicable when addressing concerns such as the possession of good human interaction skills. It is important not only that these skills are recognised as being applicable to "just in case" situations but also that they are consciously and conscientiously developed at the earliest possible stage when considering this career or in fact any career within the wider hospitality industry.

It is notable that from the interviews recorded, with the exception of first aid courses and one obligatory maritime training program, formal training for diving instructors post qualification virtually ceased. In answer to the question, "Has there been any further formal training that you were asked to undergo in the workplace?", Don's response was typical: "Yes, I did my shipboard safety and that was $200 and it was just a complete joke, of course. A lot of dive shop owners do think that we should be grateful for being involved" (DO1, 06/07/08). Stuart likewise stated: "None other than boat safety training" (DO3, 20/01/09). Although Stuart's statement implied that this formal training was conducted at the workplace, it was not. First aid courses and shipboard safety courses were conducted at places remote to the situated learning environment. In comparison to other courses mentioned by instructors, it was only the shipboard safety course that may be considered as the most substantive and useful in that it may affect the shipboard competence of some of those who underwent that course. The irony is that many of those who are assigned to completion of this course have already completed sufficient time on board their respective vessels as to be highly cognisant of the subjects and issues contained in the formal training given - hence the cynicism reflected in Don's comment. Further to this, although formal first aid training is mandated as a condition of continued employment, the majority of incidents which most instructional staff are required to assist with are relegated to the provision of plasters for chafed or broken skin and antiseptic solutions and/or vinegar for stings from marine animals. Serious illness or injury is dealt with only by the captain of the vessel or a senior instructor.

Conversely, however, the majority of interviewees commented on a range of informal meetings with their peers and trainers to improve both their instructional ability and, albeit less frequently, their integration into the working "crew". It was quite clear that, from the very start of employment as a new instructor, formal training was subordinated to informal training. In many respects this is acceptable as learning may be planned and prepared for but it was a common event to see complexities arise and variations occur between the formal training in the classroom and the way in which that knowledge was applied on the job; for instance, there is no formal exercise in the classroom that can (or should?) give a realistic simulation of how to deal with a truly seasick passenger.

Formalisation can offer set programs to follow but, according to Cross (2007), it is "Informal learning [that] is the unofficial, unscheduled, impromptu way people learn to do their jobs" (p. 15). This is a rather sweeping statement but, from review of the interviews performed, it appears fairly close to the mark. The comments on formal learning were predominantly limited to first aid and vessel operation but this does not occur in the situated learning environment. Further to this,

from the dialogic inquiry in Section 6.3 it will be seen that, although inference is made of some semblance of formality as evidenced in the induction record (Appendix D), a list of tasks to be oriented to is certainly different from the more informal manner in which those tasks are learned.

6.2.2.2 Informal learning processes and related connections

In contrast to the recurring mention of only short term first aid and shipboard safety courses from the interviews regarding formal training, one common thread apparent regarding informal training was exemplified by Dale's comment:

> It's watching, isn't it? I think we learn off each other. Like you get an instructor on the boat who does a brief and you think that's pretty good actually and you might steal that and start using it. Or you might watch someone how they might do something in the water. I know I've picked up most of my things from other instructors. (DO3, 17/01/09)

During the observational phase of this study, this comment above also appeared to encapsulate how job learning was achieved – essentially through informal learning processes.

Although certain levels of competency in diving skill performance and teaching ability within a formal setting have already been established by the respective diver training agencies and recognised as such by many dive operators, there are other attributes ascribed to competent trainers that are highly applicable to the actual workplace. Two such attributes which have been referred to earlier but are rarely referred to in formal instructional development are communication and well-developed human interaction skills involving questioning, listening and providing considered feedback (Barnlund, 2008; Berko, Aitken, & Wolvin, 2010; Bodie, 2011; Clarke, 2010; Hargie, 2011; Iverson, 2008). These are also recognised as skill sets often lacking in newly employed but relatively young instructors. Partly for this reason, new instructors are sometimes placed in an apprenticeship type role at the commencement of their employment, even though many, including themselves, think that they are capable of performing the job of instruction almost immediately. This precautionary method is prudent and allows time for the new instructor to fit in with his/her peers and those with whom he/she will be working directly in the everyday situation.

It has been suggested by Lave and Wenger (1991) that "it seems typical of apprenticeship that apprentices learn mostly in relation with other apprentices" and that, "where the circulation of knowledge among peers and near-peers is possible, it spreads exceedingly rapidly and effectively", suggesting "that engaging in practice, rather than being its object, may well be a condition for the effectiveness of learning" (p. 93), and, as Hager and Halliday (2009) expand on this, as learning progresses, "Although practice resists complete verbal specification, good practitioners can recognise and acknowledge one another's expertise, and advance it further by mutual support and engagement on matters of common interest" (p. 243). This then suggests that the degree to which human interaction skills are developed in conjunction with further technical competencies is very much related to the connections made with the new instructor's peer group. As referred to earlier in Chapter 3, in this environment, regular and constant exposure to certain methods and practices is better than reading

and memorising detail about a process and "repetition spread over intervals is more likely to stick in long-term memory than repetition all at once" (Cross, 2007, p. 79).

In this context it is clear that, during the daily routine of organising customers into specific groups of snorkelers, those who would like to try diving, those learning to dive and those who are already certified to dive on their own, there is not only a repetition of various activities but also constant interaction among all staff and the customers in their care. In the former instance, repetition of tasks would conform to Cross's (2007) definition of what may make learning more memorable, but there is still a question mark hanging over how the new instructor (apart from any other employee) becomes proficient at dealing with the vagaries of both customer and collegial personalities. From all of the interviews conducted in this particular case study, there were only rare instances where either peer or dive operation trainer appeared deliberately to set aside time to discuss human interaction skills, or indeed to enact what Marquardt (2002) argues is even more important at both a personal and organisational level: a vision of future opportunities and growth (p.74).

The implications of this analysis are that formal training, predominantly relegated to first aid and vessel operation, is conducted external to the situated learning environment and offers little by way of new skill learning. Opportunities for using first aid knowledge is limited to assistance with the most minor of incidents: serious illness or injury are delegated to the most senior employee on the dive vessel (usually the captain), and formal training offered regarding vessel operation is usually conducted after employees are already cognisant of the skills they are taught during this course. In this context, these formal learning processes appear to be somewhat futile and could easily be absorbed into the informal learning processes dominating the working environment.

6.2.2.3 Incidental learning

How new employees learn their initial tasks is essentially from watching the old hands at work and attempting to duplicate their performance. This can be a combination of informal and incidental learning processes whereby the new instructor is expected to watch and learn but other events occur that indicate another type of learning has taken place. The majority of skills learned are by informal procedures but these can also be blended with learning that appears to be developed intuitively over time through exposure to recurring situations. An example of this was evidenced by the following statement by Clive: If you've been in the industry for a while and dealing with the public you get to know the difference in diving abilities, you become a good judge especially in the diving industry you can just take a look at some of them and how they handle their equipment and some you may have to go over there and ask them if they're having any problems, etc. It's probably human nature when a person doesn't want to admit that I need help. They'll wait until somebody goes and volunteers their services. After the internship you can pick this up relatively quickly. I suppose you're not taught this; you just pick it up. (DO1, 15/05/08)

Clive was referring to the internship in which he was employed. This gave him the advantage to watch many similar situations and develop the ability to assess people performing certain tasks and then acting wisely accordingly. This somewhat intuitive ability was developed through the experience of time served. Further examples, as commented on in Section 6.3 in the dialogic inquiry, indicated other

skills learned that appeared to develop more rapidly and related to communication and interpersonal interactions. It was from these interactions that greater potential for development of both formal and informal learning processes could be envisioned.

6.2.2.4 Directed non-formal training on-site

When new instructors step onto the deck of the vessel on which they are about to be employed, they enter into what may be considered the primary or dominant situated learning environment. This is where they start a form of apprenticeship that Lave and Wenger (1991) call legitimate peripheral participation in a new community of practice and where, they suggest, "From this point of view, inexperience is an asset to be exploited" (p. 117). Rowden (2007) describes this situation as one where the newcomer, working alongside other community members, can offer knowledge gained through previous experience to the group, thus contributing to the community through the work of the group (p. 70). In this regard, the supporting cast of peers and supervisors will be able to commence filling gaps in knowledge and modifying behaviour by associative learning (Shanks, 2009; Skinner, 1957; Thorndike, 1928; Tsakanikos, 2006) to meet the rigorous schedules of daily activities. At the same time, the asset of inexperience in beginner instructors can be exploited through reviewing their interactions and the challenges they may offer to existing patterns of work (Gardiner, 1999; Kolb, 1984, Pocock, 2009). For instance, those who have a clerical background may question the manner in which reporting procedures are undertaken given the documentation that presently exists. Positive changes owing to these kinds of challenge benefit both management and the personnel using and reviewing these procedures.

6.2.3 Communities of Practice (CoPs)

The relationships developed within each of the dive operations can be defined as belonging to communities of practice, with "groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly" (Wenger, 2006, p. 1). Each of the communities observed from each dive operation had similarities that could draw the casual observer into thinking that they were indeed one community only, not three independently working groups of people. However, each maintains its own community in a competitive stance towards the others and each has certain idiosyncracies that separate each from the others, such as their allegiance to different training agencies and the levels of training in which they are engaged. At the same time, they do exhibit many common bonds.

Even so, from this analysis, two types of Communities of Practice (CoP) appeared. The primary CoP is where the new instructors become part of a team of employees including other more experienced instructors, divemasters, divemaster trainees and marine personnel who have the common goal of creating a safe environment concerned with the well-being and comfort of the customers who are in their care. Other primary communities of practice are evident at the terminal at which the respective dive vessels are moored and these groups of individuals also can often be seen working together at their respective vessels coordinating duties and conducting customers on board and orienting them individually to facilities prior to departure. At the end of the day, similar coordination of activities is evident but often with the added situation whereby members from the various communities may interact, thereby forming secondary communities of practice, sharing experiences and forging links between themselves. Understanding the various situated learning

environments and learning processes occurring within these communities of practice offers a perspective on how they affect the acquisition of instructional competency.

6.2.3.1 Primary CoPs

The primary community of practice of which the new instructors become a part includes experienced instructors and divemasters who take a primary role in the training of the new instructor and the divemaster trainees, trainers and marine personnel, retail staff, management and training agencies. The divemaster trainees are also likely to be learning some of the same skills alongside the new instructors but these skills are often considered peripheral to the formal teaching abilities that it is assumed the new instructor already possesses. For instance, these tasks could include rope work used in mooring the vessel or performing head counts of passengers and crew prior to departure to other diving sites or for the return journey home.

However, it is often the case that new instructors are employed by the dive operation in which they have completed an internship, in which case much of this peripheral training has already been performed and skills learned. This certainly eases them into a situation that, despite often expecting more of them than that of which they are yet capable, does expand their own personal reach and learning potential by association with other certified instructors from other dive operations through informal contact gained at venues attended after the day's work is finished.

Each of these primary communities of practice may be defined as relatively small, having a long life span, collocated, heterogeneous, unintentionally developed and unrecognised. They operate in a specific domain, work with their own particular groups and have a common set of frameworks functioning together to create an ideal knowledge structure (Wenger, McDermott & Snyder, 2000). In this context an ideal knowledge structure would be represented by the adopted work patterns developed and displayed by each of the respective dive operations.

Each of these collocated groups consists of approximately 10 to 20 individuals who are in constant contact with one another on a daily basis, with the only noticeable breaks in their schedules resulting from days off and shift changes. As well as old hands and new instructors, the more significant others included in these communities are marine personnel, divemasters and trainee divemasters, with a less than regular appearance of management or retail staff, the latter often switching roles with either a divemaster or an instructor. This was only evidenced in the activities of Operation 2.

The lifespan of these communities may be considered relatively long given that the manner in which members learn their jobs appears to have followed a consistent pattern for many years prior to this study and certainly during the time in which this study has been performed. Further to this, even though there have been different degrees of staff retention within each of the communities of practice during this time, there has been no significant alteration to the way work is organised.

Reflecting on the eclectic range of backgrounds from which the participants have come such as student, bank manager, landscaper, software developer and soldier, it can be seen that these are heterogeneous groups that now, as a result of their shared recent formal diver training experience and owing to their now new common concerns such as operational activities and attitudes towards others within

and without their respective communities of practice, are tending towards homogeneous activity.

Although these communities of practice are indeed comparable through many of the structural elements they share, little commonality in the manner in which management engages in deliberate intervention or developmental effort with them was observed. The variability in leadership has been described earlier so it is fair to presume in this regard that these communities can be considered to have evolved more spontaneously than intentionally. Even so, where it exists, greater organisational intervention appears to provide a stabilising influence on the composition of the community members (as evidenced in staff turnover data during the prior three years).

The common ground in each of the domains in which these communities exist was as Harry (DO1, 15/05/08) put it, "Making sure they're [divemasters] happy and the customers are happy with the servicing. It's all part of the role" and as Bruno (DO3, 26/04/09) asserted, "I like to just take people for their first dive just to see the joy and that really high, happy moment in time – all the time – every day." It was all about making community members and customers happy. Learning to achieve this obviously necessitates the achievement of competence not only in the motor skills of diving and boatmanship required but also in other aspects of the organisations such as formal protocols and the completion of appropriate documentation. This is assisted by access to the guidelines made available by the respective organisations' procedures manuals and code of practice and also by the willingness of other community members to share their knowledge.

Stuart (DO3, 20/01/09), for instance, when asked if anyone had been helpful in this regard, responded, "Yes, absolutely. They always encourage senior instructors to help out juniors and they encourage junior instructors to ask questions and be inquisitive" and Leila (DO2, 22/09/08) stated, "Everyone helping each other. Don't know what to do - just ask. But the main one is watching how things are done." This sense of community "is an important element because learning is a matter of belonging as well as an intellectual process, involving the heart as well as the head" (Wenger, McDermott & Snyder, 2002, p. 29).

In the learning stages, the existing framework appears to be positive and productive and the practices of which all members of the community become an ultimate part involve sharing ideas and information and "members expect each other to have mastered the basic knowledge of the community" (Wenger, McDermott & Snyder, 2002, p. 29). This was exemplified by what Harry identified as:

> That way if we can do that [teach all crew all jobs] with anyone who comes on we can get them up to a speed where we can rely on anyone at any time to do any job. If we can do that then it's certainly a much healthier and safer work place. (DO1, 15/05/08)

This is a laudable ideal to strive for, and, although there appears to be a high degree of homogeneity of thought, care and concern developed between old hands and other newer entrants into the community, there are questions to be raised as to what and how some of the tasks to be learned in this occupation are designed and delegated respectively. For instance, why are there fewer females performing hands-on diver training and why is it that new, relatively inexperienced instructors are

performing introductory diver training after such a short (two to three day) induction to that task with customers who may not even be able to swim?

Why also is there, in certain dive operations, such a relatively high staff turnover rate if one of the common goals of the community is to create happiness for both themselves and the customer? The answers to this question may be more complex than I have space for here but some of the factors that may influence movement away from a community may be indicative of problems such as the formation of cliques which develop and dominate other concerns (Bendor & Swistak, 2001; Hogg & Reid,2006; Lapinski & Rimal, 2005; Rimal & Real, 2003), or egalitarianism constraining individual growth through "The group norm of equality [where] no one should stand out" (Wenger, McDermott & Snyder, 2002, p. 145). Early in this study I personally observed an example of clique formation where in one of the dive operations there was what appeared to be a "boys only" group creating a marginalisation of women employees to the point of bullying. In the second situation, although it was almost universally agreed that there was little discouragement of personal development, there also did not appear to be any overt encouragement with regard to self-improvement other than to encourage (or demand) completion of programs that permitted continuation of employment. As Harry stated:

> As far as external courses there's been no requirement as such and I guess it just comes down to the individual. If they want to further their studies or career, they can follow it if they wish, but it's certainly not something that's asked of us generally. (DO1, 15/05/08)

This sentiment was added to by Bruce (DO1, 07/07/08), who stated that there was "No career path". For those who are ambitious and not content to maintain the status quo, lack of support in this regard may well be one of the catalysts for moving away from the community. This suggests less than optimal awareness of the benefits of extrinsic and intrinsic motivation as described by Deci and Ryan (1995) and as outlined in Chapter 2, p. 74.

Fortunately, because of the nature of this industry, community members can make moves into similar communities where their newly acquired skills can be utilised and which may offer clearer and possibly divergent and more ambitious career paths. As demonstrated earlier, when community members feel constrained by the group they are associated with, access to other opportunities through other, presently tenuous relationships with other groups may ironically provide stronger opportunities to achieve their ambitions.

6.2.3.2 Secondary CoPs

Because of the relatively limited geographic area in which this study was performed, linkages were also recognised connecting other similar communities. Figure 6-1 gives an indication of these linkages, tying together the respective communities embedded in the three operations under study. As this represents only three of the many operations in this relatively small geographic area, it would be fair to say that this could be multiplied many more times and represent a much more expanded informal site of learning. This may indeed assist in accelerating the learning and development of certain skills (such as dealing with difficult customers and peers) from listening to the stories and experiences of friends who may be performing the same or similar tasks in other dive operations.

The weaker linkages represented in Figure 6-1 may therefore represent considerable strength in learning potential to assist not only in the fulfilment of the initially necessary competencies required of newly employed instructors, but also in the provision of future horizons to which the instructor may look forward. Granovetter (1973) suggests that: "weak ties, far from creating alienation are actually vital for an individual's integration into modern society" (p. 203). Barabasi (2003) adds to this by stating:

> Weak ties play a crucial role in our ability to communicate with the outside world. Often our close friends can offer us little help in finding a job. They move in the same circles we do and are inevitably exposed to the same information. To get new information, we have to activate our weak ties. The weak ties, or acquaintances, are our bridge to the outside world, since by frequenting different places they obtain their information from different sources than our immediate friends. (p. 43)

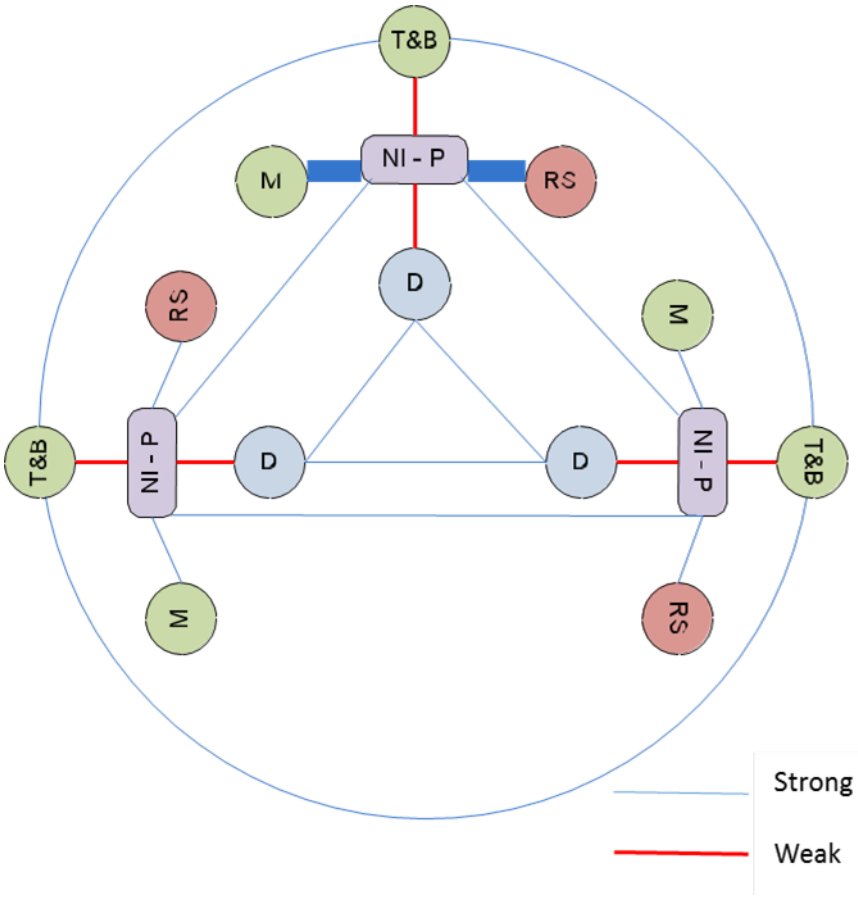

Figure 6-1 **Communities of practice indicating strong and weak linages**

Note: **This diagram indicates the relationships among three similar dive operations such as the ones in this study. The new instructors (NI) alongside their peers (P) are linked with trainers and marine personnel (T&B), management/training agencies (M), retail staff (RS) and divemasters (D). The strongest of links exist among T&B, NI/P and D but all are nevertheless connected to all, albeit more tenuously. Strong links represent relationships in constant (daily) interaction. Weak links are those representing episodic (every few days to weekly) interactions.**

From this it can be inferred that relatively small communities of practice have a far wider reach than is immediately apparent and offer many potential sources of further opportunities. This extended reach is possible through the connections, weak as they may appear, made between other communities with similarly shared interests. It could be argued that, because all of these communities, such as those illustrated in Figure 6-1 and others not yet studied, do have similar structures and organisational objectives, they could represent Capra's (1996) "web of relationships between various parts of a unified whole" (p. 30).

Putting together the jigsaw puzzle of the learning processes taking place in the environments in which these communities of practice are embedded to make such a "unified whole" requires the adhesion of dialogue. The dialogic inquiry undertaken in this study enables this by indicating what happens, when, how and through whom.

6.3 The dialogic inquiry

Earlier, in Chapter 5, a brief description of the support offered by the respective operations managers was given, indicating a difference in direct training protocols ranging from a brief introduction to the instructors' new peers to stepping on board with new instructors and teaching them the skills and procedures required of them over a period of several days. The impact of this variation on protocol appeared to be significant. Even though time spent (or not spent) by the operations managers is of no small consequence in directing new instructors as to what is expected of them, it represents only a small fraction of the time that the new instructor will spend learning what the job is all about.

The majority of this apprenticeship time is spent with the new instructors' peers and it is in consideration of the impact that this relationship has on the learning process that I have chosen now to iterate much of the more substantial and telling dialogue produced to answer the second research question, "In what ways do recreational diving instructors engage in situated learning within a community of practice to demonstrate their required competencies?" Given the premise that the majority of those participants interviewed are indeed now competent at their jobs, their responses to the questions asked during the individual interviews should offer a window into their learning experiences.

In the following pages I have merged several of the questions listed in the interview data gathering instrument (Appendix B) together with either full or selected relevant sections of their respective responses for economy of space but without altering the dialogue. I have also added certain phrases or words in square brackets to give definition to some of the specific terminology used. These extracts from the interviews conducted with the research participants have been analysed where appropriate with reference to relevant literature, in relation to addressing the essential attributes of the second research question – ways of engagement in situated learning and the demonstration of required competencies. In other words, how do they engage with the communities of practice in which they are embedded and in what manner do they demonstrate their jobs?

Figure 6-2 depicts the simple logic used in derivation of the interview questions. After initial employment, the study participants commence their work with certain, already possessed skills. This progresses through an induction process that produces a varied perception of adequacy to enter the situated learning environment as a functioning employee, then this is followed by further formal and

informal training which moves the new employee towards the competence necessary to assist in the training of others.

The sequence in the flowchart illustrated in Figure 6-2 emerged from the analysis of responses to the primary questions as listed in the interview data-gathering instrument, (Appendix B). The primary questions asked, and the rationale supporting them, was:

1. Did you have an induction program before starting work as an instructor? – Was it presumed that the instructors were already capable of undertaking their new role, or was an adequate orientation provided? If so, how and by whom was this orientation given?
2. After this program, did you feel ready to do the job you are now doing? - Were any deficiencies in prior training of the new instructor recognised? If so, how were these deficiencies addressed?
3. Has there been any formal/informal training that you were asked to undergo in the workplace? (refer rationale for question 2).
4. Is training in any form encouraged? – Was the instructor encouraged to improve their, or their dive operations' abilities by promoting further education?
5. Do you play a role in assisting others to learn? – Is this a part of the instructor's job description and what exactly does this entail?
6. What situations do you think are valuable as formal and/or informal learning experiences? – What does the instructor deem relevant to their overall training, from when they commence dive instructor training through to the present time?

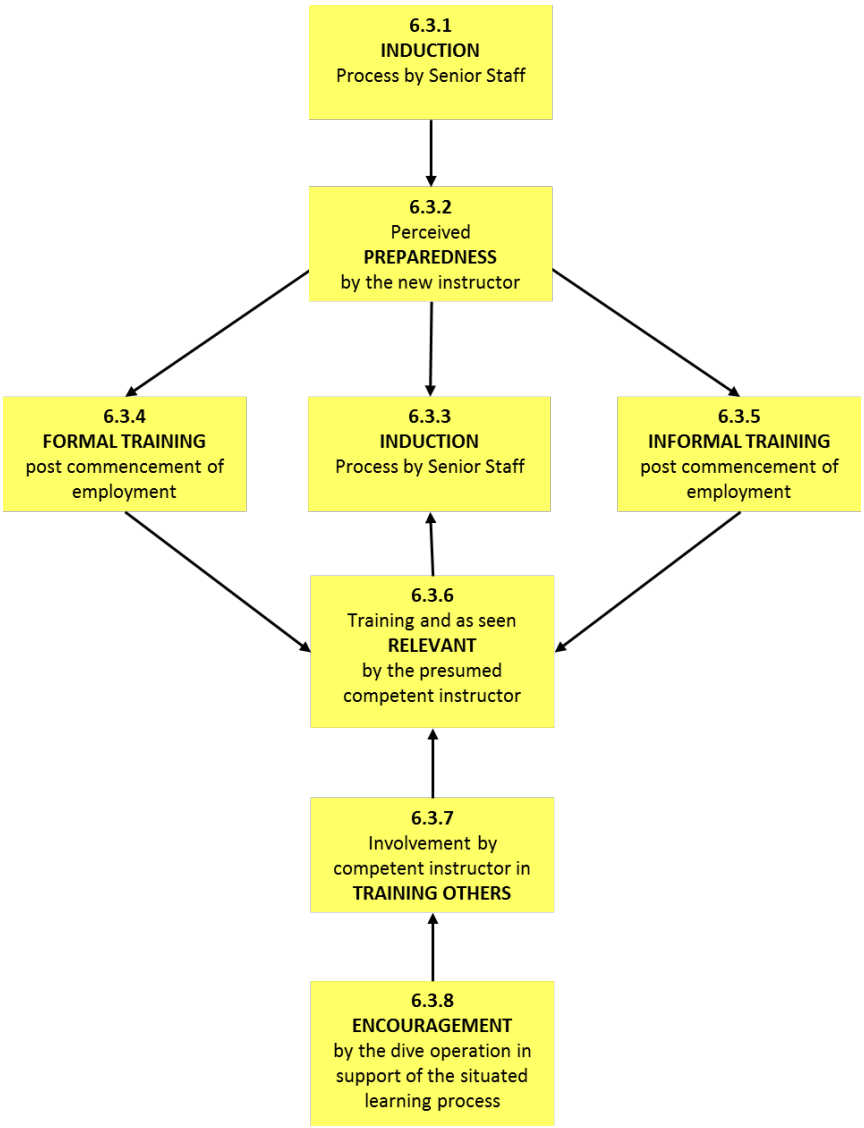

Figure 6-2 Interview issue flowchart

Note: This flowchart indicates an induction program producing a level of preparedness together with further formal and informal training to enable commencement of initial tasks and relevance to the training of others.

The questions asked thus relate to whether there was an induction program prior to commencement of work as an instructor and what it entailed, whether the new instructor regarded this as adequate, what tasks were initially given, whether there was any further formal and informal training, what was deemed relevant and if, in turn, the new instructors played a role in the training of others and what encouragement, or otherwise, was given to this entire situated learning process. Answers to this dialogic inquiry begin with the assumption of certain skills already learned and at the point of commencing work as a new instructor during an induction phase.

6.3.1 Induction

An induction program is one in which new employees are welcomed and integrated into an organisation. Bauer and Erdogan (2011) suggest that this is a process of organisational socialisation that leads to the positive outcomes of higher

job satisfaction by employees, better job performance and longer tenure (pp. 51-64). As this process by its very nature must start at the commencement of employment, the question of "Did you have an induction program before starting work as an instructor, what did this program include and who helped you with this?" was an appropriate first question to ask to understand on what basis further learning by the new instructor is achieved. From this, the following comments were made:

> Yes as an instructor probably around the three to four month period, I'd already done the back deck for six months prior to that as a divemaster so I'd had a lot of experience at that time and was finding myself very stale in that job and starting to become quite tired with what I was doing. The advantage of doing a traineeship with the company, you do learn a lot of the basics very early on. You're thrown into the deep end, especially coming from a completely different environment like the banking sector so it was all very new to me but you do learn a lot very quickly. (Harry, DO1, 15/05/08)

> It [the induction program] is quite loose and I guess again really differentiates between having a traineeship behind you and just a walk-on trainee. That's what the traineeship shows you from day [one] – you learn basically every job and every role and specific task on the boat very quickly and at the end of that traineeship you're very wise and familiar with how the entire boat runs and how the operation runs and what is expected of every employee. When you're not having that prior training, it's a lot more difficult to pick it up as quickly as possible, and again it's part of our job as senior staff to get them up to speed by trying to show them as many different roles as we can. It might not be an ideal program but it's as good as you're going to get in that situation that we're given in the workplace we're provided with. (Harry, DO1, 15/05/08)

> Yes. Being a DM for quite a while first. Worked with the other instructors. They all had their own different way of doing things and that helped. (Sharon, DO1, 29/06/08)

Both Harry and Sharon started their diver training with a company offering what is generally referred to as a divemaster traineeship. This program is of approximately 90 working days in duration but days off in between working days extend the overall time involved to close to 20 weeks. Applicants chosen for these positions are generally those with no diving experience at all. These trainees are then paid a daily rate from which amounts are deducted to cover diver training that will occur during this working period. With training fee deductions and taxation, the nett income is barely adequate to cover basic living expenses but the experience gained is intense and immediately relevant to employment as a diving professional in this geographic region.

The diver training that occurs will cover all courses leading up to and including divemaster certification, recognised as the first level of professional certification. Not only are these subordinate diver courses necessary for future instructor training completed in an environment in which the trainee is likely to continue working, but also much peripheral, non-diving skill learning is achieved, particularly with regard to vessel operation and peer cooperation. A typical divemaster trainee diver training schedule is represented by Figure 6-3.

1 23/4	2	3 7/5
	OW course	AOW course
4	5 21/5	6
Reef Teach	First Aid	Rescue pool + Emergency assistance plan
7 4/6	8	9 18/6
Rescue OW skills +exam	Rescue scenarios	40 dives to start DM
10	11 2/7	12
DM orientation	DM manual KRs	Water/Dive skills w/shop
13 16/7	14	15 30/7
Skills 1-3	Skills 4-5	W/shop 1 (sim.) P/A 1
16	17 13/8	18
W/shop 2-5	P/A 2-4	Exam
19 27/8	20	

Figure 6-3 Divemaster trainee training schedule

Note: This figure illustrates the 20 week schedule during which the trainee is expected to accomplish the required courses as listed. The abbreviations refer as follows: OW Open water, AOW Advanced open water, Reef Teach is a three hour formal program performed by a local organisation of the same name with the intention of introducing attendees to the ecology and inhabitants of the Great Barrier Reef, DM Divemaster, KR Knowledge review and P/A Practical assignments. This schedule is a guideline for trainees to ensure that they organise their training with mentor instructors on their days off work. The numbers situated directly above the comments, such as 1 23/4 relate to the (first) week and (date) 23rd of April respectively.

Secondary to this relatively substantial pre-employment program, there does exist a variety of short-term induction programs that new instructors have been required to undergo. The following comments not only support this but also offer a picture of the varied nature of the induction programs offered:

> There's a three day unpaid trial period. Then there's what they call a probationary period which is one month which is exactly the same work, the same responsibility but at a lower salary. I was doing introductory dives. (Dennis, DO2, 16/09/08)

> Yes. There's a formal orientation program and checklist to make sure you've been through all the necessary stuff on how things run [on the boat]. Takes a couple of days. (Leila, DO2, 22/09/08)

> One week familiarisation. Company protocols. Mainly H and S [Health & Safety] manual. [Learned from] the bosun at the time. Related mainly to the boat. (Doug, DO2, 10/09/08)

Of interest here is the fact that one instructor, Dennis, though being paid a lesser than normal (probationary) rate, was still expected to perform introductory dives. This would exemplify earlier comment in this thesis suggesting that the worst case instructor (someone who is still learning) is given the role of teaching the worst case diver (a person who has probably never dived before and possibly cannot even swim). Further to this, two of these participants appeared to stress that boat familiarisation appears to be of as much concern as diving. This would appear a justifiable position given that competent diving skills from prior formal training are presumed, whereas ability in situations such as mooring procedures requires specific knowledge of the vessel they are working on. This could suggest that a probationary period (and reduced income level) be viewed as an admission that the new instructors are possibly not seen as competent at this phase, and in this area of their employment. Both comments then raise questions as to not just the length of an induction program but also its content, and certainly its further and commensurate attention by the dive operator.

Even so, there were indications of a more detailed care and concern during this initial phase of employment as Calvin described:

> Yes. We did training days. Our diving supervisor, Dick, did some training with us and took us on training days and got us into taking the introductory divers and going through all the briefings and stuff like that. There would have been four or five training days out on the water just sitting down with myself and Dick. (DO3, 27/03/09)

This care and concern were endorsed by Bruno and Rachel:

> Yes. I was quite lucky because instructors I worked with were really experienced at the time. They'd all been [diving for] 10 years plus. A lot of them even 20 years. (Bruno, DO3, 26/04/09)

> Yes. Like training and stuffwise I was training for about two weeks. I was trained by a guy called Joe but he was a Japanese guy who had been an instructor for about 10 years. He did pretty much my practical training. Bonnie and Clyde did my theory. So that was just my IDC obviously but the practical training I did with Joe on Operation X. The whole training I was always being supervised and then when I was confident enough I did some by myself. (Rachel, DO3, 10/02/09)

These latter three comments gave the only real positive indicators of care and concern for the induction of employees by either management or senior staff. It should be recognised here that these comments all emanate from the same dive operation indicated in Table 5-3, appearing to present the best results in introductory diving success and in Table 1-1, the most successful at employee retention. This may give weight to the assertion that more attentive supervision could offer improved long-term dividends by repeat business and less training required owing to lower staff turnover.

However, not all new employees had this same advantage and it appears to have been presumed by some dive operations that learning would be achieved predominantly by watching and assisting others in the conduct of daily routine tasks. Although one or two individuals proceeded to answer in the negative, they continued on to explain how they were still in fact inducted in an informal, albeit brief, manner:

> Yes. I was shadowing, following for a while then doing something. The official [induction] for me is two days. When the first session is done there was someone around – one of the instructors was around because we were starting to work anyway. I don't know whether it was as official or it was just "I want to see you do that", but when I do this they have a look then leave. (Steve, DO2, 15/09/08)

> Sort of. It wasn't formal but that's generally all they do with a new instructor. They'll get them to tag along with one of the other staff. I've had new staff tag along with myself to see how we do things at the company. (John, DO2, 17/09/08)

> Yes. Well it was pretty much straight into it. Into the normal routine. You'd help the rest of the crew in the mornings to set up the gear and set up the boat. Then with divers it was first of all you help out the most senior instructors and just watch them then they'd watch you. The first job was every job that the rest of the crew does. (Sven, DO1, 23/05/08)

Although most participants were clearly given some instruction as to how to continue on with a day's work, there were others, who, if given similarly brief instruction at the commencement of their employment, appear to have been ignorant of that intention and who have relied on their wits to learn the rudiments of their new job. Reflecting this were those who had this to say about their induction phase:

I'm not too sure. I was doing out of water stuff for a week before I went in the water. Maybe because of the roster, I don't know, just that's how it was. It was good for me because that's what I needed. I was basically doing the rope work [using ropes to assist with mooring/tying the boat up] and sheep-dogging [following behind students] for other instructors, just being there as well. Probably a day or two days. I just had to basically get to know the reef. The rest I already knew. I just had to do my little circuit. (Radek, DO3, 22/03/09)
No not really, we had to make it by ourselves. (Ruth, DO2, 09/12/08)

> No. Nothing. No training day, the first day on the job you're working. Compared to other instructors I was pretty well trained. I wasn't perfect at the start. It took me, to be comfortable, maybe a couple of weeks. At least a month before I was really confident. For the intros I wasn't doing more than two intro divers for I think the first six months. (Dale, DO3, 17/01/09)
>
> No, or very little. Almost zero. (Geoff, DO3, 26/03/09)

It appears to be that in relation to the theme of induction there are pre-employment divemaster traineeships, and induction programs, if existing, ranging from one day to two weeks requiring new instructors to follow, watch and learn from their soon-to-be peers. It is significant that those who gave a negative response to this question were of a mature age coming from a professional background. With this in mind, it may be that the respective dive operators have presumed that the prior experience of these individuals in dealing with people permitted the dive operators to abdicate their obligation to demand a similar induction process to that which other instructors are made to undergo. The more negative comments regarding the apparent lack of an adequate induction process could also emanate from the fact that professionally trained individuals in other fields expect a more professionally structured induction to a new industry. In all instances, it would appear that the induction phase to which new instructors are exposed, given these comments, requires improvement. However, the responses to the perception of the adequacy of this induction phase appear in conflict with this conclusion.

6.3.2 Preparedness

It would follow that, after an adequate introduction to the dive operation, new employees should feel more prepared for the skills which they will be asked to demonstrate. For some this would possibly necessitate the need of a mentor to assist with those situations that need further guidance. Even so, the level of preparedness should be such as not only to perform basic initial skills but also to give belongingness to the community of practice in which they are now becoming embedded. The question now is "After this [induction] program, did you feel ready to do the job you are doing now? Yes/No/Partially and If not, how did you learn what was necessary to feel ready? And who from?"

The majority of participants answered this question positively and implied by their various replies that the skipper (captain) of their particular vessel was as important to them as their peers in learning their jobs. As most of the captains they were referring to had originally been diving instructors, this is of no surprise:

> Yes. After that first time of following someone along to see how it's done then you realise what works and what doesn't and you go along and get more experience and become better at it. (John, DO2, 17/09/08)

> Yes. The skipper helped about the boat. Company rules or behaviour with customers was the trip director. Ropework was an instructor helping me. (Ruth, DO2, 09/12/08)

> Partially. One of the skippers on the boat was really good in assisting me with [boat] drills and rescue drills but I was already an instructor with a certification but it was good to see that one skipper was insisting, especially with a divemaster, to make sure they received at least that kind of training but personally I had already done the course. It was great follow up to see. Apart from that, no other training. (Florian, DO1, 10/10/08)

The significance of this contrast in perception between the adequacy of an induction program and its outcome may in part be owing to the concept of cognitive dissonance (Aronson, 1999; Atherton, 2010; Festinger, 1957; Miller, Brickman, & Bolen, 1975).

As was described in Chapter 2, this is where people have a motivational drive to reduce dissonance between opposing issues and in doing so may be led to rationalise the decisions they have made and offer additional reasons or justifications to support their original choices. In this context, regardless of the perceived adequacy of training, or otherwise, because things appeared to turn out well, the training in hindsight is presumed to have been sufficient. Don's comment appeared to reinforce this theory in that he recognised the minimal effort given to his induction but nevertheless gave tacit approval to it:

> Not really, no. But I'm the sort of person that often puts myself down a bit. The proof of the pudding was I did some courses and didn't kill anybody and the courses run pretty well! (Don, DO1, 06/07/08)

This comment gives further evidence to the presumption that, because of apparently positive outcomes, the induction phase offered at the commencement of employment, though often recognised by some as less than optimal, is nevertheless adequate and sufficient to proceed with the tasks with which the new instructors are entrusted.

6.3.3 Initial tasks

It is fair to presume that initial tasks chosen for the new instructor would be those more easily achievable and would move from the simple to the more complex. This does not necessarily follow as the quality of prior learning, not necessarily diving- oriented, appears to have been taken into account. The question "What were the first tasks you were appointed to do as soon as you were employed as an instructor?" gives weight to this presumption:

As an instructor I was running the back deck of the boat for several months, something I'd already previously done as a divemaster but I was more responsible at that stage for training a lot more of the new crew that were coming on board the boat and occasionally helping with the introductory divers. (Harry, DO1, 15/05/08)

> Certified divers [leading already certified divers on a dive] and doing the back deck. (Sharon, DO1, 29/06/08)

> Initially was employed as a divemaster so feel quite confident. Started with introductory diving within a couple of weeks of becoming an instructor. Just thought I'd better get stuck in and do something. (Stuart, DO3, 20/01/09)

> Obviously it was more like a divemaster role. Basically you haven't got experience, you have to build your experience. (Florian, DO1, 10/10/08)

From these comments the initial tasks given for a relatively short period of time on the respective dive vessels was working in the capacity of divemaster assisting with general duties required to prepare both instructors and customers for general snorkelling and diving activities such as performing introductory diving experiences for customers. Harry and Sharon were two instructors who were fortunate to have completed a divemaster internship with the particular dive operation at which they were currently employed and accordingly they were familiar with these initial tasks. Stuart, on the other hand, when new to the dive operation he was currently employed in, at the age of 41 and having a military background, was certainly well placed in this role. Similarly, Florian at an age of 30+ and with a background as an environmental engineer appeared also to have been suitably placed.

By contrast, some instructors were placed in positions indicating a relatively more relaxed work situation such as leading those wishing merely to snorkel dive (using a snorkel and remaining on the surface all the time). This then appeared to be a good means also of allowing a substantial amount of their working day to consist of interaction with a varied range of customers. In this way, interpersonal communication may be practised in less stressful situations than in the more complex task of leading introductory diving experiences. Of this transition the following comments were made:

Snorkelling. Eased into doing intros. First tagged along. I'm almost always on intros. Two weeks before going 'solo' with intros. (Leila, DO2, 22/09/08)

Snorkelling, then put on intros. (Jake, DO2, 10/07/08)

In other situations, however, some new instructors were almost immediately tasked with conducting introductory diving experiences - possibly reflecting more the demand for certified staff to assist with short-term profit generation than the concern for the long-term outcomes of customers wishing to repeat their experience (Stiglitz, Sen and Fitoussi, 2009). As commented by several participants:

> I went straight into introductory diving. That was straightaway and was all I really did and all I really wanted to do. I didn't really want to do courses, it seemed to take a long time. I liked to just take people for their first dive just to see the joy and that really high, happy moment in time – all the time – every day. Just going through the different levels in the courses and stuff – I kind of liked that and got appreciation out of it. Got enjoyment out of it. (Bruno, DO3, 26/04/09)

> Introductory divers. One day after I became an instructor. Then open water courses with another instructor shortly afterwards. Did this for three weeks then back on to the boat. (Bruce, DO1, 10/09/08)

> Learn to do a briefing and then pretty much the intro diving straight away. I was taking two people at the start and then when I was more comfortable, three then four. (Rachel, DO3, 10/02/09)

An outlier in the responses was Dale's comment of having to meet the challenge of all tasks with apparently no guidance other than what he had learned from his previous training experience leading up to his employment as an instructor:

> I was the only instructor on the boat so I had no-one to teach me. I got on and did certifications, open water, and introductory divers and guided certified divers and snorkel guides. (DO3, 17/01/09)

Fortunately, this did not seem to be commonplace but earlier comments do indicate that some thought has been given as to the suitability of certain new instructors in their initial tasks and persons such as Dale could quite well have been judged correctly as sufficiently competent to meet the demands of the situation in which he was placed. It would appear then that there are four initial starting points after induction: supervision of snorkellers and skin divers[9], supervision of all diving staff, supervision of certified divers only and finally, an almost immediate tasking of training introductory divers to which all of the former three starting points appear to have to graduate, albeit in short and varied time frames, as indicated in Figure 6-4.

[9] A snorkeler is a person using mask, snorkel and (usually) fins at the surface only. A skin diver is one who uses the same equipment only but often dives beneath the surface.

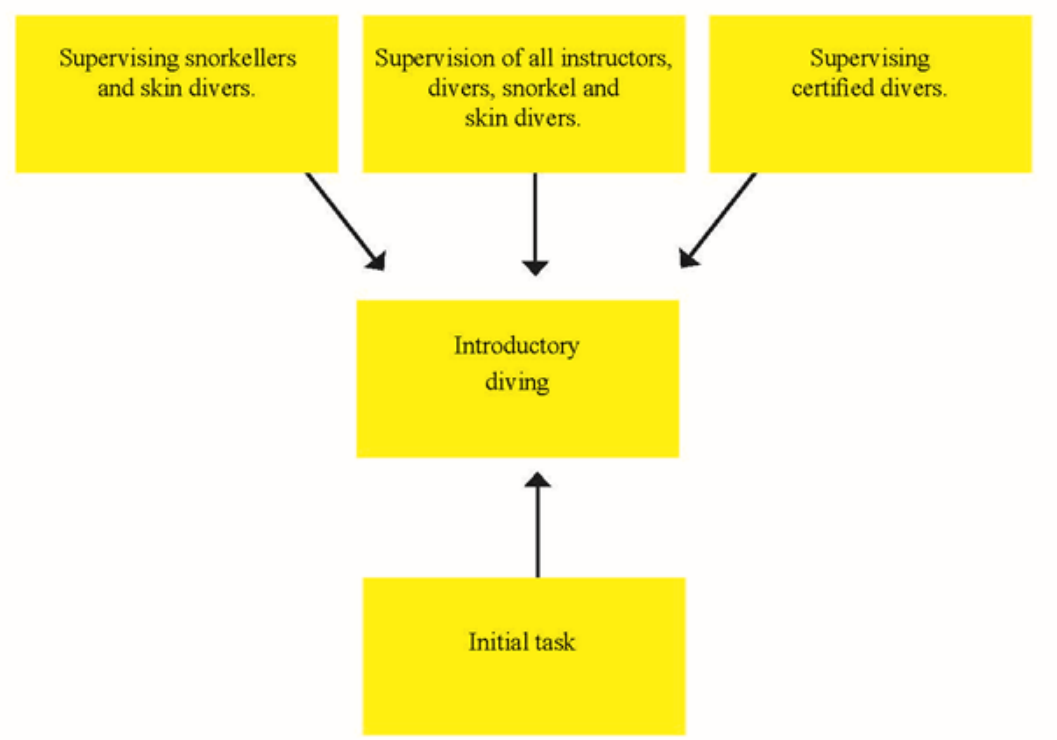

Figure 6-4 **All originally held positions gravitate towards the prime task of conducting introductory diving.**

For some of the participants interviewed, such as Bruce, Rachel and Bruno, a two to three week time frame performing divemaster duties appeared to have been the maximum period of time prior to commencing the activity of leading introductory diving experiences. However, it was not made clear how much of this time was relegated to learning this specific function. From all cases I have personally observed, it is fair to assume that learning how to take an introductory dive took no longer than two to three days after the new instructors learnt other deck duties. This situation whereby a newly certified, yet relatively inexperienced instructor is given the work of guiding customers who may either have never been underwater before or indeed be unable to swim, could be seen as the least competent instructor (beginner) teaching the least competent divers (those who have probably never tried it before). This already fraught situation is further complicated by the fact that new instructors may have to escort up to four such individuals at a time.

6.3.4 Formal training

The majority of formal training necessary to achieve the various basic levels of certification required for instructor status has already been successfully achieved. However, there are other skills allied to the job of diving instructor that require further formal training. Of the many comments analysed regarding the question of "Has there been any further formal training that you were asked to undergo in the workplace? Yes/No and if so, what was this?" the following represented the areas of formal training with which the new instructors are provided. Essentially these are boating skills, first aid and other relevant courses conducted by external training providers, and formal review of quality assurance questionnaires completed by customers and changes to local codes of practice impacting on operation protocols. The most common and most substantial formal training program is that imposed by legislation - elements of shipboard safety:

> Within the company itself, no not really. There's obviously been the shipboard safety that was introduced. All the boat crews around the area had to participate and that's something I did as soon as it was introduced. (Harry, DO1, 15/05/08)

> Yes. Elements of shipboard safety. Got booked in for this. Operation 1 covered the cost $450. SFA [Senior First Aid] and O2 [Oxygen first aid provider] certifications. (Bruce, DO1, 10/09/08)

> Yes. Elements of shipboard safety. (Leila, DO2, 22/09/08)

Various organisations are entitled to offer this form of training but any certification program offered must state that it "satisfies requirements for Elements of Shipboard Safety (ESS) under the National Standard for Commercial Vessels Section D4.2 as required by State registered authorities and is a pre-requisite for further licensing" (TAFE, 2012, p. 1) and provides the student with the knowledge and skills to:

- Carry out the duties required of crew members during onboard emergencies
- Use onboard lifesaving equipment to implement survival techniques during periods in the sea and in survival craft
- Use onboard lifesaving equipment to assist in rescuing a person from the water
- Identify potentially hazardous situations arising in the work environment and take appropriate action to minimise risk of injury (p. 1).

Successful completion of this course is required for anyone working on board commercial vessels including tourism operations such as reef and diving boats. (TAFE, 2012, p. 1)

This program must be retaken every five years.

More frequent tertiary training required however, and more often than not also offered by external training providers is usually first aid oriented. Every three years the occupational first aid course designated with the unit of competency HLTFA301B must be completed, but every year the cardio-pulmonary resuscitation (CPR) component designated HLTCPR201A and an oxygen first aid provider course designated 21965VIC must also be renewed. This situation was also frequently commented on in one manner or another:

> Yes. EFR [Emergency first response – a brand of first aid course offered by

> PADI] and first aid update. (Charlie, DO1, 05/07/08) Not besides first aid. (Rachel, DO3, 10/02/09)

> Yes, we had to do boat safety that they still do now. CPR [Cardiopulmonary resuscitation] courses, oxygen, resuscitation, those types of things that obviously they still do now. That was pretty much it. (Jeremy, DO2, 30/09/08)

> Yes. Things like your O2 and that sort of stuff you have to do anyway. Also your defibrillator course and things like that they have like a trainer come in and if everyone wants to do the course you're more than welcome to come in on this day, pay the money and get to do this. It's [the course in automated electrical defibrillation — AED] not actually a requirement but it's pretty good to be able to do it. (Radek, DO3, 22/03/09)

Contrasting with these two compulsory areas of formal training, some new instructors were encouraged to complete other, work related programs, again performed by external training providers offering training in equipment repair, marine biology and underwater camera use. It is significant that the following comments, unique to these study participants alone, gave indication of awareness by dive operations of further training for instructional improvement but where opportunity for involvement did not appear generally available to all members of any of the communities of practice:

> Yes. The only kind of training I've been involved with apart from on the job training initially when you start in the shop and on the vessel. I've been to at least three dive company conventions over the last four years. Two Scubapro seminars and one Aqualung seminar – both were intensive. (Arthur, DO2, 13/10/08)

> No, but the company has asked me to learn about the reef. I did that a few days ago. (Ruth, DO2, 09/12/08)

> No, except for learning to use the underwater camera. (Dietrich, DO1, 24/05/08)

The importance of these skills should not be understated. In some larger operations these functions are performed exclusively by in-house staff offering further potential for making a profit. For instance, customers who come to see the Great Barrier Reef often take the opportunity to purchase professionally taken photographs to record the event. Having staff trained to offer this not only improves that profit making potential but also provides to incumbent members a potential further avenue for skill learning and future employment opportunity also gives another goal for incumbent staff to aim to achieve. However, in many situations, it is often easier for some dive operations to use contract photographers for this function.

The only indication of formal training that is undertaken in any form within the dive operation in which the new instructor is employed is that of reviewing the latest changes to legislation, customer questionnaires that comment on their experiences with the company and features of daily boat operations such as drills and ropework:

> Yes. There was recently a practice code [change to the Code of Practice] of diving in Queensland. Not something you really learn from. Also emergency procedures and what you need to do with the skipper. (Steve, DO2, 15/09/08)

> Yes. Meetings when the senior instructor and skipper talk about what we could do better. The QA [Quality assurance] forms are reviewed and if anyone ticks a box we have to talk about what should be done about it. If necessary. (Sharon, DO1, 29/06/08)

> Yes. With regards to standards, if there's any change in standards they are informed by a memo or one of the office managers coming down and talking to them. If there is an incident that occurs on board that's first of all discussed amongst the crew and then it's addressed as to how it can be fixed. Managers are contacted as to how that could be fixed. (Geoff, DO3, 26/03/09)

> Yes. Well, probably once a month or a couple of times we do drills. Earlier on when you weren't quite so sure how to work we ran through that, step by step what you should be doing. Tying things to the boat like anchor chains and that sort of thing. Rope work. You get taught how to do it. It might be by the skipper or the senior staff. You get shown and told how to do the ropes or whatever it might be. (John, DO2, 17/09/08)

These responses were consistent with the fact that the majority of formal training required to become a dive instructor has already been completed but they do indicate other formal training programs that are essential for the completion and continuation of employment. These are necessary for diving professionals to conform to the Queensland Code of Practice and include Apply First Aid (occupational first aid), Oxygen first aid provider and Elements of shipboard safety. This latter course is a three day program and it is now a requirement for anyone working on any vessel in a professional capacity to complete within six months of commencement of employment.

There seemed to be little apparent concern for any further training in diving capability such as marine life awareness or retail knowledge unless this deficiency is required to plug a gap in what the operation has to offer. Hints of this management attitude may be inferred from Ruth's comment regarding her company requiring her to learn more about the reef and Arthur's comments about the equipment and retail seminars he had attended. Finally, and reflecting on comments regarding formal training provided by the management of their dive operation, whilst recognition of assistance by appropriate mentors in most situations was in evidence, it is noteworthy that none of this formal training is directed at that most significant of work requirements – the conduct of introductory diving. The presumption must then be made that this area of training relies more on informal learning processes engaged in within the situated learning environment and where competence is both gained and demonstrated through the gradual acquisition of experience.

6.3.5 Informal training

From earlier discussion of informal learning in Chapter 3, it is apparent that the greater part of what individuals learn about their jobs is through interaction within a community of practice and in less contextualised settings (Cross, 2007; Davies, 2008; Lave & Wenger, 1991; Rowden, 2007). It then follows that

importance is given to the question of "What informal learning do you think happens in the workplace (or out of it?)".

Comments on informal learning varied from the vague to the specific but with certain themes appearing that related to vessel operation, the significance of interaction with other people and recognition of the importance of deliberate mentoring. Once again it was evident that in all of the training offered, vessel familiarisation and its related skill sets were a dominant issue, as indicated by the following:

> There's a lot of informal learning from the crew who've been here a long time. From the skipper. (Tim, DO3, 04/04/09)

> Just ways they [other instructors] do things that you see worthy and adapt it to your own way. There's obviously learning like that. Just around the boat as well. We've got quite good skippers on our boat who are really happy to teach. I could take a bit of interest in learning how to drive the boat and finding out a bit more about what happens downstairs [in the engine room] and that sort of stuff. It's all information – I ask Jake to show me this and that's cool. (Aaron, DO3, 15/02/09)

> Everyone helping each other. Don't know what to do? - just ask. But the main one is watching how things are done. Especially with boating skills. Rescue skills should be practised more often. (Leila, DO2, 22/09/08)

> I guess different skippers, different captains want to do different things in different ways so possibly moorings lines or ropes on particular reefs or when we're tying up at the end of the day. Dealing with clients and customers and changing some of the services at a different angle. Obviously it's something we've looked at to improve overall customer feedback and service as part of the hospitality and tourism industry. (Harry, DO1, 15/05/08)

Earlier I indicated that most of the vessel captains (skippers) had previously been employed as instructors and were well acquainted with many of the demands placed on them when in that position. It is appropriate to put this in perspective. Their knowledge was often gained in earlier years but significant changes to diver training methods have occurred since they were practising and their suggestions must not necessarily be taken for granted as being correct. For instance, the stress on academic knowledge requiring memory and number manipulation skills in earlier years has given way in part to an emphasis on broader knowledge of other related activities such as environmental issues represented by the Professional Association of Diving Instructor's (PADI's) Project AWARE (Aquatic World Awareness, Responsibility and Education). Even so, the captain's accumulated wisdom and often well-developed abilities in dealing with people are an invariably rich resource to learn and reflect from, alongside other community members with whom the new instructors work, and as reflected in the following comments:

> It's watching isn't it? I think we learn off each other. Like you get an instructor on the boat who does a brief and you think that's pretty good

> actually and you might steal that and start using it. Or you might watch someone how they might do something in the water. I know I've picked up most of my things from other instructors. (Dale, DO3, 17/01/09)

> If you're talking about daily running of the operation on the boat, any practical skills: moorings, ropes at the beginning of the day. At the end of the day tank filling, etc. With practical, once you have seen it once, you've got it. There was no training in terms of dealing with – this job is 90% dealing with people – and the ability of being nice, friendly and offering some kind of service. I keep going back to that one because for me personally it's the main thing. (Florian, DO1, 10/10/08)

> Teaching/demonstrating DMT [divemaster trainee] skills. Face to face with customers. (Dietrich, DO1, 24/05/08)

> Informal? I guess that comes along when you're working with different personality types and observing how they do something differently to you and appreciating and liking how they do something and then taking it on as something you do yourself. No-one has said to you "This is how you do it". It's more a case that you've gone, "That could work for me". So you give it a try and if it works then it becomes a part of your patter. (Arthur, DO2, 13/10/08)

Many of the participants recognised the necessity and importance of developing personal interaction skills not only with their peers but also with those for whom the instructor was responsible. This should serve as a further indication of the necessity for more consideration to be applied to an earlier and possibly more formal introduction to the learning of communication skills (Barnlund, 2008; Berko, Aitken & Wolvin, 2010; Bodie, 2011; Clarke, 2010; Hargie, 2011; Iverson, 2008) during subordinate professional training, as was explicated in Chapter 2.

Informal learning was also identified by the more deliberate mentoring made available by senior instructional staff:

> Just talking to other instructors. That's how I learnt a lot of it is – just like things were happening in the water with other students or people and I would ask Joe why this would happen and he would sit me down on how to prevent that from happening and then that would never happen in the first place. General control, position, everything like that I was actually – I dealt with it but then once talking to Joe he was the first trainer for six months. (Rachel, DO3, 10/02/09)

> Meetings with senior instructors at the end of the day. (Bruce, DO1, 07/07/08)

> When someone else is working, specifically one instructor. The rest I've listened to it can be more from what you wouldn't do. There's one instructor that enjoyed listening and watching his briefings and I took some on so that's informal learning. Things that people say that I pick on and comment and gets a good response from the customers I adopt it. (Steve, DO2, 15/09/08)

> With the intro thing, it's just such a huge responsibility, so for me I would get a little nervous before I got into the water because things could, you know, things could go downhill very quickly. It's always in the back of my mind but now I've taken so many [introductory divers] and I would say I'm pretty cautious as far as a dive instructor goes. My thing on the boat is I'm really fussy with masks. I hate it if a diver has a foggy mask, even if it's slightly foggy, if the mask doesn't fit properly, it's too tight or too loose because I found that that was the main reason that people would spit their regulator. I found that. So I'm really pedantic and I think it's why some of the other instructors [aren't quite the same as] me being so fussy with equipment, but for me I'd rather spend a couple more minutes fixing that up before they get into the water rather than having to fluff around in the water. Especially when they get water flickering their nose they freak out and so finding out things like that and other things. (Stuart, DO3, 20/01/09)

Watching and learning from peers and senior staff, or what Lave and Wenger (1991) would call "old timers" (p. 29), appeared to be the universal method of learning what the job of diving instruction was all about in all of its aspects: from paperwork and learning more about issues such as medical conditions contraindicating diving or recognising marine life to giving the daily briefings, boatmanship knowledge related to manouvering and use of the vessels and, of prime importance, communication skills, dealing with customers and how to organise and perform diving activities. It was evident also that new instructors very quickly evolved in their capabilities to assist more recently appointed instructional staff and play a role in their learning process. In this regard it is of interest to see the mirror image of the process they in their turn underwent to achieve their competence and what they now consider to be valuable learning experiences. This exemplifies how new instructors not only learn to demonstrate their competence, but as "old timers", how they also engage in the training of new instructors within the situated learning environment (Lave & Wenger, 1991).

6.3.6 Relevance

As we noted earlier, Cross (2007) suggests: "Learning things in advance, 'just in case', is a losing game. Until the case arrives, the worker suspects the subject matter won't be relevant" (p. 39). However, in this context, subject matter, such as boat handling, is almost always directed at what is immediately relevant and, to the question of: "What situations do you think are valuable as formal and/or informal learning experiences?", most of the comments analysed identified above water work as of primary importance:

> Being on the boat learning all the time, rescuing snorkellers. Not planned, just happens. Unlike the formal exercises like man overboard. (Sven, DO1, 23/05/08)

> Real life situations. Simulate real rescues. Really important. Then reflecting on what we can do to improve what we did. Teaching people to use their initiative important. As an instructor not to slack off - work at being a role model to the DMTs especially. Ropes/boat work being a part of the crew as opposed to being just an instructor. (Bruce, DO1, 07/07/08)

> Drills. More realistic the better. Frequency about twice a month. We get the least experienced people involved as soon as we can. (Doug, DO2, 10/09/08)

> DMTs rescue training. Tank filling. Watching/working with other instructors. Start doing courses. I did [watched] three [courses] first before starting off on my own. (Charlie, DO1, 05/07/08)

These comments endorsed what Garrick (1998) says: " In the workplaces using competency based standards to measure performance, this [Garrick's] study has found that the pre-defined nature of competencies can remove elements of professional judgment" (p. 157) and as explicated earlier in Chapter 3. Nevertheless this did not detract from the importance placed on the role of mentoring given by instructional peers:

> I think knowing how things are run on the boat. It helps you fit into the new working environment. Easy in and get the hang of how most things are done. This is how we do certain things. I think it's the same – you just learn and get taught by staff already there how things are run on the boat whether it be diving activities or whatever it might be. If you don't know how to do something someone shows you how to do it. (John, DO2, 17/09/08)

> I guess the formal process is where Dick [operations manager] will come out and spend a number of days with a new instructor. Even Dick can teach bad habits but he's still out there taking an active role in making sure they understand how things work on the boat and how he expects things to be done. He just takes a little bit longer and gets a bit excited also sometimes. He tends to get lost every now and then. Nothing unsafe. He usually comes out when it's quiet. Everyone who starts is given a fair idea of what to do and what's expected of them and the procedures manuals are all in place and they've got to be done within a certain amount of time and have to go to different people on the boat to get different parts of that procedures manual. (Aaron, DO3, 15/02/09)

> Just being in the job itself and given the training and guidance from other people. (Calvin, DO3, 27/03/09)

Unique in itself was the comment by Jake about "Showing people animals underwater. Getting used to the environment" (Jake, DO2, 10/07/08). In its singularity, this alone could lead to the assumption that the majority of all

experiences deemed as important for instructional staff to learn are not underwater but above it. Emphasis is then placed on the dive operation vessel as the primary learning environment and where the majority of competencies are displayed.

The predominant themes in these responses then were the need for authentic experiences, an appreciation for the "hands on" approach of one of the operations managers in assisting with the induction and training of newly employed instructors (perhaps contributing to a "Hawthorn" effect on the entire community – where the presence of a supervisor alone without any tangible involvement in activities can still affect performance), and the overriding issue that confirmed previous observations: peer to peer learning within, as Leila (DO2, 22/09/08) put it, the "community that helps each other."

6.3.7 Training others

The essence of a community of practice is its directedness towards a common goal and the importance placed on teamwork and solidarity (Lave & Wenger, 1991, p. 93). An implication of this is the willingness to assist one another in learning efficient methods to achieve those goals. In asking the question: "Do you play any role in assisting others to learn? Yes/No and if Yes, how?" a unanimous "Yes" was given by all participants and described more precisely by the following participants, distinguishing particularly between the roles of training divemaster trainees and new instructors:

> Generally there's the new trainee side and a course instructor will start with them on the open water course and train them to become an open water diver first of all. Generally I'm heavily involved in the advanced, rescue and the divemaster courses that follow and if I don't have a direct hand in the actual training in the water as such I certainly have help in the theory as far as general related questions in my own time or whilst I'm travelling on the boat or in the office – I do value the time I spend with them. We go through a pretty hard schedule, I went through it myself, and I also know it can be left by the wayside if you don't pay attention to them. I guess again, having enjoyed the teaching and the diving is something I enjoy doing anyway I find it can be easy to do. I also help out the trainees on the boat whenever I'm available such as general boating as far as ropes and procedures, safety, watching and just the hospitality and tourism side of things. Making sure they're happy and the customers are happy with the servicing. It's all part of the role. (Harry, DO1, 15/05/08)

> All the new DMTs. As they come on I fully induct them. We have an induction crew form. I have a list for that and verbally go through the list and go around the boat showing them what's what. Takes about 45 minutes and then over a space of say 2-3 days during downtime, show all the things discussed and how to operate. (Bruce, DO1, 10/09/08)

> Yes. Because I've been here a while now, I'm called on a fair bit now to show new staff what to do. Whether it be with ropes - only the other [day] I was showing some new staff how to use the anchor and work the anchor winch. There are tasks around the boat, show them how to do whatever it might be. Ropes or whatever. (John, DO2, 17/09/08)

Every five to six months new divemaster trainees are employed and their dive training invariably commences within the first two weeks of employment. From then on, further diver training takes place only on their days off with experienced instructional staff performing most of their remaining training, both diving and non-diving. This training schedule is illustrated in Figure 6-3 and is far more intense than that experienced by new instructional staff, who are often employed after recently becoming certified as diving instructors but who may or may not have had the advantage of a traineeship. This assumption may be inferred from the following comments:

When the new instructors come on board, I'm always happy to tell them the way I think they should do things. I listen to their briefings and critique them on their briefings and stuff like that. Especially the younger divemasters who want to go on and do their instructors, offering help. Calvin has just finished his instructors now. I was always there if he needed me to come and sit in on his talks. Throwing ideas around and things like that. (Aaron, DO3, 15/02/09)

> Yes. Like with the new instructors I sit down with them after Dick's [Dick is the operations manager] dealt with them and run through how I expect it to be done. (Dale, DO3, 17/01/09)

It is of interest to see that, apart from these comments and the monosyllabic responses of others who simply answered "Yes" without qualification, everyone appeared to participate in the training of their peers and subordinate divemaster trainees. Dominant themes apparent in many of the responses related to boatmanship and assistance with the performance of briefings to customers. Very little reference was given to the assistance given to in-water activities and perhaps this was an indicator of prioritisation and the relative unimportance given to this area of training.

Additional to the comments describing the initial induction programs, formal and informal learning and the roles that instructional staff in turn play in teaching others and what they consider important to learn, further questions were asked that referred to the impact on what and how skills are learned. These questions related to the encouragement (or otherwise) that was given to learning in general.

Although not directly linked to those questions eliciting detail regarding initial training and the formal and informal learning processes that occur in the situated learning environment, early demonstration of competencies can be affected by the overriding culture of the organisation as directed by its management. This may have considerable bearing on the diligence pursued in maintaining and improving what learning does take place as inferred by Kirkwood and Pangarkar (2003) and Wenger, Dermott and Snyder (2002) and as described more fully in Chapter 3.

6.3.8 Encouragement (Motivation)

Goal-driven behaviour as explicated in Chapter 2 enables individuals to negotiate changes in the demands (Csikszentmihalyi, Abuhamdeh, & Nakamura, 2005) that in this context are ever present with respect to the physical environment, new skills to be learned and a daily changing customer intake: the latter offering the constant challenge for improvements in interpersonal communication skills as also

emphasized in Chapter 2 with regard to the works of Barnlund (2008); Berko, Aitken and Wolvin (2010); Bodie (2011); Clarke (2010); Hargie (2011) and Iverson (2008). Change and modification of behaviour alone are a broad and demanding issue where diving instructors often need motivation to achieve. On the assumption that encouragement to achieve is primarily an obligation to be initiated by those in leadership positions, the responses to the question of "Is training in any form encouraged by your: Peers? Supervisor? Captain? ABC Dive? Yes/No? and if so, what is this?" were generally positive. Even so, although not specifically nominating any one entity as the prime motivator, it was implicit that there exists a generally encouraging culture, but this encouragement appeared to be targeted at what is more in the dive operations and not necessarily the dive instructor's interest. This made apparent by the comments below:

> Yes. Generally for the company if we have new instructors coming in we put them under someone's wing whether it's under a course instructor for several weeks so they get to know the general way that we teach and deal with clients as far as the course structure side of things is concerned. We also spend a lot of time initially on the back deck of the boat getting them to run through the overall running of the jobs and different tasks on the boat so they get to know things very quickly on the boat. They also get to know the crew very quickly on the boats, who can do what and who can't. Getting them involved in ropes and moorings is something that we try to get in very quickly, as well as tender training on the smaller vessels. (Harry, DO1, 15/05/08)

> I don't think - for myself I haven't really expressed any interest of actually going forward and doing my skipper's ticket. Obviously they're [instructors] not getting any extra for it; they're just doing it because they want to do it. If you want to do it then they're really encouraging and helpful and they'll take the time out to sit down with you and take you through it. As far as the company goes, they're pretty happy to be very flexible with your shifts and stuff like that if you want to do any training. (Aaron, DO3, 15/02/09)

> Yes. Tests on the Code of Practice, Reading the operations manual. Otherwise not really. One lady is having a hard time getting time off to do her Coxswains[10] because of staffing problems. There just isn't enough staff. If people were hanging around longer perhaps management may invest something in this but high turnover of staff doesn't make it really possible, I guess. (Leila, DO2, 22/09/08)

> Yes, absolutely. They [management] always encourage senior instructors to help out juniors and they encourage junior instructors to ask questions and be inquisitive. We did speedboat licence. The defibrillator course last year. Of course we do the procedures manual every year so that's formal training once. And of course all the other

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[10] A Coxswains course certifies the person to drive a commercial vessel up to 12 metres in length operating up to 15 nautical miles to sea.

> training you have to do like your first aid every two years. Your O2 and CPR. (Stuart, DO3, 20/01/09)

These comments also highlighted another issue that was embedded in the dialogue: staff turnover and the difficulty of finding time to attend and complete further training, albeit in the dive operation's better interests. Encouragement to learn and acquire further skills related to previously mentioned peripheral activities with the potential for greater profit taking was evidenced by comments such as:

> None other than solo diving for underwater photography. (Dietrich, DO1, 24/05/08)

> Reef Teach [a marine awareness program] is compulsory for the Operation 2 staff. They [Operation 2] want a green logo[11] on their flyers so that's about six hour's unpaid training on that one. I can honestly say I didn't learn anything in those six hours that I didn't already know from reading over the last five years. (Dennis, DO2, 16/09/08)

However, the majority of comments indicated encouragement to learn those skills that were mandatory for retaining employment:

> Ah, the only thing I've been encouraged to do is get my light rigid bus licence so I now drive the bus as well as do the other work which influences what I do with my time on the boat as well. There's no discouragement unless you have to take time off and then there's a process to apply for time off. (Dennis, DO2, 16/09/08)

> Yes. Since I've been here, obviously for employment the oxygen and first aid [course]. Since one of the company policies is if you're going to be working here longer than six months then we do a shipboard safety course. That's three days so we learn about using extinguishers and liferafts and that sort of thing. It's safety at sea and that's a mandatory company thing. Most of us have done that by now. They sort of encourage that and with the bus license as well to drive the buses. One of the other guys has just done his recreational boat licence so now he drives the tender a bit more. I already had that before I started with the company. That's one of the things they sometimes encourage people with. But not diving related. (John, DO2, 17/09/08)

On the other hand, some found it difficult to be positive about the dive operation's attitude towards further learning and commented as such:

> I can't say. Any further training you have to want to do it. Like more instructor ratings, EFR [Emergency First Response – a brand of first aid training], being a skipper. It's a personal choice. Not much encouragement. (Sharon, DO1, 29/06/08)

[11] This is an insignia placed on advertising materials to indicate concern for environmental conservation.

> Not really. After DMT level where you want to go it's up to you. You have to go and ask. No career path. I personally think it's a good way to be as I can go where I want to. I make my own decisions on what I want to do. (Bruce, DO1, 10/09/08)

Some of the responses to these questions confirmed the encouragement of peer to peer informal training that takes place and formal courses leading to certifications directly related to conformity with the requirements of the Queensland Code of Practice and that are necessary for continuation of employment: Apply First Aid, Oxygen first aid provider, Elements of shipboard safety, marine licences and the light rigid (LR) extension to a standard Queensland drivers licence. This latter is required to transport customers to and from the diving vessel and/or training facility or office.

However, perhaps the term "encouragement" as interpreted by some of the respondents to this question has been misconstrued as "demand" as it is unlikely that they will be allowed to continue in their employment unless these other qualifications have been successfully achieved. Perhaps the expression "encouragement" has become a euphemism for "demand" in this context. On this issue it was also of concern to assess whether the more negative opinion regarding diminished levels of encouragement became discouragement. To the question: "Is there any discouragement to learn anything by anyone? Yes/No and if so, how does this occur?" being asked, a unanimous "No" was the answer given to the first half of this question with the exception of one participant, Leila (DO2, 22/09/08). Leila appeared to see discouragement as a definition of the lack of any tangible encouragement to be rewarded for doing further training: "But you won't be paid or allowed time off to do any courses. This is the first industry where training of staff isn't seen as important to them". Most industries, for example manufacturing and engineering, allow staff to take time off from normal duties and continue to be paid while training.

This is an interesting situation. Almost all of the other formal programs which the participants are encouraged to complete are in reality a demand to retain their jobs and with no evidence of paid time off to achieve this. Neither is there any increased income potential for these extra achievements and in most cases dive instructors have to bear the cost of these courses themselves. In this regard, discouragement to learn may be the true default setting of a dive operation. Ironically, the instructors themselves do not appear to realise this situation - one which is diametrically opposed to employment in areas such as the mining industry that not only pays for the employees to attend these ancillary courses but also pays for all other related accommodation and living expenses associated with their attendance and often a wage while they are completing the course.

Encouragement to learn gives impetus to the achievement of competences within the situated learning environment. However, from the dialogic inquiry it could be viewed that, separate from the informal learning experienced in peer-to-peer communication, "encouragement" towards further learning is more identifiable as "demand" for skills directed towards continuation of employment within the dive operation, and at the expense of the instructor employees.

6.4 Summary

This chapter has answered the second research question, "In what ways do recreational diving instructors engage in situated learning within a community of practice to demonstrate their required competencies?" It began with a synthesis of the key elements contained within the situated learning environments, the respective learning processes involved in each of those environments and the communities of practice within which the participants become embedded. It then gave a brief review of the connectedness of formal, informal and incidental learning processes within the respective dive operations reflecting on initial training prior to employment and further, on the job training experiences, thereby emphasising the apparent effect of directed on-site non-formal training. Following this was a description of the primary and secondary communities of practice in evidence, together with their interconnectedness and possible effect on learning.

This matrix of learning environments, learning processes and communities of practice was then glued together with a substantial review of the dialogue conducted with the participants, identifying the themes of concern apparent as indicated by the answers to the interview questions and confirming the manner in which instructors demonstrate their required competencies. This dialogic review also provided a lens through which to see the ironic strength of weak linkages with other less directly attached communities of practice.

Section 6.2 synthesised the elements contained in the situated learning environment by describing those areas in which the communities of practice were employed: the dive operation head office; dive vessel; and diving school. This then outlined the learning processes used to acquire desired competencies through formal; informal; incidental; and directed non-formal activities followed by a review of the established primary and secondary communities of practice.

Section 6.3 analysed the data collected and identified issues emerging from dialogic inquiry and observation. The flow of inquiry was represented by Figure 6-2 indicating what induction processes were used to initiate new instructors to their jobs; whether they were prepared at the end of this process; the initial tasks to which the new instructor was directed; formal and informal training in the situated learning environment; assessment of relevance of training; involvement with training new instructors; and what (if any) encouragement was given to support the situated learning process.

This has made clear the ways that recreational diving instructors engage in situated learning within their respective communities of practice and how they demonstrate their competencies. On the basis of this understanding, Chapter 7 proceeds to consider what issues are evident to provoke change to existing instructional strategies.

Chapter 7 Instructional Design

Any theory and set of practices is dogmatic which is not based upon critical examination of its own underlying principles. (Dewey. 1938, p. 22)

We as instructional designers must go into the community of the practitioner, using ethnographic methods of observation and reflection. And become participant observers. We develop a focus on how the community learns. (Clancey. 1995, pp 33- 34)

7.1 Overview

So far, the instructor demographics in this study have been described according to the skills that the various stakeholders in the industry use to define the achievement of competency. This has been followed by a discussion regarding the ways in which the formal and informal learning processes are linked to the situated learning environment through the communities of practice, both internally and externally, in which the instructors find themselves positioned. Also discussed have been the strength of the weak ties with other communities and the importance of linkages in finding vision for future career opportunities: vision that is not so easily found in existing situations.

This has clearly shown the ways that recreational diving instructors engage in situated learning within their communities of practice.

This penultimate chapter now uses information from the theory and data relating to instructor dialogue and the existing artifacts used during instructor development to assist in answering the third and final research question, "On the basis of the answers to the first two questions, how can instruction be designed to promote an improvement to what is presently known about the industry?"

To provide such an answer, this chapter gives a brief review of the existing instructional strategies used both formally and in the situated learning environment, the gaps in knowledge as revealed by this study, suggestions for filling those gaps and the changing roles of the trainer and training practices. Finally it evaluates the discrete parts making up the entire process of learning directed towards the production of a competent recreational diving instructor.

7.2 Existing instructional strategies

Many of those who eventually choose to become recreational diving instructors do not have this objective as one of their earlier driving ambitions. Often a different choice of career (for example, Harry who was a banker and Stuart a soldier) was made and adopted well before diving appears to be an option as a form of employment: recreational diving instruction sometimes occurs incidentally during the pursuit of diving as a pastime. It was while engaged in this pursuit and seeking development of their knowledge and abilities through early levels of diver training that it became clear to some that this may offer an occupation that is much more appealing than the one in which they are presently employed.

On deciding to follow this career pathway, participants explained that they targeted attendance at an IDC or its equivalent, from which comes the achievement of the minimum qualification to begin work as a diving instructor. Even though it is suggested by agencies such as PADI that leadership training begins at the immediately subordinate level of divemaster certification (or equivalent), the training of beginners to dive is not permitted until instructor level certification is achieved at an Instructor Examination (IE) and after an intense seven to 10 day IDC. In this geographic area, it is also unlikely that a person will be employed in a divemaster role unless he/she is also certified as an open water scuba instructor (OWSI).

It may be argued that leadership training directly influencing instructor certification may begin considerably earlier through either prior life experience unrelated to diver training or, in the diving context, as a result of the mentoring relationships that develop between student divers and their instructor/s en-route to the IDC/IE process (or equivalent) that may ultimately place them in the role of instructor themselves.

The immediate requirements for attendance at an IDC/IE are: to have been a certified diver for at least six months; to have completed 100 dives; and to be at least 18 years of age. These established guidelines presume that an instructor candidate has sufficient diving and life experience and the motivation necessary to teach other people to dive.

7.2.1 The Professional Association of Diving Instructor's (PADI) IDC

Although other training agencies have their own particular curriculum to guide the conduct of final, formal instructor development programs, I have chosen the PADI IDC to discuss as it is representative of the majority of recreational diving instructor development courses that are conducted globally. This does not however, confer any belief that it is the best program of its kind, or without fault.

The key strategy apparent in all PADI diver courses is that only those skills that are considered immediately relevant to any particular course are learned and performed (Professional Association of Diving Instructors course director manual, 2011). For instance, starting with the first open water diver course, it may be useful for a learner diver to be able to dive deeper but the main objective of that course is to teach basic survival skills in relatively shallow, calm and clear water, albeit in an enjoyable manner emphasising the fun of diving. It does not introduce any complicated equipment, techniques or life-saving skills: these are introduced in subsequent courses dealing with specific issues. For instance, if a diver wishes to dive deeper, there is a specialty diver course specifically designed to teach this activity.

This strategy disposes of virtually all ancillary information that could be useful to future diving but is inessential to learning the particular course's predetermined objectives. Even so, every course briefly stresses the need for continuing education with reference as to how other courses dovetail with the presently attended course. With this minimisation of time requirements, together with a greater stress on self- study as an aid to prior preparation, many courses are now so well streamlined that they permit a very swift transition from the classroom to in-water activity. This is a similar strategy to the conduct of an IDC that requires

preparatory academic homework, thus minimising time spent on activities other than those immediately necessary for successful attendance at an IE.

Although there is now an option to complete part of the IDC on-line, the full IDC schedule is as follows, indicating the subjects covered and the days and approximate times allotted for their completion.

Description	Hours
Day One	
Morning	
Course Orientation	1.5
Business of Diving – online version	1
Learning, Instruction and the PADI System – online version	1
General Standards and Procedures – online version	1
Afternoon	
General Standards and Procedures	
Teaching in Confined Water	2
Skill Demonstration Workshop (and 800 m/y swim)	1.5
Day Two	
Morning	
Confined Water Teaching Presentation 1	2
Marketing Diving – online version	1
Rescue Diver Course	1.5
Afternoon	
Start Diving – online version	1
Open Water Diver Course	1.5
Developing Knowledge Development Presentations	2
Day Three	
Morning	
Knowledge Development Teaching Presentation 1	3
4 Es Counseling Workshop 1	1
Conducting Open Water Dives	2
Afternoon	
Adventures in Diving Program	1.5
Confined Water Teaching Presentation 2	2
Day Four	
Morning	
Open Water Teaching Presentation 1	3
Discover Scuba Diving Workshop	2
Afternoon	

Description	Hours
Adventure Dive Workshop	3
Day Five	
Morning	
Confined Water Teaching Presentations 3 and 4	4
Afternoon	
Risk Management – online version	.5
Risk Management	2
Knowledge Development Teaching Presentation 2	3
Exams	
Day Six	
Morning	
Knowledge Development Teaching Presentation 3	3
4 Es[12] Counseling Workshop 2	1
Afternoon	
Open Water Teaching Presentation 2	3
Rescue Exercise Workshop	2
Day Seven	
Morning	
Teaching PADI Specialty Diver Courses – online version	1
Keep Diving – online version	1
Divemaster Course	2
Afternoon	
How to Teach the RDP (optional)	1.5

Table 7-1 Instructor Development Course (IDC) Schedule

As may be inferred from reviewing the above schedule, the IDC consists of several areas of development that essentially build dive theory knowledge and in-water skills, teaching how to teach in different environments and developing familiarisation with the PADI system and its respective products and protocols. During the academic section of the course, the claim is made that it "…emphasise[s] learning and development – not evaluation" (PADI CD manual, 2011, p. C-10). However, these areas of development do in fact constitute what can clearly be seen

[12] The 4 Es are education, equipment, experience and environment. The philosophy is that, after people are educated how to dive, they must be fitted with appropriate equipment, given opportunities for experience and informed sufficiently about the environment – specifically how to protect it from harm. RDP - Recreational Dive Planner. This is a device designed exclusively to assist divers to plan dives that do not exceed allowable times at particular depths, thus avoiding decompression sickness Table 7.1 has been reproduced from the PADI Course Director manual (2011, pp SP – 21-22)

as a formative evaluation as the instructor candidates are continuously challenged, directed and encouraged to make improvements to ensure adequate performance. Adequate performance in PADI's terms of reference is calculated from the use of standardised evaluation forms and slates giving numerical scores for presentations given by the instructor candidates. Although PADI claim this is an objective evaluation, final scores may frequently be coloured by subjective interpretation.

Those areas of performance that are ultimately challenged in a summative assessment at an IE are similar to (but not the same as) as those assessed and developed throughout the IDC: knowledge of dive theory, PADI systems, standards and procedures, knowledge development (classroom), confined water and open water teaching presentations, basic diving skills, rescue ability and general skills (such as equipment assembly and buddy checks) and professionalism.

It is a review of the subjects contained within the IDC curriculum that is of concern when considering what might be unnecessarily present in or substantially missing from both formative and/or summative assessments. For instance, in the physics section of the dive theory assessment there are questions such as "Calculate the size of lift bag necessary to lift a 237 kg anchor displacing 130 litres at a depth of 20 metres in salt water". This type of question seems neither necessary nor sensible when challenging an instructor candidate's understanding of buoyancy; the occurrence of this type of calculated event is highly improbable in any recreational diving situation.

Even so, this concern seems somewhat trivial in comparison to the absence of subjects such as those that may impact on the everyday working life of an instructor. Examples of these could range from a greater understanding of the drugs (both prescription and otherwise) that may have a contraindicating effect on the ability of a person to dive to certain theories of learning indicating how different people learn differently (Gardiner, 1999) and how individual strengths can augment others' weaknesses within, say, a community of practice in which the new instructor might be located. This and other educational theories could have a considerable effect on the maturation of a diving instructor's knowledge and her or his future interactions with the diver training/learning environment.

These latter examples indicate both the inclusion and the exclusion of subjects regarding the more academic side of instructor development but there are other, more practical issues that demand attention. One such issue is the fact that emphasis is placed on the different ways in which, for instance, an open water course may be conducted - that is, what may or may not come first in the actual course setting: reading a text, watching a DVD or exciting possible students first by trying diving in confined or open water. However, while there are many visually reinforcing videos exemplifying certain areas of this level of training, there is no section of work conducted within the IDC that shows how an instructor would actually manage the flow of any of these course styles in practice for this very basic of courses. Also not considered is the relevance of theories such as Gardiner's (1999) theory of multiple intelligences when choosing from these various course options that may be used to optimise the learning process. Certainly, during the subordinate divemaster course there are specific practical assessments of conduct during sections of this course but these are lone experiences and cannot in any way be considered substantial enough to compensate for the deficiency of training in this critical activity during an IDC.

The IDC appears to have flaws as a final instructional experience but it could be argued that the primary strategy conforms to the philosophy of teaching what is immediately relevant and what is taught is merely an introduction to what must be ultimately mastered. For instance, a deep diver course will introduce to the learner diver, within the four requisite dives for that certification, how to conduct safe deep dives - but then it is up to students to follow the rules they have been given and consolidate that new knowledge using their earlier or future experiences. This is a presumption that could easily be applied to this final instructor course but there is a serious difference: success at the IDC/IE process will provide learners with a certification that allows them to teach a range of diving courses to those with little or no experience. Inexperience in the former case could lead to self-injury whereas inexperience in the latter might lead to the injury of someone within the instructor's care.

Prospective students may have a similar lack of experience in certain areas of diving, as do their new instructor. For instance, a newly graduated instructor has the ability to certify an advanced open water diver completing a drift dive as one of the optional dives and yet may have never performed one him/herself. This situation does not appear sensible or advisable. Is there any earlier or future knowledge and experience that can be relied on to buffer this possible lack?

7.2.2 Formal learning

Earlier mention was given in Chapter 3 to the suggestion that formal learning, as Rowden (2007) defines it, is a set of "discrete planned events (experiences) used to instruct people to perform specific defined jobs" (p. 7). In all levels of diver training, the events to be achieved are planned and conform to a set of unambiguous standards in the expectation that these events may be duplicated in similar fashion when unsupervised. For example, to achieve an advanced open water certification one of the five dives required is a deep dive that may be conducted to a depth of 30 metres. This requires divers, who may have completed only four or five previous dives in total, to plan and execute a dive nearly twice as deep as they have been before, ensuring that the time they spend underwater for that particular depth does not go beyond decompression time limits and that appropriate safety measures are taken, such as placement of a redundant air supply (spare air) at an appropriate point in case of unexpected air depletion. This is often well organised but single-incidence training in this particular event is expected to be sufficient for a diver to replicate the experience in a similar manner during future attempts at this type of diving. It is well to note here that, with only one further attempt at reproduction of this type of diving under supervision during the divemaster course, it is possible for the same diver to become a diving instructor who is certified to teach this diving experience.

Certain other subordinate skills leading up to acceptance on an IE have also been listed in Chapter 5, indicating many of the practical skills learned formally and in direct collaboration with a diving instructor. Many of these may have been performed rarely. However, it is the final instructor development course (IDC) that is supposed to introduce these now presumably experienced divers to the terminal requirements for instructor certification: the final step towards allowing them the freedom to teach non-divers to dive or, in many cases, already trained divers to

advance to higher levels of training such as the advanced open water diver course with the embedded and mandatory deep dive as described earlier.

The progression of formal diver training after first learning to dive follows a similar route to that described in Table 2-3 in Chapter 2: adventure diver, advanced open water, rescue diver, divemaster. Also easily recognised from Table 2-3 is the limited amount of formal training demanded of the learner diver leading to the final step of attendance at an IDC/IE to achieve the open water scuba instructor (OWSI) certification.

Alongside these earlier diving courses and prior to, or post, attendance at an IDC and the consequent summative assessment of the IE, there is other formal training that in the geographic area in which this study has taken place is not optional, and must also be completed to secure and maintain a position as a diving professional. These courses, as mentioned earlier, are in occupational first aid, oxygen first aid provision and elements of shipboard safety and are recognised units of competency HLTFA301B, SRXEMR003A and TDMMF1007B respectively as endorsed by the Australian Quality Training Framework (AQTF). Other related courses that are very useful in securing a position in this industry, but may be considered optional in this context, are those leading to a Light Rigid (LR) extension to a Queensland driver's licence and a coxswain's licence in which is included the elements of shipboard safety and the marine radio operator's certificates. The LR extension to a driver's licence is required to transport customers to and from their accommodation.

The coxswain's licence is useful for maneuvering small vessels at sea to transfer customers to larger vessels or platforms and when assisting with the retrieval of tired divers or those conducting drift dives. It is generally expected that all diving instructors who wish to continue with dive instruction as a career achieve these certifications and bear the costs of doing so themselves, including those related to the implementation of standards related changes to the respective training agencies' curricula as originally learned at their initial instructor development training course.

These skills and requirements are certainly useful to the occupation of diving instruction but it is clear they do not contribute to the breadth of actual diving experience. However, this situation does indicate the necessity to interact with various agencies and individuals to achieve success in these areas of accomplishment and interfaces well with the less formal learning experienced in the situated learning environment.

This apparently limited formal training may lead to inappropriately extreme situations. Consider this possible scenario: An 18 year old with one to two years living on an unemployment benefit who has been given the opportunity to enter an internship with a diving operation and who dives in essentially the same conditions (warm, shallow, good visibility and no current) throughout his internship period (approximately six months) to fulfil the majority of the 100 dive requirement to attend an instructor examination. It is now possible for this newly certified instructor to teach virtually anyone to dive, including the vulnerable, possibly in a more challenging diving environment in which he or she (the new instructor) has little or no experience. Concern regarding instructor training that may precipitate this possible situation was mentioned frequently by many of the study's participants, such as the following:

Some of the people who come out of the IDC and IE are still pretty raw aren't they? So next month they're [Divemasters] off to do their instructor course, they do their IDC, they do their IE, they get awarded an instructor ticket and then a week later on they're out on the boat and teaching people, maybe twice their age, how to dive, with little or no experience actually in the real world whatsoever. (James, DO2, 30/09/08)

> You have – well with PADI you can just do your divemaster and a week later pay for your IDC and you're an Instructor and then you're teaching people up to divemaster. Obviously you know that. It felt that these instructors that were on that boat were just winging us through it. They just weren't really showing us the more important things about safety, everything like that. Diving techniques. I'm talking about as soon as you've got your rescue you can guide certs [certified divers]. And now I know how fragile certified divers are as well. I figure it was more that I should have been shown how to do it properly. I think that something could have happened to me and I don't know how I would have dealt with it. (Rachel, DO3, 10/02/09)

> I just think they [new instructors] need a bit more real life with real students' not just pretend instructor candidates who are blatantly holding their breath. None of that rubbish because nobody does that anyway. But the subtle things that open water students do [such as dealing with those who use fins incorrectly or display poor buoyancy control]. Maybe something like that might work and help some instructors. (Don, DO1, 06/07/08)

> 18 years old is a bit young as a minimum age for an instructor. There should be work as a DM for a period before going on to instructor training. Being able to train DMs straightaway after instructor certification is wrong. Should be a couple of years' experience at least. (Artie, DO1, 30/06/08)

With the aforementioned and apparently extreme scenario not being too uncommon an occurrence, and taking account of the concern stated by the participants interviewed, it does hint at the necessity of other, predominantly informal learning processes that should be experienced during the established diver training curriculum and within the situated learning environment when employed. These learning opportunities should be engineered to offer compensation for possible, if not probable gaps in diving experience and life skills as evidenced in the instructor confidence/competence observed.

7.2.3 Informal learning

Much of the informal learning that takes place en-route to instructional competence is in the accumulation of diving experience: a situated learning environment that is not necessarily bound to a working situation.

After the requisite dives for the subordinate courses leading up to attendance at an IE are taken into account, there is a balance of 60 – 70 other dives that must be

achieved to reach the 100 dive benchmark required to attend an IE. Usually these are with friends at other dive sites that may or may not be similar to those in which prospective instructors have received their training. This experience then becomes part of the informal learning (for instance, diving with an instructor trained in a particular type of diving skill such as underwater photography) and incidental learning processes (for instance, learning by accident that certain corals, when rubbed up against, offer uncomfortable lesions) whereby the potential instructor candidate may gain greater awareness of different environments, diving equipment and skills, routines and relationships. Further to this, one of the advantages of working in the diving industry is the availability of relatively inexpensive or free diving experiences with other diving operations from which new instructors can not only improve the breadth of their diving experience but also take note of how other diving professionals apply their skills within their working environments.

However, with the paucity of experience that many instructor candidates appear to possess in certain types of diving, as Arthur remarks:

> They may have done 100 dives and become an instructor, but all 100 dives were under supervision. Then they were out there training people so it's bizarre. I'm saying I think they should have done some more diving. Way more logged dives and variety. Not just tropical wreck diving, not just warm water, not just beaches, not just daytime. I understand that that can be logistically challenging but it also sorts the wheat from the chaff. I think they need to experience these other angles to really know what they're doing. I was lucky because I had to. (DO2, 13/10/08)

It does raise the question as to how this may be rectified and if it is not possible during the formal conduct of an instructor development process, how the knowledge and experience necessary to teach these areas of possible deficiency are, or can be developed in the future for those instructors indicating this need. From this study, it was observed through the review of log books and informal conversations that the predominant dive experience gained by new instructors was during prior divemaster internship programs attended, and diving from the dive vessel on which they were employed during days on leave. By the very nature of the locations dived, these dive experiences are in relatively calm, clear, warm water with little current. Further to this, there was little indication of any organisation offering responses to this concern of restricted experience other than facilitating low cost diving experiences with other diving organisations. To the question of "Is training in any form encouraged?" the following responses were given:

> I think that is also the nature of the business with DO1. There's no possibility of doing something or going higher. There should be a bit more. (Florian, DO1, 10/10/08)

> No, not in terms of learning. It might not be discouraged but it's not encouraged. (Steve, DO2, 15/09/08)

In confirmation of the concern voiced regarding diving experience, and reviewing the various comments critical of the limited breadth and quantity of experience that new instructors have compared with their more experienced instructors, comments were made such as:

> I think its 120 dives you're supposed to have these days. I'd still stick around that number of dives mark to get you at the level of instructor but quite honestly I think it's a little bit low. I'd go at least 160 to 200. (Clive, DO1, 01/04/08)

> For an instructor course? I think more dives. I think 100 dives is not enough.

> I went into the course with 250 and I saw one of the guys coming in with 100 and you could see the difference and you can see the difference with instructors going open water [basic diver certification] to instructor in a year. (Dale, DO3, 17/01/09)

These comments give voice to the belief that a certain number of dives are essential before there is an appearance of reasonable ability sufficient to become a diving instructor, particularly when related to the type of diving experiences they have had. For instance:

> Why do people think they can become instructors after only 100 dives at Shelly Beach exactly the same dive they've done their entire life? There are instructors on our boat who haven't dived outside of Hastings and Saxon Reefs. It's very difficult to say. (Don, DO1, 06/07/08)

The dive sites of Shelly Beach, Hastings Reef and Saxon Reef are typical of dive sites used for basic training and offer relatively shallow, calm, clear and safe diving environments that provide little in the way of a challenge for diving skills. Don's comment went further to qualify this belief that more dives are necessary, insisting that reliance on the number of dives alone as an indicator for sufficiency of experience prior to becoming a diving instructor is not enough. Other, similar comments confirmed this concern:

> I think having 100 dives and having done open water right through to instructor I don't think a person with just that should qualify. (Stuart, DO3, 20/01/09)

> To me, although there are some extremely talented, very capable people who have come through the ranks, to me it's not quite right that there are people working as trip directors on liveaboards in the Coral Sea and all they've ever done [diving in clear, calm waters]— they might have done lots of it — and they're dealing with people who dive under ice in drysuits in rivers. (Arthur, DO2, 13/10/08)

Comparing this concern regarding possibly deficient diving experience with other issues affecting future competence, these particular criticisms appear to be, in all probability, a smokescreen that may disguise one of the more substantial concerns regarding instructor competence: a possible lack of previous exposure to a pivotal aspect of the new instructor's job: making the customer happy through good communication and positive human interaction skills.

The basic prerequisite of having completed 100 dives for attendance at an IDC may very well be adequate if there is sufficient breadth of experience in the type of diving having been gained. Nevertheless, criticism of this and other requirements pre, during and post the IDC will still be made and in some regards this still deserves consideration. In this particular instance it would appear that there is a need to offer provision for gaining a broader experience base apart from that which may be offered by the present situated learning environment to those newly employed instructors who exhibit this deficiency.

7.2.4 Situated learning revisited

Situated learning has already been discussed and elaborated in Chapter 6 and it became clear that existing instructional strategies in this regard are not uniform but nevertheless, most instructors appear to have induction programs in various forms that are sometimes reinforced by an operations manager or boat captain's (skipper's) early presence in their training or learning. As one of the participants, Charlie, put it:

> Watching the way others do it. Being part of a team. Just asking. Help comes from teamwork. (DO1, 05/07/08)

This view was supported by Aaron, who stated:

> Just learning from the other instructors basically. Just different techniques of doing things and different things to say to people when they do have a problem. Just ways they do things that you see worthy and adapt it to your own way. There's obviously learning like that. Just around the boat as well. We've got quite good skippers on our boat who are really happy to teach. I could take a bit of interest in learning how to drive the boat and finding out a bit more about what happens downstairs and that sort of stuff. (DO3, 15/02/09)

From this and other dialogue it can be seen that the organisation and fulfilment of duties was very much a case of watching, listening and asking questions of those community members who are already performing those tasks in accordance with what they, in turn, have learned from those who have gone before them and in concert with their respective daily activity schedules.

Concern was still expressed by other instructors at what does occur and what could be improved upon. On the question of what can be done to improve training, the following responses were given by one of the participants from each of the respective dive operations and the comments were typical of many given by others. Harry commented that:

> I think a lot of the trainees, and obviously it comes down to the individual, are great and they've got the mental capacity to be able to pick it up very quickly and cope with the situations we see and deal with every day. A lot of them don't. They fall short, they just don't know what to expect and a lot of them just think that being an instructor is like being on a holiday every day. They don't see the other side of it that the general hospitality, tourism and general service is also one of the major roles. In fact as a course instructor I often comment that you're not just an instructor but a teacher, counselor sometimes and psychiatrist as well and it's all brought into line on the job. Training is certainly much easier where you're stepping into a role expecting to be able to handle all of that from day one. It's something you do pick up over time. (DO1, 15/05/08)

It is significant in Harry's comment to see the recognition of individuals who are entering the workplace with unrealistic expectations as implied by the expression "a lot of them just think that being an instructor is like being on a holiday every day" and "they just don't know what to expect". The former expression recognised that some new instructors exhibit a hedonistic approach to their employment, with the second expression hinting at this approach possibly avoiding the necessity to be more business oriented in their attitude to the job. The comment that "…you're not just an instructor but a teacher, counselor sometimes and psychiatrist" gives voice to the as yet unrecognised expectations of the job and confirms the necessity for more substantial theoretical knowledge, such as that derived from such as Bloom (1956), Skinner (1957), Kolb and Fry (1975), Gardiner (1999) and Rowden (2007), to develop the ability to understand why people do things and how better to interact with both customers and peers. The passing of time certainly does provide experience to counter these apparent deficiencies, but in a commercial environment dedicated time to achieve competency is limited. Even so, Jeremy suggested that:

> So I think after they get certified maybe there should be a point where they do a little more on board training with more experienced instructors who maybe just watch over them and help them out to ensure that they're going to be really safe. It's different from place to place too because some places like [our dive vessel] really push the intro dives like most boats do and there are other dive companies who do a lot more certified diving. So there's obviously a difference in what's going to happen on the boats between certified and intros. I think that they should have someone looking over them more for a little while, maybe just a month or so, who is just overseeing what they're doing. (DO2, 30/09/08)

Undergoing a suitable induction period with an experienced supervisor appears to be a sensible suggestion. In many regards, this protocol is undertaken by the dive operations under study, though it is generally not quite as straightforward as a single new instructor being overseen by one other experienced instructor and certainly often not for a month or longer, as suggested. What Jeremy identified correctly is that "It's different from place to place" and that the apparent induction process is often undertaken by various instructors with differing experience levels

over much more limited time frames, and in what appears to be a relatively haphazard manner.

Leading up to this situation and also confirming Harry and Jeremy's comments, Geoff suggested that:

> I think there should be more of an – well, "induction" is probably the wrong word, but real life experiences. I'm not sure what instructors go through now but I know when I went through the instructor course it didn't prepare you at all for what was out there. Some more on-board experiences – that happens a lot up here with the divemaster trainee programs. They're getting experience, real experience on boats working with instructors, seeing how it works before they become a divemaster and then instructor. (DO3, 26/03/09)

This indicated the apparent difference between a new instructor coming from a series of subordinate, formal training programs leading up to a final instructor development course and subsequent examination and someone who has completed exactly the same formal programs but also has had the advantage of working as a divemaster or an instructor trainee in a similar environment for several months before examination (IE) and employment as an instructor. As each type of individual – the one with and the one without a traineeship - will most probably possess no more dives than the other, it also indicates another reason why the minimum 100 dive requirement prior to attendance at a final examination can be adequate in some situations. This may well indicate that other factors such as communication skills, work ethic and attitude towards their job are the difference between those who are more or less immediately acceptable in an instructional role and those who are not.

Underlying all of these comments is undoubtedly the need for closer scrutiny and mentorship by more senior instructors and /or supervisors to ensure not only that expected roles are achieved but also that counseling and advice are available to encourage new instructors and enable goals to be met. In short, these comments highlight the necessity for goal making, mentoring, a proper induction process and on-going supervision (Bradt, Check, & Pedraza, 2011; Saks, Uggersley & Fassina, 2007).

With two of the dive operations there existed a rudimentary induction protocol evidenced by a record sheet used to ensure that beginner instructors and divemasters have not only been given an introduction to certain information and tasks but also been observed in emulating those tasks after being shown how to perform them. An example of a typical induction record is found in Appendix D. On paper this appears to be a good way of monitoring areas of on-site learning that various staff members may have covered, how the dive organisation keeps track of and progresses this induction program, how competence is measured after introduction to those skills requiring emulation and who is evaluating them.

The findings of this study suggest that this process of induction takes time, whose duration is of significant interest and open for debate, but without doubt there must be an established time frame to which a certified instructor must be bound prior to the endorsement of full qualification - and this by an industry recognised, competent diving professional. It is evident that, with all that is being done to improve the manner in which skills are approached and the efforts made to provide a

semblance of induction and mentoring, there are still improvements that could be made.

7.3 Gaps apparent

Returning to the information in Chapter 1 concerning the conduct of existing instructional programs, it appears from the data available prior to this study (Lippmann, 2008), that the relatively low incidence of accidents or deaths occurring from instructional activity offers little evidence to suggest the need for investigation of these instructional programs and how knowledge and skills are derived from them to achieve competency as a recreational diving instructor. This, however, is not the case. The data produced from this study indicate there are other skills and knowledge that may well be valuable in the instructor training process. This could then have a beneficial effect by provoking greater awareness of, and improvements to, the relationships apparent among success rates of introductory diving, the knowledge, experience and competence level of the instructors conducting those experiences and the retention of staff when greater attention is given to their early training at the workplace. Together these instances highlight the economic and emotional impact on both customers and instructors further implying an ensuing impact on the dive industry as a whole.

In consideration of these concerns alone, it would appear that, although knowledge and skills as a diver are important through experience gained, they may not be as important as the human interaction skills with which we are more familiar: care, concern and being capable of interacting well with peers and customers alike. This point recalls Geoff's (DO3, 26/03/09) comment regarding those who are completing their subordinate training predominantly within the environment in which they expect future employment: "They're getting experience, real experience on boats working with instructors, seeing how it works before they become a divemaster and then instructor."

In such a case, paucity of diving experience in this subordinate position is possibly not as much a flaw in instructional design as is, in comparison, the presumption that what is learned post and pre diving certification following present protocols is sufficient to compensate for what appear to be life skill deficiencies on the part of particular instructors. This being the case it would then also challenge the knowledge base required within the existing IDC curriculum and support the argument proposed in this thesis, based on the data collected, for the inclusion of more substantial learning in other areas of concern. This includes communication and educational theory (Barnlund, 2008; Berko, Aitken, & Wolvin, 2010; Bodie, 2011) and their practical significance to the industry in general and the instructor in particular.

Further to this particular argument, I would also maintain that the IE may not be the end-point whereby instructor candidates become free to train without referral to and collaboration with an already qualified and industry accepted competent instructor. It is clear there is much to learn after becoming certified as an instructor and becoming qualified as one who has achieved industry accepted competency may well be a further milestone to be achieved post certification. More research should be undertaken post IDC to see if there is any measurable improvement to issues such as injury, sales and customer satisfaction with the addition of a formal mentoring system.

7.4 Plugging the gaps

The data confirm there are gaps in both the formal and the informal learning methods presently used for instructor training. These gaps are related not only to what is missing from an IDC curriculum or the subordinate training leading up to this but also to what should, but may not, be occurring after the presently established final certification as an instructor takes place, particularly with regards to on-going support.

7.4.1 Support and mentoring

It can be argued that, in consideration of what is immediately necessary to produce a certified instructor under the present situation, the existing IDC appears to do its job effectively when the presumption is made that what occurs pre and post IDC is of sufficient substance and validity to support and develop any deficiencies in an instructor's knowledge or skills. However, the presumption is misplaced in that support and development are not mandated by any training agency or regulatory authority. Well organised mentoring processes, as can be evidenced from the interview data have been found wanting in the dive operations in this study. PADI does give mention and recommendations regarding mentoring but does little to ensure that this is woven into the fabric of formal training. These processes need to be better designed, more overt and transparent.

This lack of required support also belies the demand by certain training agencies that a new instructor must work through a dive operation and not work independently: the type of support and guidance necessary may not be there – in other words, advice on techniques or problem solving may be minimal or non-existent, even though there will inevitably be ever-present readiness to supply products that must be purchased from them. However, if all instructors were required to be finally certified by an industry accepted mentor prior to full qualification after a suitable period given to attaining practical experience under guidance, there could be a better basis for allowing independence as an instructor or not. This means that the role of instructors post IDC would change to considering not only what other learning must take place in the working environment in order to qualify as competent instructors but also, in turn, their possible future roles as mentors. This situation was already evidenced by the positive learning assistance given a couple of the more senior instructors (old-timers) to divemasters and new instructors:

> We go through a pretty hard schedule, I went through it myself, and I also know it can be left by the wayside if you don't pay attention to them. I guess again having enjoyed the teaching and the diving is something I enjoy doing anyway I find it can be easy to do. I also help out the trainees on the boat whenever I'm available such as general boating as far as ropes and procedures, safety, watching and just the hospitality and tourism side of things. Making sure they're happy and the customers are happy with the servicing. It's all part of the role. (Harry, DO1, 15/05/08)

> When the new instructors come on board I'm always happy to tell them the way I think they should do things. I listen to their briefings and

> critique them on their briefings and stuff like that. Especially the younger divemasters who want to go on and do their instructors, offering help. Craig has just finished his instructors now, I was always there if he needed me to come and sit in on his talks. (Aaron, DO3, 15/02/09)

Mentoring, although briefly covered in the earlier stage of divemaster training, is relegated to the relationship developed between divemasters and their instructors. What I propose based on the data is a logical progression of this process to consolidate this activity in the workplace where it can be used to cover a greater spectrum of activities and extend the responsibility and legitimacy of senior instructional staff who are already recognised as competent. This then obviates a change to the role played in instructor training and future qualification. Mentoring should be given more than lip service and the brief coverage given in the existing instructional process; it should be woven further into its fabric, very much in concert with Kolb's (1984) learning cycle. From this, areas for improvement can be recognised and enacted earlier than experienced in the present situation. A suggested protocol for change to the present process is illustrated in Figure 7-1, indicating the flow of instructional learning from beginner through to competent and qualified instructor.

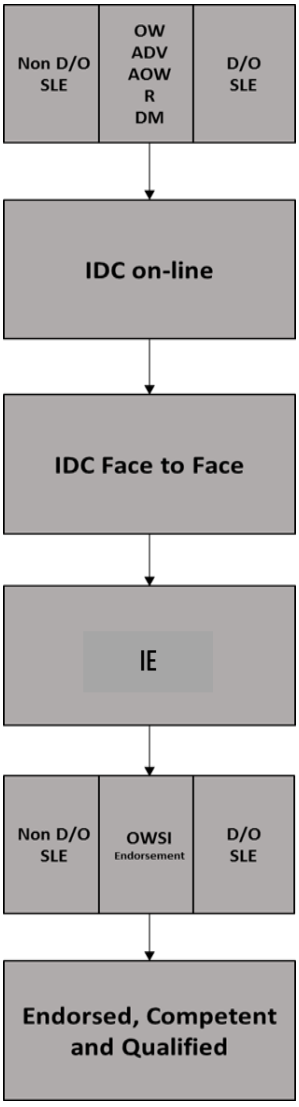

Figure 7-1 Instructional flowchart beginner to competent instructor

Note: Abbreviations used in this figure are as follows: D/O = dive operation; SLE = situated learning environment; OW = open water; ADV = adventure diver; AOW = advanced open water; R = rescue; DM = divemaster; IDC = instructor development course; IE = instructor examination; and OWSI = open water scuba instructor.

In consideration of each step in this chain of events, the beginner moves from a series of dive courses to attend an IDC, then undergoes an IE (examination) and proceeds towards employment that in this geographic area is relatively quickly obtained. These steps are described as follows.

7.4.1.1 The situated learning environment

When a person makes the decision to become a diver, further continuing education may occur at different training sites and dive operations and possibly with different instructors. At the start of Figure 7-1 I have illustrated an overlapping of two possible learning situations. One is where a diver learns from an independent instructor or instructors in a non-dive operation situated learning environment and the other is where learning may take place in a situated learning environment as represented by the dive operations in the context of this study. It could also be that an independently trained diver can start in one environment and switch to the other at any time during the learning process. However, whatever flow of training is chosen, in progressing forward to a level of certification permitting attendance at an instructor development course and subsequent examination, all divers must successfully attend the prerequisite courses of open water, adventure and/or advanced, rescue and divemaster. Once the divemaster certification level has been attained, and provided that the further prerequisite of a minimum age of 18 years has been reached together with an experience level indicating completion of 60 logged dives and a minimum of six months since first being certified as a diver, the diver may then continue on to instructor level training. It is at this point that the diver has a choice of approach to her or his instructor development course.

7.4.1.2 IDC on-line

In the present IDC schedule, two methods of completion are offered. The first is attendance at a seven or eight day face-to-face program with an instructor trainer. The second is to complete an on-line portion of the IDC by connecting with the PADI web site and reviewing the equivalent of approximately three days of academic training, then attending a face-to-face IDC to complete the remaining days containing the more practical activities.

An alternative option I would suggest is that that far more of the presently constructed curriculum of the IDC could be presented on-line and mandated, with both its on-line content and the face-to-face portion of the curriculum modified to accommodate more realistic scenarios which would better prepare new instructors for the realities of their new occupation. The on-line portion could quite easily include more advice on medical conditions, the importance of vessel familiarisation/handling, language abilities, practical engagement with environmental organisations, risk management, communication and human interaction skills and lifestyle choices that reflect the desired role model behaviour required of professional instructors. In addition, the face-to-face portion of the IDC could either be reduced to accommodate those choosing the on-line alternative or undertaken in a time frame to

allow greater interaction with the instructor trainer and peers. The advantage of choosing the reduced version is that less time is taken away from income generating employment, making this process less costly. The disadvantage is that there is less direct interaction with an experienced instructor trainer and peers. This in itself would reflect poorly on better communication and human interaction skills which can be seen as having far more weight in the learning process than it is presently given credit for.

7.4.1.3 IDC face-to-face

The advantage of taking the full face-to-face instructor development program is almost the converse of the former instance (greater opportunity cost to the instructor candidate but more communication with other experienced divers) and in its present form it does give the advantage of extra time for practising presentation skills to make examination success more likely. Even so, and with more of the present IDC session schedule being relegated to on-line study, the face-to-face portion of the IDC should not be proportionally reduced but instead modified to offer more real-life training.

One example of this could be with in-water situations where instructors have no certified assistant[13] to help them. In the present IDC, use of a certified assistant is compulsory but it is very rarely a real life situation. In the context of the IDC/IE it gives a false impression of almost any commercial training situation. Another example would be to teach how to integrate all of the training aids and other ancillary materials required to teach the most basic of courses: the discover scuba diving (introductory) and open water courses. Then in practice, scenarios could be presented that would require thought and team work, not just the rote learning that can usually get even the dimmest candidate through the present examination process. This may be summed up by Don's comment:

> On the IDC everyone is stressing about how to pass an IE. Trying to polish up their skills and you know your skills don't have to be that shit hot in order to teach other people really, if you've done a half decent briefing. A lot of it is how to do things the PADI way that we all know is not always that realistic. [For instance, supervising a group of students and evaluating skill performance one student at a time with the assistance of a divemaster - whereas in real-life, several students may be evaluated at the same time and rarely ever with an assistant]. Maybe a lot of the stuff was useful but at the time you focus so much on the IE and a lot of it, about the risks, and risk management, that kind of stuff, but you're not tested on that at the IE it goes in one ear and out the other but obviously it is important. (DO1, 06/07/08)

This could be also interpreted that emphasis is being placed only on basic skills required to pass an instructor examination with lip service only being given to valuable learning for all involved through thought and team work that would be required in real life situations.

[13] A certified assistant is a diver who is certified as a divemaster or higher

7.4.1.4 **Instructor Examination (IE)**

The IDC/IE process was created in 1985 with the intention of separating the instructor trainer from the examination process, thereby allowing a clear and fair assessment to be performed by someone who has no hidden agenda in passing or failing an instructor candidate for reasons of favour or prejudice resulting from prior knowledge.

As described in earlier chapters, the instructor examination takes place over a two day period where the examiner is either a full time employee of PADI or a contract examiner who has no connection with any diving company but is nevertheless employed in an instructional/examining role in another industry. These individuals have strict guidelines to follow but the method of evaluation is predominantly one of box-ticking (refer Appendix E) after observation of demonstrated abilities: an instructor candidate makes the right statements and the right motions and when sufficient marks are given for this, the relevant presentation or exam is passed. Once all areas of examination are successfully completed the candidate is awarded a certificate of completion but permission to teach is not approved until all paperwork is audited for accuracy. This usually takes up to 10 working days. Even so, many successful candidates are employed almost immediately as divemasters until final certification cards and papers are received. In the PADI system of training, this means that after graduation, an instructor can teach others to dive - from beginner (non-diver) through to divemaster almost immediately.

7.4.1.5 OWSI endorsement

I would suggest further research towards consideration of a modification to the present situation by adopting an endorsement program post IE. In Figure 7-1, the successful IE candidate, now capable of teaching others, may choose to work independently or with a dive operation. Either can be deemed as a situated learning environment no different from the earlier phase of subordinate course completion. However, at this point there is one significant difference. In the earlier phase they were not directly responsible for anyone's life. Now certified and given this weighty responsibility, instructors face a far more serious situation that demands greater assistance and vigilance by experienced, qualified and competent instructors. This vigilance should be more explicit and documented. One method of endorsement could be to use an induction record similar to that used by dive operation DO1, as presented in Appendix D, but modified to accommodate a variety of realistic situations attesting to the new instructor's integrity, knowledge and ability. Control over such an addendum could be by way of an industry endorsement mark printed clearly on the instructor's qualification card signifying competence as well as qualification.

7.4.1.6 Endorsed, competent and qualified

There is little doubt that the abilities of new instructors are related to the quality of the training they received in the situated learning environments in which they have been involved. As was observed in Chapter 6, many of the participants in this study had the advantage of a divemaster internship having taken place over a period of several months. For instance, Harry states:

> That was the advantage of doing a traineeship with the company, you do learn a lot of the basics very early on. You're thrown into the deep end, especially coming from a completely different environment like the banking sector so it was all very new to me but you do learn a lot very quickly and I think it's the best way to learn about diving and boats in general. Spending a period of over six months doing the

> traineeship then going onto the divemaster course after that was certainly something I feel was very worthwhile, especially considering a lot of the other crew that we see and have had over the time. (DO1, 15/05/08)
>
> New instructors coming from these ranks, despite having endured the penury of this early occupation/extended training course, now have the advantage of a greater knowledge of the typical dive operation found in this geographic region. This will then allow for a more expeditious transition through any endorsement program that may be applied post IE. However, anyone wishing to train independently may be required to undergo a more rigorous process of competency confirmation.

This subsection of the chapter has reviewed the present flow of training from beginner through to competent instructor with recommendations for change but now consideration should also be given to what other perceived concerns are identified in the instructor training process.

7.4.2 Improving the IDC

As it presently stands, the IDC appears to be substantially well designed and goes straight to the point in discussing elements of the diving industry that exist, explaining the products available to assist with improving knowledge in certain areas (such as children and scuba diving) and developing an instructor candidate for attendance at an IE that challenges those elements considered to be benchmarks of competency required for certification as an instructor. However, these latter challenges stimulate the concern expressed by Garrick (1998), who stated: " the pre-defined nature of competencies can remove elements of professional judgment" (p. 157).

The mostly objective formats used in both formative and summative evaluation of an instructor candidate during both IDC and IE assign numerical scores as the principal guideline for recognition and remediation of incorrectly demonstrated motor skills or classroom presentations (Appendix E). Typical examples would be how (and if) instructor candidates recognise a student unable to clear a mask of water, how they overcome any perceived difficulties and perhaps, in the classroom setting, whether visual aids were utilised effectively or not. The score range is from 1 to 5: as long as instructor candidates attain a final score of more than 3.4 or 3.5 respectively, they pass the assessment. These types of scored examples are simple to deal with and there are various straightforward solutions to remedy any flaws in performance: this challenge and the subsequent scoring pose no real dilemma, but other situations that require genuine problem-solving ability are not sufficiently addressed as evidenced by the interview data discussed in Section 7.2.2. These situations include lack of personal diving experience and experience dealing with learner divers experiencing difficulties.

7.4.2.1 **Dilemmas**

The data from the interviews demonstrated that the majority of in-water problems that demand quick solution are similar to the above example of recognising a problem with, and a solution for, mask clearing. However, participants suggested that many other challenges occur frequently and demand more than a simple solution. For instance, on descent underwater, what would the actions of the instructor be towards customers who have difficulty equalising[14] their ears and who have no divemaster to support them with control of the other divers in his/her charge? This type of situation is very common, yet during the developmental stage of training not only is little or no consideration given to this form of practical dilemma but also, it is insisted that, in all in-water exercises during development and examination at an IDC and IE respectively, a divemaster must be selected and used. With this extra supervision demanded, this likely dilemma is relegated again to a problem with a simple solution. This is rarely the case in reality; in the study's geographic area, the use of a divemaster to assist with diver training is a rare event. The simple reason is economic and the presumption that a diving instructor does not need an assistant unless there are more than eight divers in his/her charge: after all, that is what international standards state for ideal conditions – but diving at the Great Barrier Reef (indeed, diving anywhere other than in a swimming pool) is not always ideal.

The insistence on the use of a divemaster in developmental training and in the subsequent examination may be well meant and reflects what training agencies would like to see as the norm. It can also be argued that their own commercial agenda is the primary motivation for this, as it then demands the necessity for more divemaster certifications, and hence revenue. However, this argument pales in comparison to the need for greater supervision and a much more effective solution to dilemmas than reducing them to simple problems easily solved. This is not what happens. These dilemmas are reflected by the following comments:

> I guess once I'd completed the IDC in a lot of ways it also left me wondering what was going to happen next. It is a great course to do obviously, as a candidate for an instructor, but at times it's like a lot of other courses that by the time you finish and when you do become an instructor, you wonder whether you do know enough - will you cope and be confident? (Harry, DO1, 15/05/08)

> I knew it was a reasonably involved course so I expected at the end of the course I would be able to slot into a job as a dive instructor quite easily. I felt and still sometimes you do a course and you do a test and you feel like you've only learned how to pass the exam or whatever but you haven't really learned to apply it. I felt that I expected that the

[14] The process of equalisation in this particular instance is whereby air is introduced to the middle ear space by one of a variety of techniques so that the increased internal pressure will equal the increasing outside water pressure. For the non-diver, this feeling of increased pressure is readily recognised as similar to that experienced when landing in an aircraft where the surrounding air pressure increases on descent.

> course would teach me more than how to just pass at the end. I would know how to do the job. (Stuart, DO3, 20/01/09)

Practical solutions to real-life dilemmas posed by commercial constraints must be given greater consideration during instructor development.

7.4.2.2 Conducting a diving course

After the present certification process is completed successfully, a diving instructor is often then able to teach a variety of courses. In the PADI system of diver education, this allows the instructor to teach courses from the very basic introductory diving course through to the divemaster course, the final level of training that is immediately subordinate to, and required for attendance at, an IDC. PADI's IDC, and most other equivalent instructor training courses presently available, have teaching how to teach as a primary objective. This objective is generalised enough to train an instructor candidate to convey information that enables mastery of skills and knowledge to both non-divers and subordinate divers.

The Scuba Schools International (SSI) diver training agency insists however, that to conduct further training at higher levels, other conditions related to each of those higher levels must be completed for each of those levels of training (SSI *Training and dive center standards*, 2012, pp. 71 -88). This could well be argued as mandating further formal learning with sound intention, but could equally be argued (and by virtue of having to use this strategy of stratified instructional training) as an admission of failure in teaching how to teach generic programs in the first place. However, it could be a simpler reason altogether: to sell more courses to the instructor, and hence to increase revenue.

Regardless of the training agency conducting the IDC (or its equivalent), the instructor candidate is introduced to the materials and protocols necessary to conduct an open water diver course as a minimum. PADI's support material is comprehensive and also stresses the following:

> The Open Water Diver course professional video – Effective Conduct and Marketing – offers tips and suggestions for organizing, conducting and promoting your entry-level courses. Watch it periodically to remind yourself of key training and marketing concepts. (PADI Course Director manual, 2011, p. C - 89)

Despite giving comprehensive instructions and tips both in written form and by visual demonstrations via DVD, the IDC still does not set aside a formal session dedicated to the process of physically conducting this course in any of the methods available. Possibly, if there is a reluctance to incorporate this amendment to the IDC process, this could be mandated and included in an internship program created by the respective dive organisations. This would then address this situation post IDC, stressing again the need for a mentoring relationship being set in place to the success of programs such as this one.

Once versatility in conducting this early course is achieved, it would be fair to say that one aspect of instructional competence has also been achieved. At this stage, and with the adequate guidelines and support materials that PADI in particular provide, it is a simple step to organise and conduct other levels of training. Much greater emphasis should be placed on the conduct of the beginner course in the IDC

to lay a solid foundation for this training platform, the first course from which the attendance at virtually all further courses emanates.

7.4.2.3 **Foundational knowledge**

In the subordinate courses to the instructor course, such as the rescue diver and the divemaster courses in the PADI system of training in particular, solid but generalised information is provided in the main texts provided for these courses together with ancillary products such as DVDs covering the theoretical subjects of physics, physiology, equipment knowledge, diving skills, the environment and the recreational dive planner. Although there are several exhortations to take local conditions into consideration, there are still subjects that are only briefly discussed but are arguably of universal concern. Mention has already been made of the need for inclusion of such subjects as communication and human interaction skills and a more robust knowledge of educational theory but on a more physical level there is also a concern with health issues, specifically, fitness levels, alcohol consumption and the use of drugs both prescriptively and recreationally.

For each person who visits the Great Barrier Reef and wishes to dive, there is a medical statement that must be completed and signed (Appendix F). This gives appropriate guidelines for indicating suitability to dive or not. If an individual admits to using certain prescriptive drugs it is not a diving instructor's prerogative to make decisions on what may or may not be suitable for diving. In this geographic area and because of the well-established relationships with local doctors, advice is usually quickly received from medical professionals if there are doubts regarding unfamiliar drugs being taken. Even so, there are certain commonly prescribed drugs whose effects and suitability for diving are well known and this is information that would be of great benefit to new diving instructors.

From this research however, it is a sad reflection on those employed in this industry to see many diving instructors give scant regard to the use of recreational drugs and in particular, cigarettes and alcohol. The physiological consequences of excessive use of either of these two common drugs (which are not often seen as drugs) by divers can go well beyond being out of breath and the euphoric feeling of intoxication. As described by St Leger Dowse (2011):

Cigarette smoking leads to increased carbon monoxide levels in the blood causing hypoxia[15]14 and bronchial lumen[16]15 eventually become compromised due to increased deposits of contaminants from inhaled smoke. The first instance causes oxygen starvation, the second the over-inflation and consequent rupture of alveoli because of air trapping: this latter is the root cause of an air embolism[17]16, which has the ability to cause death within minutes of a diver surfacing. Other recreational drugs such as cannabis, cocaine, amphetamines, tranquillisers, barbiturates and heroin also cause severely deleterious effects that may also become life threatening. (p. 2)

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[15] Hypoxia is a partial lack of oxygen.

[16] *Bronchial lumen are small airways leading to the terminal air sacs of the lungs, the alveoli, where gas exchange takes place.*

[17] An air embolism is simply defined as "bubbles in the blood" and causes similar signs and symptoms to those of a stroke.

It can be argued that inclusion of this particular subject regarding health for diving in a course designed essentially for teaching people how to teach, is infringing on issues of personal choice. This could be considered inappropriate within the IDC but as diving instructors are exhorted to be role models in all aspects of their conduct this should be a welcome addition, not a cause for censure. There is also a health and safety issue reflecting on a diving professional's duty of care. The prevalence of diving instructors using recreational drugs should be of concern to diver training agencies and dive operations alike and an emphatic stand should be taken by either and/or both entities to minimise this situation. Inclusion of a session in the formal framework of the IDC would give far more credibility to the importance of this issue than possible informal conversations taking place with other dive industry members who may be ambivalent on the subject.

Other voluntary inclusions that have been introduced into locally performed IDCs in the far north of Queensland are lectures on diving safety and local underwater ecology performed by officers from Workplace, Health and Safety (WH&S) and members of a local environmental training group respectively. The content of these lectures dovetails well with the existing subjects of risk management and PADI's Project AWARE[18] program, the latter generating demand for greater knowledge of the local marine environment, as one study participant, Artie (DO1, 10/08/08), commented: "reef knowledge is definitely an issue." These issues can easily be seen as a necessary inclusion in instructor training in more than generic form. Local protocols for risk management and safety issues should be of concern to all dive related operations, including diver training agencies, and developing instructors would benefit from an emphasis being placed on this topic by other recognised authorities.

With the more recent and constant barrage of information regarding global warming and its consequences, particularly for coral reef systems, the environment holds a prominent position in the concerns of the diving industry. Specific knowledge regarding this issue is now not just a matter of passing interest but also of vital significance to all individuals connected in some way to the aquatic environment. It is an often-heard comment that divers are in a privileged position to see firsthand, and intimately, the effects of environmental changes on underwater ecosystems. This privilege brings a responsibility to ensure that changes observed are communicated effectively to society at large. Change cannot be recognised however, if there is not a full understanding of how these ecosystems operate under stable conditions.

There are many subjects that could be introduced into the existing IDC curriculum but it is a fair argument that, if all subjects impacting on a diving instructor's achievement of competence were to be installed at this point, the formal learning process of the IDC could encroach on skills and abilities far better learned in a more informal setting. With these two latter subjects of risk management and the environment, for example, it could also be argued that they be included in the

[18] AWARE is an acronym for Aquatic World Awareness Responsibility and Education. Project AWARE is a program that supports environmental programs universally and through its income generation provides, for example, considerable funding for research projects undertaken by scholars in marine science at James Cook University.

prerequisite knowledge required either prior to attendance at an IDC or for certification as an OWSI.

Concern regarding more formal training in this overall ambit of instructional knowledge was evident:

> I'm not sure what instructors go through now but I know when I went through the instructor course it didn't prepare you at all for what was out there. (Geoff, DO3, 26/03/09)

> I would like to have had more theory lessons. Could be more formal. (Bruce, DO1, 07/07/08)

> I believe there needs to be more prerequisites. (Arthur, DO2, 13/10/08)n contrast, there was considerable concern also for more informal training to be integrated into the learning process:

> Work as DM before being an OWSI (Open water scuba instructor). But can't see it being done if not subsidised by some form of HECS fees. If it was treated more as a real occupation (instead of a holiday job) with assistance to attend, the programme could be padded out more. (Leila, DO2, 22/09/08)

> More hands on training. For a year. If a person has spent a lot of time on a boat such as this as a divemaster, they come out of their instructor course fairly confident. (Tim, DO3, 04/04/09)

This highlights the tension existing between both formal and informal processes of learning and supports both the necessity to ensure valid "discrete planned events" of formal learning (Rowden, 2007, p. 7) with a commensurately valid process of informal learning in the workplace, to conform to Cross's (2007) suggestion that "Workers learn more in the coffee room than the classroom" (p. 235). However, although the necessity for certain inclusions are evident, the current inclusion of other prerequisites is a contentious issue.

7.4.2.4 **Concern over arbitrary prerequisites**

Without performing a more exacting dissection of the IDC, in particular of the contents and theoretical questions that are of doubtful value, prerequisites for attendance at an IDC appear to have been arbitrarily decided. However, as inferred from the research data, one such prerequisite, the minimum of 100 dives prior to attendance at an IE, probably requires more investigation. There may also be a good argument to insist on some of these dives being dedicated to certain specific activities as suggested by the following participants:

> Actually one of the highlights there was that we got to dive Lake Eacham to do some deep diving. That was really good. I got fully narked [a common expression used for nitrogen narcosis, a physiological event describing excessive nitrogen gas absorption from diving at depths of approximately 30 metres and deeper. The diver experiences symptoms similar to alcoholic intoxication]. It was good to

> know what that's like. You always talk about it but never experienced it. (Radek, DO3, 22/03/09)

> Varied and extreme conditions are very critical for training. Thermoclines, surge etc. (Bruce, DO1, 10/09/08).

In other words, an insistence that a certain number of dives be performed in, for instance, deep, night, and search and recovery diving, would give a more substantial experience base to assist in ensuring the developing instructor does not become certified on the absolute minimum of dives with the majority being achieved in calm, clear, shallow sites which offer little challenge to their abilities.

Another, more recent prerequisite for final OWSI certification that PADI demands of its instructor candidates also deserves scrutiny. This is the prerequisite of becoming an Emergency First Response Instructor (EFRI). The argument for its necessity is that it increases the flexibility of the instructor by enabling him/her to teach first aid to rescue divers or divemasters who would otherwise have to train elsewhere to complete this requirement. Also, as first aid can be taught to virtually anyone and is not limited by the same medical restrictions imposed on diver training, increased income potential for the instructor from a now greatly expanded market could be realised. However, in the far north of Queensland, but not necessarily isolated to this geographic area alone, there are two obstructions to this argument. The first is that, with dive operations such as those in this study, there are approximately 10 to 15 instructors employed and, of these, only one instructor (if that) is designated to teach first aid to the operation's diving customers and/or staff. In larger organisations transporting 200 to 300 customers to the reef on any day, it is usual to see the employment of a first aid training organisation specialising in this function. Instructors employed by these dive operations would therefore not have the opportunity to use their certification at their place of work and hence, while still employed by this organisation, would be unlikely to use this qualification at all.

The second obstruction to using this first aid instructor certification is that, to perform occupational first aid training offering the unit of competency entitled HLTFA301B - Apply First Aid to this arguably expanded market, a further certification is required entitled TAE40110 Certificate IV in Assessment and Training. The certification must be further augmented by an extension to the EFRI course entitled "First Aid at Work". The total cost of these extra courses in addition to the original EFRI course is similar to the cost of the IDC. For most instructors, this is just not economically viable. Hence, the enforcement of the first aid instructor certification in this geographic area, a relatively high employment area for diving instructors, is not realistic and thought should be given to removing this as a prerequisite for recreational diving instructor training and changing it to an optional, additional course. No other adventure learning instructional activity places such a demand on its instructor candidates.

7.5 Changing roles

Those who are considered qualified to conduct the formative assessment demanded of instructor training are those who are entitled either instructor trainer (IT) or course director (CD). These individuals may organise and conduct IDCs or their equivalent but in all ways must conform to the restrictions placed on where, with whom and how the IDC should be conducted and strictly adhere to the IDC curriculum. As with many present-day diving programs, the IDC's conduct may be either a course performed entirely at an appropriately situated IDC venue or, in part, one where certain subjects are completed by e-learning as coordinated by the respective training agencies. Whichever option is chosen, the role of the IT or CD is affected, changing the roles that he/she may play.

7.5.1 e-Learning

The e-learning option within the formal learning process allows for a more flexible approach to learning so those sections of the curriculum that do not require any practical involvement can be covered remotely: therefore less time is required at a distant and/or more costly venue. Although this appears to offer clear advantages of economy and flexibility, it has the negative result of less interface with instructor trainers, who, by their very qualification, possesses a high degree of skill, knowledge and experience from which much insight can be gained regarding those same subjects covered on-line. The argument may be made that, when instructor candidates eventually do come face-to-face with their IT or CD, they can then ask any questions that they may have regarding those subjects covered remotely. However, reflecting on the IDC schedule as outlined in Table 7-1, it can be readily seen that, even without considering homework and remedial study, each day already requires eight to 10 hours of attendance for completion. Extra time for adequate interrogation and advice on subjects not being immediately undertaken is restricted, inhibited and from my experience, unlikely to happen. This option may remove a rich source of knowledge from the instructor candidate and creates a more dehumanised program that by its very construction may be implying a lesser value to the human interaction so vital to this industry. The redundancy of the IT or the CD in the eLearning sections of this particular course may result in a less than optimal learning potential.

7.5.2 IDC attendance

In a conventional seven to 10 day IDC, the IT or CD can use their superior knowledge and experience to enrich the delivery of subjects taught that can optionally now be taken on-line. This allows for the establishment of a close rapport and supportive role made possible by the time available for direct contact with instructor candidates. However, with the advent of e-learning, where face-to-face attendance is minimised, the role of the IT or CD has had to change to accommodate this less personal approach, to develop greater understanding and skills with the more sophisticated technologies used in both training divers and to extend their knowledge

in possibly less familiar areas such as that regarding the retail oriented system offered by PADI's EVE[19] business management software.

This use of more sophisticated technologies indicates that the IDC has already changed and developed to offer flexibility in methods for completion and curriculum content. In so doing, this change lends credence to the idea that, given that the IDC is an evolving entity, adaptation to further change is entirely feasible, perhaps changes more beneficial to instructor competence than those involving e-learning.

7.5.3 Changing role of the instructor

With the greater role being played by e-learning in all levels of diver training (PADI *Undersea Journal 3rd Qtr, 2012, PADI eLearning 101: Rescue diver online*) it can be seen that the interaction between student diver and instructor is being minimised and as much as possible being relegated to in-water training directed at learning essential practical skills. Nearly all levels of diver training with all diver training agencies now have both support systems and materials available to minimise face-to-face or traditional classroom contact with the diving instructor.

Such a change to the on-line learning environment is not detrimental at the subordinate levels of training as this now changes the way a diving instructor can perform his or her job. It assists with the dispensation of spontaneous, homegrown approaches to lecturing and it provides more chance of students learning from a well-designed process which avoids ambiguities and redundancy of expressions. For instance, in the open water diver course, the system of learning can be reduced to reading short, simply constructed chapters, watching a DVD, checking questions done for homework (or in a short period of class time after watching the DVD), answering a 10 question written, multi-choice/true-false style quiz and then either getting straight into the confined water for a practical session or repeating the former cycle of events until in-water training is required.

The only time an instructor is needed for information is to answer and elaborate on homework or quiz questions answered incorrectly. No formal lectures are needed, as all of the information at this stage of learning is simple and immediately relevant. This situation is unlike instructor level training and optimising time for practical skill learning is quite logical and time-economic.

7.6 Evaluation

At the conclusion of many IDCs or their equivalent are IEs regularly scheduled and conducted by examiners who have been certified to conduct the summative evaluation of instructor candidates. These examiners have experience at organising and conducting all levels of training agency certification and as such, should be well positioned to make clear decisions on a candidate's performance at the conclusion of an IE.

7.6.1 The examiners

Within the PADI system of training, examiners employed are either full-time employees of PADI or contract examiners holding a similar function in another

[19] EVE is the acronym for electronic virtual employee

industry but according to their licensing agreement with PADI, they have no financial interest in any diving operation. This is to minimise any possibility of prejudice or favour. Examiners use the same evaluation forms and slates that the CDs use during the IDC, giving a numerical score to all areas of skill and knowledge challenged during the IE, all of which must be successfully passed for instructor certification.

This summative evaluation is designed to be essentially objective, reflected by the numerical scoring system utilised. However, subjective impressions may also be used in judgment as is implied by the IE statement of understanding that all instructor candidates must sign in agreement of the terms under which they are evaluated. The relevant statement contained in that statement of understanding is:

> Attendance at the IE is at the discretion of the Instructor Examiner. If your behavior, attitude or actions are considered unprofessional, inappropriate, or distracting to other candidates, you may be required to leave. Dismissal from a PADI IE will result in forfeiture of the program fee and evaluation scores. Furthermore, dismissal for such reasons will require written permission from PADI to attend another complete IE. (PADI course director manual, 2011)

This ability to veto an instructor candidate's otherwise passing performance indicates that it may require an unusual personal aberration on the part of the instructor candidate to provoke dismissal. However, it is a fact that many who attend an IE have been recommended by their IT or CD not to attend because, during the relatively longer developmental stage of training, aberrant behaviour has been recognised, yet there is little in the arsenal of formative evaluation procedures available that can be used similarly to veto continuance. One example of this from my own experience was where a candidate had only just succeeded to attain the minimum scores required during his second IDC to be allowed to continue on to attend an IE. In counseling him I insisted that another instructor be present to confirm what I had to say regarding the student's unlikely chances of success at the upcoming IE at which he insisted attending. He was indignant at my concern over his lack of progress and what I predicted to be a negative outcome at the IE. He assured me that because his wife had two days before bought a particularly expensive crystal, suspended it over their marital bed, and from the energy he subsequently experienced emanating from it and empowering him, there was no doubt at all of his forthcoming success. He failed. This scenario concluded this individual's second IDC after continuously displaying reliance on what he felt and not what he put his mind to. For a further instance, he felt that he did not need guidance recommended by PADI or myself in constructing presentations: he felt that he knew enough from what he believed to be the correct way of doing things; questionable belief systems are not an appropriate replacement for concrete effort.

The irony is that the examiners may not identify aberrations in instructor candidates because, like illiterates who develop ingenious methods to hide their disability (Prychonda, 1988), those who know they have a tendency to aberrant behaviour can just as equally avoid scrutiny in an extreme situation such as this. It is to their advantage also that there is relatively minimal exposure to examiners in the short time frame they are in contact with them. In comparison, an IT or a CD who must score a candidate objectively has little recourse to opposing continuance at the conclusion of the IDC even knowing that this candidate should not become certified

at this time. However, an IE examiner with less than a few hours of interaction and with the authority to veto may not see any sign of aberration during the IE and permit certification. This situation is clearly in itself aberrant.

One training agency, the National Association of Underwater Instructors (NAUI), is well known to hold as one of its main criteria for final instructor certification the question (in words to this effect) "If this person was now certified as an instructor would you allow him/her to teach your loved ones to dive?" It is with regret that I admit that, of the many divers I have attempted to prepare for an instructional role, for many I could not answer this question in the affirmative.

Sadly, even though individuals complete all of the formal requirements necessary to complete their IDC successfully with instructor trainers such as myself, and despite being counseled regarding any diving or life experience shortfalls that should be addressed, they are still at liberty to present themselves at an instructor examination (IE) where they generally find it easy to "pass" assessments similar to those provided in the IDC (which they often will have attended during the previous week). With this process, it is also far too common in my experience to see some who should have passed this IE fail and sometimes unfairly, but worse, many more pass who should not be certified as an instructor at the time. One particular comment regarding such an individual (one of my IDC candidates who I recommended not to continue) is:

> I'm not going to name anyone but I do know an instructor, he was a divemaster with us, an Italian bloke, he was a nightmare. An absolute nightmare. I don't know where he is, he's in town somewhere now working as an instructor. He was scary. He lasted about three months on our boat as a divemaster. I've never seen anything like it. As a divemaster he was scary. To see him put on as an instructor that was even scarier. (Dale, DO3, 17/01/09)

It could also be well argued that one examiner is insufficient to preside over this decision. For the reasons presented above and at this early stage of an instructor's career, a sole examiner using the present process for certification should not have the final word in instructor qualification. In comparison with other adventure sports, recreational diving instructor candidates are the only individuals who appear to have no input from their instructor trainers in the candidates' final evaluation. Certainly it is very hard to create and maintain a system without flaws but this is one concern that requires further scrutiny but may be one that can be solved by the introduction of an OWSI endorsement process as discussed earlier. Even so, comment is often heard that it does not matter much whether those who are certified are good or not: the market will decide by ejecting those who do not suit the job.

7.6.2 Should the market really decide?

The expression "the market will decide" is often heard in the dive industry to define the belief that those instructors who are certified and employed as such will soon find out whether they suit this form of career or not. As a good benchmark for early assessment of this, if they are happy working with people they will be more likely to be successful than those who are more introverted and aloof. Not only will they feel comfortable but also the diving customers who are placed in their charge will reflect the instructors' enjoyment and therefore success at their job. If their personality appears positive and happy to their students, it is more than likely that

instructor will create the desired situation often recognised by either repeat introductory dives or healthy retail sales and applications for continuing education.

It seems that letting "the market decide" is a superficial belief, because in this context it appears to condone a "let's see" attitude which favours the current situation whereby new instructors are introduced to the crew of a vessel with little more than instructions to follow a senior instructor and watch what he/she does and learn from it. Individuals may have certain characteristics that predispose them to success as diving instructors but guidance through a robust internship and mentoring program can offer certainty to their credentials. Lack of this simple protocol can cause catastrophic failure, leading to customer complaints, higher than necessary instructor turnover and, ultimately, damage to the industry. The presumption that newly certified instructors will survive or not when left to their own devices is presumptuous at least and needs greater thought.

7.7 Summary

Interpretation of the data and information gained in answer to the first two research questions as discussed in Chapter 5 and Chapter 6 regarding the competencies required of the instructor and how they are acquired has allowed this penultimate chapter to answer the third research question of " … how can instruction be designed to promote an improvement to what is presently known about the industry?"

In answering this final question, a focused review has been made of the existing instructional strategies used both formally and in the situated learning environment describing the instructor development and examination process and suggesting that at least one of the critical prerequisites for attendance, the minimum number of dives required, is in fact possibly quite inadequate. This was then followed by a description of the instructor development course (IDC) indicating gaps apparent in knowledge with suggestions for improvement as well as one particular suggestion to change the Emergency First Response Instructor (EFRI) certification prerequisite for completion of OWSI certification to an optional, not mandatory, requirement. The changing role of the trainer was discussed with the effects of eLearning and its partial elimination of effective time spent in face-to-face contact with the instructor trainer and finally the chapter reviewed the summative evaluation of the instructor development process both formally through the existing examiner's role and how informally through the market's capacity to decide and/or rely upon an instructor's future.

Design of the existing instructional training process, with the exception of the development of eLearning, has remained relatively unchanged for nearly three decades. In the determination of issues indicating improvement of this process, this chapter commenced with a description of the existing instructional strategies used by PADI, a training agency representative of the majority of recreational diving training agencies globally. From this, formal and informal learning processes were discussed and how induction programs affected outcomes within the situated learning environment. From this background, gaps apparent in the existing process were identified and how support and mentoring were used to remediate this issue.

The situated learning environment, identified as either dive operation oriented, non- dive operation oriented or a combination of both, is where the diver will receive his or her training leading up to the IDC and IE. The IDC may be

undertaken partially on- line or completely face-to-face indicating concerns regarding the devaluing of the instructor trainer's role and experience during this process. Compensation for this could be attained by further support and mentoring post-IDC to ensure a fully endorsed, competent and qualified instructor.

Improvements to the IDC are suggested that would address dilemmas recognised where instructor candidates are: not examined on real-life and problem solving activities; given comprehensive instructions, tips and appropriate materials to perform an open water diver (beginner) course yet not evaluated on their performance of one; lacking foundational knowledge regarding the abuse of drugs, environmental issues; and local governmental legislation. Further to this, there is concern for improvement to the arbitrary prerequisites of minimum dive experience levels prior to instructor training and the mandated first aid instructor certification required prior to full instructor certification.

Full certification as a recreational diving instructor requires successful attendance at the IE and after the provision of all prerequisite documentation. The conduct of the IE and the examiners also come into question; it is suggested that the IE is not the end- point for instructor endorsement and that training agency examiners should not be the final decision makers of industry acceptance. Presently, there is an attitude of "let the market decide" – whereby an instructor candidate who may successfully complete the existing IE program, yet, to the instructor trainer is clearly unsuitable for the job, will be removed quickly from the industry owing to that individual's personal idiosyncracies. The concerns here are how an individual gets that far and what damage can they do while proving (in the company, and possibly supervision of customers) to the industry that they are unsuitable?

Chapter 5 described how recreational diving instructors understood what competencies they are expected to achieve and how they are displayed. Chapter 6 qualified this by describing how the instructors engage within the situated learning environment within their communities of practice. For instance, instructors are required to be familiar with the local code of practice, pass a written in-house test of knowledge, conform to the relevant guidelines read and learned, and then commence working in the situated learning environment integrating this knowledge into their existing practices.

This chapter has now presented how, on the basis of this knowledge, instruction can be designed to promote an improvement to what is presently known in the industry. What remains now is to produce a snapshot of this study to précis the findings, implications and significance of these findings and consider how they can improve the achievement of instructional competence through both formal and informal learning processes

Chapter 8 Conclusions

> ***Now we have the problem of discovering the connection which actually exists within experience between the achievements of the past and the issues of the present. (Dewey, 1938, p. 23)***

> ***The old way of learning used workshops, training programs, role plays, lectures, readings, tests, practical assignments. The emergent way of learning is more likely to involve community, storytelling, simulation, dynamic learning portals, social network analysis, expertise location, spontaneity, personal knowledge management, mobile learning and co-creation. (Cross, 2007, p. 41)***

8.1 Overview of the thesis

Chapter 1 of this thesis laid out the focus of this study: how do recreational diving instructors become competent? Giving substance to how diving instructors do this initially required reflection not only on how this was envisaged in the first place but also how it presently compares with the benchmarks of performance demanded of other outdoor adventure activities. The motivation in performing this study was also discussed, making it clear that accidents and deaths of divers are not the call to action: there are other concerns such as customer perceptions, instructor turnover and the related economic and industry consequences.

The selected history of diver education described offered a lens through which the reader can see an amateur sport with skill sets previously learned in a relatively brutish manner evolving into a more sophisticated system of training that may even offer challenges to the protocols of training in those other adventure activities to which it has been compared. This challenge and the many questions and criticisms both asked and levelled respectively at the process of instructor development and the ultimate achievement of competence inspired me to distil these concerns into the three research questions that have guided this study:

1. How does a group of recreational diving instructors understand and demonstrate what their required competencies are?
2. In what ways do recreational diving instructors engage in situated learning within a community of practice to demonstrate their required competencies?
3. On the basis of the answers to the first two questions, how can instruction be designed to promote an improvement to what is presently known about the industry?

The central theme of this thesis is clearly seen to be that of competence. In a more abbreviated form, these questions became: what are the competencies desired; how are they presently achieved; and from this knowledge how do we improve methodologies for future achievement?

In Chapter 2, I reviewed the literature pertaining to the training of divers and diving instructors in its historical and sociocultural contexts and indicated the demographics of those participating in the sport of diving. The literature revealed the evolution of training methods employed from techniques requiring more physical effort, owing a lot to the absence of adequate equipment, to a more streamlined, systems-based approach teaching only what is deemed appropriate and relevant at each level of certification. This improved change was brought about by the increasing demand for this activity but presently gaps in training are apparent, particularly in relation to basic learning theory and how this allows for better interaction with the working environment in a more informal manner. Concern for the interaction of learning theory with the working environment generated a review of the literature regarding adventure activities in general.

The literature of relevant learning theory impacting on adventure activities in general and recreational diving in particular, with an emphasis on the manner in which these theories may impact on instructional development, appears to challenge the present diving methodology that teaches only what is immediately relevant. However, my argument is that the lack of understanding of basic principles dealing with communication, leadership and learning theory is one of the primary reasons for concerns regarding the inhibition of informal learning processes in the workplace and its retardation of consequent success enabling a developing instructor to achieve instructional competence. This relationship links directly with the conceptual framework as described in Chapter 3 laying out the three distinct areas related to the respective research questions asked in this study.

Chapter 3 presented an outline of the conceptual framework. This described how the study has indicated the flow from new instructor through a situated learning environment to emerge as a competent recreational diving instructor, a sequence illustrated by the framework. This transition directly involves competence, the central theme of this study, and its definition with respect to achievement by compliance with existing training agency and governmental standards. The situated learning environment was also described using a further illustration depicting it as a three dimensional learning cube, the sides of which represent formal, informal and incidental learning.

Informing the first stage of this transition was a discussion regarding social capital (Bourdieu, 1999; Coleman, 1990; Putnam, 2000) which new instructors already possess as they enter the situated learning environment (Brown, Collins & Duguid,1989; Capra, 2002: Wenger, 2005). On entering this environment the instructor attaches him - or herself to already established communities of practice (Cross, 2007; Wenger, 2006) as a legitimate peripheral participant, eventually becoming more centrally positioned in the community through further formal, informal and incidental learning processes to become a fully active and competent member (Cross, 2007; Hager & Halliday, 2009; Lave & Wenger, 1991; Marsick & Watkins, 1990 Rowden, 2007).

Chapter 4 described how the conceptual framework as discussed and illustrated by both the three-stage transition and the three-dimensional view of the critical learning processes has served as a scaffold for the research design. A social constructivist paradigm was then followed in the form of a case study to build

meaning making from the planks of thought as put together by the triangulation tools of observation, dialogue and referral to commonly used artifacts.

Initially, consideration was given to the basic considerations of the epistemological, ontological and axiological foundations on which this study was developed and then how my role as researcher was intended to build meaning from all of this, given that I was already embedded in the industry under study yet was attempting to approach the construction of meaning without imposing my personal views on my analysis of the data provided by the participants. A description of the data collection was then given identifying the techniques used with reference to the trustworthiness of results and the credibility, transferability, dependability and confirmability of the data so obtained. Finally, ethical and political considerations were discussed detailing the limitations that may affect a study of this nature, and this one in particular. A further limitation of the study was the relatively small sample size. For this reason, these findings cannot be generalised to the broader recreational diving community based on this study alone.

Chapter 5, Chapter 6 and Chapter 7 analysed the data obtained regarding those data relevant to each of the three research questions. In Chapter 5, the research question answered was "How does a group of recreational diving instructors understand and demonstrate what their required competencies are? This provided details regarding skill expectations of the developing instructor by organisations and governmental agencies; tabulated demographics identifying the eclectic group of participants with respect to gender, age and experience; a more explicit description of how competencies are displayed; and certain apparent limitations of the successful achievement of competency.

The second research question, answered by the dialogic data iterated in Chapter 6, was "In what ways do recreational diving instructors engage in situated learning within a community of practice to demonstrate their required competencies?" The data clearly indicated the diminishing presence of formal learning methods, with an inversely proportional appearance of informal and incidental learning processes by involvement within the communities of practice a part of which the instructors found themselves. However, a weakness within these communities was evident in the lack of support given to any future learning or other career potential that may be available.

Chapter 7 asked the question "On the basis of the answers to the first two questions, how can instruction be designed to promote an improvement to what is presently known about the industry?" and gave clear direction as to how change could be effected given the results derived from answering the first two research questions as described in Chapter 5 and Chapter 6. Beginning with a description of existing instructional strategies, the chapter briefly revisited certain aspects of the formal and informal training necessitated immediately prior to an instructor development course. It then critiqued the content of the existing courses particularly with regard to prerequisites for attendance, apparent gaps in learning, the examination process and the market's role in deciding instructional competence. It also offered suggestions for change including provision for more support and mentoring.

In this, the final chapter, a synthesis is made of the findings and implications resulting from the data obtained: how these data have been analysed to answer the research questions and to establish the methodological, conceptual and empirical

significance of the study, thereby offering new knowledge that can be used as a basis for future improvements in the establishment of recreational diving instructor competence.

8.2 Findings and implications

In relation to Chapter 5, Chapter 6 and Chapter 7 that described the data and their associated analyses, I now discuss the major findings of the study and their respective implications. It is important to also bear in mind these data have been obtained and analysed in a geographic which is in many ways distinctive and representative of a relatively small part of the recreational diving industry universally. However, there may be certain idiosyncracies shared by all members of the industry in the search for answers to the research questions posed in relation to instructional competence, situated learning and instructional design.

8.2.1 Instructional competence

Instructors, organisations and government agencies do not necessarily have similar skill expectations of diving instructions and these divergent expectations may not be fully known by the new instructor at the time at which he/she becomes employed in that position. Also, certain capabilities, given the rather eclectic backgrounds of those who become diving instructors, may be absent or deficient and thus impact on the achievement of instructional competence.

Findings	Implications
Competencies can be identified by the review of four identifiable subsets: compliance with instructional standards; compliance with organisational standards; exemplary diving skills; and exemplary human interaction skills	Competence with instructional standards and diving skills is achieved predominantly by successfully completing a final instructor examination displaying competencies in contrived scenarios leading to flawed conclusions as to performance integrity in real-life situations.
Induction processes are relatively brief.	The dive vessel's captain who is not necessarily involved with direct observation of those competencies listed in the induction process makes the evaluation and accreditation of compliance with organisational standards.
There is a lack of formal or informal training in effective communication and human interaction skills.	There is a presumption apparently made that this area of competence has either already been learned or will be learned from peers within the community of practice in which they are embedded. This is an area of weakness that could be strengthened by a more robust mentoring programme with time set aside for individual counselling.

Findings	Implications
Females were underrepresented in the cohort of those instructors performing introductory diving experiences.	As it is fair to estimate that the female/male population is evenly divided, the absence of women from a role in training may be to the detriment of the industry in not appearing as welcoming to the female population as it could be. With the equipment and training methodology easily applied to both genders, there is no reason for females to be relegated to tasks other than those directly diving related because of traditionally held views on what their roles should be. Further study is recommended on this significant issue.
Leadership involvement appears to be in direct proportion to instructor retention rates.	The role of strong training leadership should not be underestimated. A staff member substantially dedicated to the training function should more readily identify job dissatisfaction and encourage role change or modification.

Table 8-1 Findings and Implications Regarding Instructional Competence

8.2.2 Situated learning

New instructors begin to move into the situated learning environment at different stages of life and from a variety of backgrounds, offering certain previously learned skills that are useful in their new situation. All, however, regardless of differences, enter the same communities of practice with the advantage of learning from one another and in particular from the "old timers" presently employed. Alongside already learned life skills from previous occupations and the formal and informal learning that has taken place during diver and instructor development, certain processes were identified that, although occurring at an embryonic stage in instructor development, appeared to offer efficient means of learning. Those processes are listed in Table 8-2 identifying their respective implications.

Findings	Implications
Informal meetings occurred between peers at the end of each working day to review successes and weaknesses requiring improvement but there was no indication of specifically targeted individual counselling.	Informal meetings between peers and new members of the community were an indicator of communities of practice in action where informal learning was realised by the interaction between "old timers" and those Lave and Wenger (1990) referred to as legitimate peripheral participants.
Communities of practice existed exhibiting the common bonds of relatively small size: being collocated, heterogeneous, unintentionally developed and unrecognised and sharing weak links between other, similar communities.	There was little evidence of any formal or informal training in communication and human interaction skills. This requires remedy. Technical skills are subordinate to communication and human interaction skills, yet there was more discussion regarding the former than the latter. Time spent in familiarisation with the respective jobs to which an instructor was ultimately tasked was short: two to three weeks maximum but only two to three days before conducting introductory diving experiences.

Findings	Implications
Induction programs consisted predominantly of observing a senior instructor and performing limited activities under guidance.	Induction programs appeared laissez-faire and in particular of very short duration for the critical skill of performing introductory diving: this allowed minimally experienced instructors a very restricted time to learn how to teach those wishing to try diving who may even be unable to swim- a less than optimal outcome for the client, the Queensland economy and the recreational diving industry as a whole.
Other formal training as required by the Queensland Code of Practice, other than that required for instructor certification was mandated to ensure employment. The default setting of diving operations appeared to discourage learning that was not directly involving the present needs of the operation, thus inhibiting career vision.	Further training other than those courses directly leading to and including instructor development, as mandated by the Code of Practice, were usually paid for by the instructor, not the diving operation. This put a further financial obligation on instructors compounding the financial strain of the already relatively low incomes paid.

Table 8-2 Findings and Implications Regarding Situated Learning

Note: Significant factors affecting situated learning appeared to be the informality of interaction between old timers and less experienced instructors, more time spent on technical than on interpersonal communication skills, laissez-faire induction processes and further, requisite training to maintain employment not being supported financially by employers.

8.2.3 Instructional design

The formula for instructor development and final certification, apart from a shift to on-line substitution of certain portions of formal training has not altered significantly since the mid-1980s. This by itself is no reason to change. However, from observation and comments recorded from study participants it appeared clear that whilst some practical elements of diving and teaching skill were evident on summative assessment, other elements of professional knowledge and behaviour may not be so. Key issues in this regard are tabulated in Table 8-3.

Findings	Implications
Criticism of the apparently arbitrary 100 dive minimum prerequisite for attendance at an instructor examination (IE) may not be justified without consideration of other issues such as the types and quality of diving experienced.	The prerequisite 100 dive minimum was generally criticised for indicating an apparently low experience level, yet may not be as concerning in relation to other issues. One compromise that I would suggest is to modify this requirement by including a number of dives in certain different aspects of diving.
Diving courses were designed to teach only skill sets that are deemed immediately relevant for that certification level. Certain foundational knowledge was absent from instructor development, of which the subjects of communication and human interaction skills, as already identified, were of more concern to the instructor and dive operation than was the further development of technical skills.	Instructor development may be retarded by ignorance of certain educational theories that could accelerate social learning. A similar argument could be made with regard to the absence or deficiency in supervision of new instructors and the ability to reinforce theory as applied to the working environment.

Findings	Implications
Instructor development courses (IDCs) appeared deficient in immediately related issues such as drug use that impacted on areas relevant to instructor maturation and the development and achievement of competency. Both formative and summative assessments of instructor candidates in the conduct and supervision of in-water activities were idealistic in comparison with real-life situations.	IDCs and Instructor Examinations (IEs) should depart more from teaching and assessing the conduct of ideal situations and move more towards teaching how to deal with real-life, problematic situations. Lack of training in this regard again retards learning when placed in the situated learning environment.
The prerequisite of becoming an emergency first response instructor (EFRI) in the PADI system of training prior to becoming certified as an open water scuba instructor (OWSI) was found to be contentious and of arguable necessity.	Debatable prerequisites created further financial strain on an instructor candidate who was already outlaying a considerable sum of money for his/her basic instructor development course.
The role of trainers is changing and requires greater technical know-how with eLearning and other diver related software.	Instructors should make themselves versatile with computational knowledge as the trend to e-learning is increasing. Though it often reduces the benefits of greater face-to-face contact with a skilled professional, it does offer greater flexibility of learning in topics not necessarily requiring in-water training.
Examiners appointed by the training agencies are not necessarily the best arbiters of assessing final instructor qualification.	A recreational diving instructor could complete final endorsement under the scrutiny of at least one industry accepted and recognised competent and practising recreational diving instructor. More research required on this issue.

Table 8-3 Findings and Implications Regarding Instructional Design

Note: Implications regarding the findings related to instructional design indicated criticism of the existing minimal dive experience level required prior to certification as an instructor and showing deficiencies in the formal foundational training in issues such as interpersonal communication skills, increased technical (computational) knowledge and that final qualification should look to industry/operational endorsement for final qualification rather than a relatively quick and impersonal two-day summative assessment by a training agency examiner.

8.3 The study's contribution to knowledge

This study has indicated a time for change to the learning processes directed at the achievement of competence by recreational diving instructors and en-route has made substantive conceptual, methodological and empirical contributions to research. It is of particular significance that there is no other research in evidence indicating the position of informal and incidental learning in the entire and presently constructed instructional development process. The data also confirmed that at least in this situation, it is a valid claim that "Informal learning is the unofficial, unscheduled, impromptu way people learn to do their jobs" (Cross, 2007, p. 236) and is without doubt a confirmation of Lave and Wenger's (1991) statement that "Human interaction skills are an important part in the development phase of technical competencies" (p.93). Both of these findings indicate the greater relevance that informal learning has to finalising qualification as a recreational diving instructor by introducing a time frame post certification for appropriate internship and mentoring

and ultimate endorsement by a more qualified industry member or members, other than a training agency examiner, as is presently the case.

8.3.1 Conceptual significance

The concept of competence has been at the core of this study supported by the theory of situated learning. This enabled me to view the process of moving from newly certified instructor through the situated learning environment which I conceptualised as a three dimensional cube of learning - formal, informal and incidental learning - finally leading to the emergence of a competent professional. In transition, it can be seen that the developing instructors often chose an abdication of material and monetary desires in favour of the less material benefits experienced in a more altruistic lifestyle directed towards producing happiness for those in their charge as well as themselves.

Transition to this more philosophical approach in a working situation appeared to indicate a relationship between the robust nature of early scaffolding directed at informal learning and resulting success with both customers, the object of that work, and the tenure of the worker. In short, robust instructional scaffolding in informal, not formal, learning practices increased success as indicated by professed job satisfaction and continuation in the profession.

The acquisition of competence is multi-faceted. With reflection on the conceptual framework as described in Chapter 3, the structural process through which the beginner instructor transitions to competent instructor is made clear in describing the learning processes contained within the situated learning environment, and as part of a community of practice. However, the content of that which is learned, viewed differently by the various stakeholders in the industry - training agencies, instructors and diving operations – though giving implicit acknowledgement to the importance of communication and human interaction skills, appears to provide minimal integration into the present learning process.

The recreational diving industry, in the geographic location in which this study has taken place, experiences a considerable turnover of customers on a daily basis. This demands exemplary communication and human interaction skills from the instructional staff dealing with them. Although many of these instructional staff, by their very nature, are already disposed well towards working more with people than product, the relatively fast process of becoming a recreational diving instructor is such that it attracts many into the profession who do not hold the same disposition.

This study therefore highlights the necessity of taking into account the value of social capital developed from prior experience; its absence in many of those who commence instructor training and/or lack of consideration of what they know; and a learning process that integrates communication and human interaction skills into the fabric of the learning cube to produce fully competent instructors – in recreational diving, or indeed, in any other activity. However, in this geographic region, and as noted in Table 1-2 on page 17 in Chapter 1, certification as an instructor in recreational diving requires considerably less experience and training than for any other outdoor activity. This situation has not changed since the commencement of this study.

8.3.2 Methodological significance

This study commenced by describing the historical background of diver and dive instructor training, directing it towards a qualitative research process using case study methodology and involving 29 participants employed by three diving operations aligned with competing training agencies. This was contextualised by the presentation of literature related to the education of instructors within the recreational diving industry specifically, and to those involved with adventure education in general. A synthesis of this literature positioned the training of recreational diving instructors uniquely, and provokes attention owing to the relatively short time frame (little more than six months) to require an individual to go from non-diver to instructor.

In conceptualising the process of transition from non-diver to competent instructor, Figure 3-1 exposed the elements of the compounded system of learning to which this research could be addressed. These elements: competence definition; competencies required; communities of practice; the situated learning environment; social capital; and how the new instructor navigates his/her way through this maze of learning, were used to frame research questions and observational guidelines to ultimately provide rich, descriptive data from which trustworthy conclusions were drawn.

The dialogic, observational and artifact data produced enabled full and clear description to address each of these elements as discussed in the data analysis chapters. Chapter 5, Chapter 6 and Chapter 7, the data chapters, presented a link between context and conceptual description to answer the research questions. Chapter 5 first defined how recreational diving instructors understand and display required competencies and from this, identified the multivariate definitions of competence as described by the key stakeholders in the recreational diving industry producing a specific definition for competence related to recreational diving instruction. The analysis of this data provided a further foundation for describing, in Chapter 6, how competence is acquired within the situated learning environment and in a community of practice. In logical sequence, Chapter 7 then answers how instruction can be designed to promote improvement to what is already occurring within the industry.

Despite the possibility of a conflict between the desire for a "detached, objective observer" (Danaher, 2001, p. 69), and a researcher who "must share an intensity of experience with the phenomenon" (Patton, 1990, p. 71), the latter issue prevailed in this instance, as I could manage my own assumptions and beliefs (Robson, 2002, p.18) and give clear description of the situations and processes under study. The advantage of being a researcher with more than 30 years of practical experience in this environment placed myself in a unique position to empathise with the participants, their actions and ideas – allowing for the production of trustworthy data.

These "solid descriptive data" offer dependable transferability of this analytical methodology (Patton, 1990), describing: a definition of competence; logical flow of data analysis; and indicators for change to instructional design that could well be used in other, adventure industry contexts.

8.3.3 Empirical significance

The empirical significance of this study has been to indicate the necessity of the human element in contributing to the reform process directed at instructional development. It is clearly evident that there is a muted discord regarding what is taught in theory and what is experienced in practice. The involvement of this relatively small cohort of instructors within this case study gives voice to this disparity and the necessity for those with the power to change learning methodologies to respond.

The results of this study have been analysed qualitatively, recognising the spectrum of individual skills necessary to become fully competent as a recreational diving instructor and the value of relationships between beginner instructors and "old hands". Whilst these data can be considered as a somewhat limited confirmation of what is intuitively thought to happen in any organisation, there is no apparent preceding study indicating these relationships within this particular industry but even without any specific precedent, this is a positive thing. Possessing similar trends to other industrial or commercial concerns adds weight to the use of knowledge and solutions realised by techniques such as reflective thinking and the arts and practices of learning organisations (Mujtaba, 2006; Ocon, 2006; Polzer, Milton & Swann, 2002; SchÖn, 1983; Senge, 1994; Shukla, 1997).

These qualitative data have revealed a wide range of individuals with a similarly wide range of backgrounds and social capital entering this industry often for a more appealing lifestyle than for commercial reasons. Regardless of the starting point, all of these individuals have to submit to the same formal training but nevertheless learn their jobs by more informal and incidental means whilst also contributing via their own previous life experiences to the communities of practice in which they are embedded. They all learn from one another. Perusal of the World Wide Web of many adventure training studies offered internationally reflects similar and distinct issues. This would indicate the importance of this study's research in the achievement of competence to an array of adventure learning instructional activities. However, there is one common thread of discontent resulting from the realisation that the income which they are awarded for their work is often substantially less than what they are used to receiving from their previous occupations, and indeed is often seen as insufficient to provide for future needs should they wish to marry, own their own home and have children. In this regard, the work of a recreational diving instructor appears to offer limited potential, with little vision of a more fulfilling future.

This concern appears to be reflected also in the data suggesting that the acquisition of competence could be retarded or even never gained owing to early resignation from the industry. Certain factors implied limitations to the achievement of competencies. One implication that can be drawn from this is that females, predominantly relegated to hospitality duties, have less of their time available to assist with training divers, and hence this area of their employment is often neglected, limiting their ability to achieve certain competencies. Another limitation is that employee retention rates appear to be proportional to the intensity, or lack thereof, of involved leadership in training management. This latter is of importance as it relates to whether or not instructional employees remain in the industry

sufficiently long to reach certain required competence levels. These concerns suggest limitations to the achievement of competence as well as opportunities for further research.

8.4 Opportunities for further research

During the course of this case study, the data analysis has raised many questions suggesting further means of improving the recreational diving industry. For instance, are the prerequisites for attendance at an IDC and/or an IE substantial enough? In particular, is the minimum of 60 dives for attendance at an IDC and/or 100 dives for attendance at an IE indicative of sufficient experience for instructor examination? Should these dives be structured so as to broaden an individual's experience by diving different locations and/or activities such as deep, night and wreck diving? Who should ultimately certify a recreational diving instructor as competent – a training agency and/or a qualified industry member? Further research needs to be performed to investigate and measure standards to inform safety issues.

Further to these questions, and specific to the local geographic area in which this study has been undertaken, the data raised questions about the achievement of competency as a direct result of dive operational protocols. Although certain quantitative data were obtained in this regard, they were insufficient to give robust conclusions. However, there appear to be sufficient data to argue the need for further research into gender employment inequality and leadership involvement.

8.4.1 Limitations to the achievement of competence

The manner in which the individual elements of instructional competence (standards compliance, dive skills and interpersonal communication skills) are achieved relies on beginner instructors having sufficient exposure to those skills in which they must become competent, together with being able to maintain a position in the learning environment for sufficient time to achieve all the required elements of competency.

To be marginalised and/or discouraged from continuation in employment as an instructor limits or prevents this achievement. During the course of this study, two particular factors emerged to provoke this situation. The first factor was gender employment inequality evidenced in both the ratio of females employed as instructors compared with males (4 out of 29) and the type of work delegated to specific genders. The second factor was leadership involvement and its ensuing effect on the retention of employees within the situated learning environment.

8.4.1.1 Gender

There is very little, if anything, to distinguish between the competencies required of males and females in the occupation of recreational diving instructor. Observations in this study indicated that the number of female instructors employed in the geographic region of this study was relatively low and that they were more likely to be relegated to hospitality related work such as assisting with catering, or organising paperwork and equipment for their male counterparts. This suggests a stymying of skill learning directly related to teaching divers and a disincentive to continue with this as a valid career for female instructors. As an inhibitor to further development on the part of the female instructor, there may also be other factors involved. One such factor was indicative of the "ticking clock" reference to the

desire to start a family; pregnancy and efforts to become pregnant are contraindications for diving and staying out of the water at this time is recommended. Even so, as the female population is giving birth at a later age than experienced historically (Hayes, Weston, Qu, & Gray, 2011), this should still provide many productive years for female divers to pursue this as a career prior to starting a family. Furthermore, there is no evidence females have a greater risk of diving injury than males (St. Leger Dowse, Bryson, Gunby & Fife, 1994; Heggie & Caine, 2012).

From a broader perspective, with the acceptance that the general population of many countries is approximately 50/50 male to female (Geohive, 2011, p. 1) and with there being no apparent physical differences specifically related to the female population other than pregnancy it should be fair to assume that 50% of the available customer base is female and therefore we should expect to see a similar ratio of female instructors – but this is not the case. In Figure 8-1, PADI's (2013) data on diving certifications by gender, the ratio of males to females involved in this sport is approximately 2:1. In this study, if the data were reflect a similar proportion, 10 out of the 29 participants would be women.

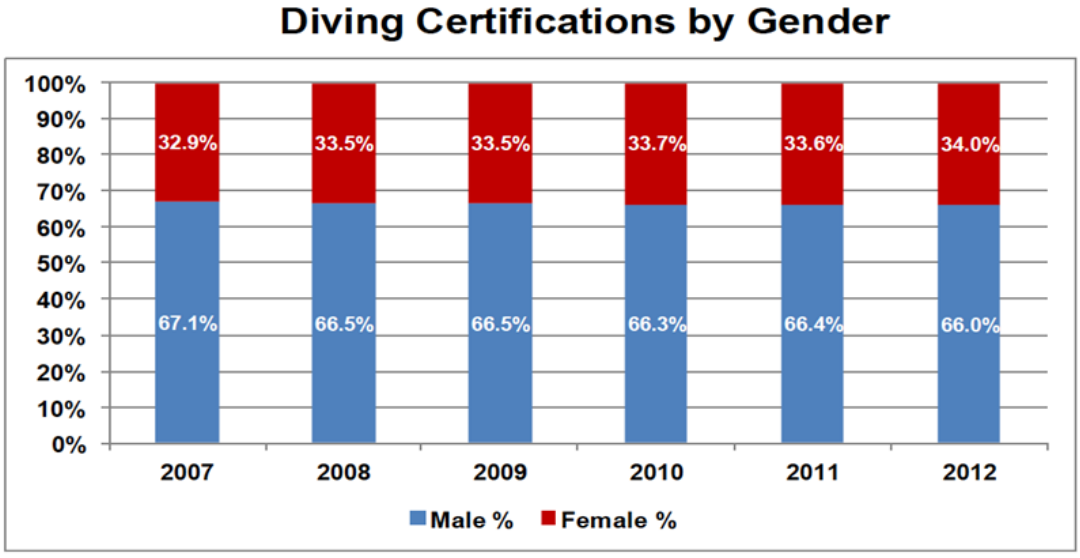

Figure 8-1 **Diver certification – Gender comparison**

Note: **Diving certifications by gender. This chart compares the percentage of male and female certifications produced between the years 2007 and 2012. Retrieved February 2013 from http://www.padi.com/scuba/about-padi/PADI- statistics/default.aspx**

These figures represent total entry-level and continuing education diving certifications for all PADI offices internationally. However, divers may have multiple certifications such as open-water (beginner), advanced open-water and a variety of specialty diver certifications. Therefore one person could be represented in these data multiple times: hence the number of certifications does not necessarily equate to total numbers of individual students of either gender. These figures also do not include introductory diving certifications or non-diving certifications such as an equipment specialty certification. In this regard, these data may be quite skewed dependent on the actual continuation of education relative to gender, but nevertheless they do appear to reinforce data obtained in this study with regard to the preponderance of male participation in this sport, either as a recreation or as an occupation within this recreational activity. Even so, the number of female

instructors employed in the role of instructor in this study appears to be significantly lower than what one would expect to see if reflecting on PADI's data.

As well as the disproportionate employment ratio evidenced in this study (four females out of a cohort of 29 instructional staff), another limiting factor in the achievement of instructional competence was the clear segregation of skills, with certain skills being relegated to female instructors and others to males.

This situation of disproportionate employment of males compared with females and the similarly skewed delegation of tasks support an argument of gender prejudice in how dive operation leadership was conducted. Further research is required to investigate further the gender disparities that seemed to exist.

8.4.1.2 Leadership

Initial direction to newly employed instructors was given by the respective operations managers by way of reviewing company protocols through the use of procedures manuals and the Code of Practice and other relevant paperwork related to the job.

This was then followed by an introduction to the peer groups who were delegated the task of training new instructional staff and divemaster trainees by rotating them through each of the on-board activities that occurred whilst at sea and in dock. Based on the data analysis, the support given by the operations managers after the basic review of manuals and paperwork completion varied considerably, as did the respective retention rates of those employees.

In Chapter 1, Table 1-1 detailed the retention rate of employees over a three-year period. Illustrated graphically in Figure 8-1, this indicated that the retention rate of employees may be directly associated with the support that could be attributed to the involvement, or otherwise, of leadership specifically directed towards training.

Figure 8-2 Leadership versus employee retention 2008 - 2010

Note: Employee retention rate versus involvement in training management Leadership in training management over the years 2008-2010 indicated that the more active the leadership, the greater was the retention rate of employees. Leadership measurement was by way of direct observation of time spent by the individual in charge of training in direct involvement with instructional staff. In Operation 3, daily contact with at least two days at sea observing and mentoring staff was evidenced. Operation 1 indicated a management offering frequent contact each morning before vessel departure but rarely at sea observing and mentoring staff. The management of

Operation 2 was only seen to be giving advice at the vessel before departure. Operation 3 was the only operation that had an individual whose primary function was staff training.

John F. Kennedy (1963) as cited by Clemmer (2007) stated that "Leadership and learning are indispensable to each other" (p. 1). From these data, this famous statement was indicative rather than definitive in expressing the idea that leadership is also indispensable for retention of the staff in whom competent skill performance is being learned and achieved. Although correlation does not necessarily imply causation, the fact that organisational protocols had not changed over this three-year phase of the study could also indicate that the probability of certain areas of instructional competence being expeditiously achieved was much higher in the operation that retains its staff longest. Further research should be undertaken to investigate the effect that leadership roles have when directed more specifically at training management

8.5 More Personal reflections

In reflecting not only on this study but also on the personal journey started more than 30 years ago with my involvement in the recreational diving industry, I have found it difficult to stand apart and watch a story unfold through listening to the dialogue of others and observing their actions with senses that had to deny any previous ideas that I may have held; I was all too well aware of the common problem of prejudicial filtering of data to suit predetermined agenda. At the same time, I was mindful that with my experience, assisted with the tools of critical thinking, I could, and should be able to, deduce what is and is not working to produce effective and competent recreational diving instructors. Even so, it was humbling not only to see more vividly the baton of diving instruction being passed on to younger hands but also to reflect on the criticism I had often levelled at those very early pioneers and their comparatively crude methods of training to which I and many others were subjected. They were just doing their best with what they knew and what resources they had: a perspective I had not appreciated as much as I should have - because that may also be the way many see the training methods used by myself and my peers in the years to come. Hence, the gaps that I see apparent in the training of diving instructors today are not to be seen so much as possible failures in delivery but more as parts of an evolving process that will continually be remedied and modified as time goes on.

This has been a personally rewarding experience that has challenged me in many ways, producing data that indicated relationships in some ways confirming my suspicions yet in others turning them around. This in itself was a lesson well learnt and by the very nature of this outcome alone proves the fact that learning should never cease and that ideas should not be so much set in the concrete of belief that they cannot be altered by the revelation of hard data.

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Appendix A Information Sheet and Consent Forms

INFORMATION SHEET

Title of Research: Workplace competence for recreational diving instruction through situated learning in established and evolving communities of practice OR How we learn to be good at the job and who helps us do it

Explanation of the research:

The primary research questions are to:

A. How does a group of recreational diving instructors understand and demonstrate their required competencies?
B. In what ways do recreational diving instructors constitute engage in situated learning within a community of practice to demonstrate their required competencies?
C. On the basis of the answers to the first two questions, how can instruction be designed to promote an improvement to what is presently known about the industry?

The research is necessary for Mr K. Cardwell to fulfil the requirements of a thesis for the Doctor of Philosophy degree studied externally through the University of Southern Queensland. The study is self-funded with no obligation to third parties.

If you agree to participate in this research you will be asked to take part in 2 semi-structured interviews that will take up to 1 hour each and 2 observation sessions included as part of normal day-to-day work. These sessions may require a follow up session to clarify or extend data gathering. In addition, you may be asked to assist with a review of findings. Participants will also be invited to provide feedback on the transcripts of their individual interview/s.

All data gathered will be in a written or audiotape form and will be securely stored until destroyed.

The intention is to submit a thesis to fulfil the requirements for the Doctor of Philosophy degree and to complete associated presentations and publications and on agreement with the Directors of ABC Dive a workplace focused report will be made available to participants. ABC Dive is a pseudonym for the respective dive operation being studied.

Explanation of participants' rights:

The researcher will answer all questions about the research procedures and processes.

The researcher will safeguard the data generated during this study and maintain all participants' privacy. Publication of the research will not disclose personally identifying information, and will not compromise company specific sensitive data. With permission of the ABC Dive Directors, a workplace focused report will be made available on request.

Participation is voluntary. Participants may refuse to answer any questions without penalty and are free to stop participating at any time without penalty. Risk is low and minimal impact is envisaged above that encountered in everyday life.

Consent Form

Research on recreational diving instructors' learning in the workplace

Participant:

I agree to participate in the research described in the information sheet.

I understand the explanations in the information sheet and have received satisfactory answers to all questions I have raised and agree to the conditions as described.

I understand I will receive no remuneration for participating in this research. I envisage no reason why I should not participate in this research.

I understand that I may refuse to answer specific questions and withdraw from the research at any time without penalty.

I understand I will receive a signed copy of this form.

Signature……

Date……..

Researcher:

I certify that the privacy of the participant will be maintained and that I have answered all questions fully.

Signature…….

Date……..

Please contact University of Southern Queensland's Research Services Office (Tel 07 46311438) should there be any concerns about the nature and/or conduct of this research project.

Appendix B Interview Data Gathering Instrument

Interview data gathering instrument

Participant#:

How long have you been with ABC Dive?

How long have you been employed in the recreational diving industry?

What is your previous experience?

What qualifications do you have?

When did you first decide to become a diving instructor?

Why?

Has it met your expectations so far?

Can you see yourself continuing in this work?

How long did it take for you to get a job as an instructor after completing the Instructor Examination?

Do you know the difference among formal, informal and incidental learning? Examples to help with definition:

Formal learning: classroom, team meetings regarding updates on training standards

Informal learning: understudying a supervisor giving briefings to divers on site, asking how to tie a knot

Incidental learning: in class learning the right buttons to push to get attention, on site learning knots but finding out which rope is best for your application

Questions to answer (on separate sheets and audio):

A. How does a group of recreational diving instructors understand and demonstrate their required competencies?

1. What do you think your job is supposed to involve in the position you are holding now?

2. Is there anyone designated on board as the 'workplace trainer' or is there anyone you specifically go to for help regarding training/learning situations whilst on board to ensure competency in your job? Yes/No

3. If so, who is this and how does he/she assist you in learning?

4. Is he/she helpful? Yes/No

5. What role do you think they should have in assisting you?

6. Do you feel competent in the job you are now doing? Yes/No/Getting there!

7. Could anything be done to improve this?

B. In what ways do recreational diving instructors constitute engage in situated learning within a community of practice to demonstrate their required competencies?

1. What were the first tasks you were appointed to do as soon as you were employed as an instructor?

2. Did you have an induction program before starting work as an instructor?

3. What did this program include?

4. Who helped you and how?

5. After this program, did you feel ready to do the job you are doing now? Yes/No/Partially

6. If not, how did you learn what was necessary to feel ready? And who from?

7. Has there been any further formal training that you were asked to undergo in the workplace? Yes/No

8. If so, what was this?

9. What informal learning do you think happens in the workplace (or out of it)?

10. Is training in any form encouraged by your: Peers? Supervisor? Captain? ABC Dive? Yes/No

11. If so, what is this?

12. Is there any discouragement to learn anything by anyone? Yes/No

13. If so, how does this occur?

14. Do you play any role in assisting others to learn? Yes/No

15. If so, how?

16. What situations do you think are valuable as formal and/or informal learning experiences?

C. How do we best design instruction to promote an improvement to what is known about the industry currently?

1. What do you think were the best learning events (stories or experiences) prior to attending an Instructor Development Course, and were these formal or informal situations?

2. How do you feel that these events reflect on what you do now?

3. What did you expect of your Instructor Development Course?

4. Did this live up to your expectations? Yes/No

5. Please explain.

6. Do you feel that your other training programs (Open Water, Advanced Open Water, Rescue diver and Divemaster) prior to attending an Instructor Development Course gave you necessary information to do the job you are now doing?

7. Please explain.

8. What suggestions do you have that can improve this situation?

9. Do you have any further comments on how you feel about training and/or learning before final instructor certification and/or after entering the industry as what is described by the various training agencies a “qualified professional”?

Appendix C Observation Schedules

Observational Schedule One

Site	
Location	
Date	
Observer	
Trainer	
Brief description of the context (who is involved-the trainees/other workers; their relevant characteristics).	
What is the setting like (appearance, rules, any apparent customs, etc)?	
The purpose (why are the people there; what is the reaction of the people to this; what goals are being pursued?).	
Stimulus	

Objective
Action directed to whom?
Form of action?
Qualities of behaviour
Effects of this behaviour

Observational Schedule Two

Date:

Trainer:

Time	Activity	Site	Description of context, setting, action and directed to whom.
0730			
0745			
0800			
0815			
0830			
0845			
0900			
0915			
0930			
0945			
1000			
1015			
1030			
1045			
1100			
1115			
1130			
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1600			
1615			
1630			
1645			
1700			
1715			

1730			

Appendix D Induction Record

Employee details and induction record

Personal information:

Name: _____ **Sex:** _____ **D.O.B.:** _____

Address: _____ **Phone:** _____

_____

Next of Kin _____ **Phone:** _____

Medical Conditions / medications _____

Certification level _____

Enter the name of the provider and the date that each certification was acquired in the space provided below.

	Provider	Date Certified
Medical		
First Aid		
CPR		
Oxygen		

Vessel Induction

Operations manual			E/room fire vents &		
Watch & stations bill			Fuel shut-offs		
Muster stations			Watertight doors		
Liferaft familiarization			Tender operation		
EPIRB use			Anchor & winch		
Life jacket and life ring use			Oil & fuel spill kit		
First aid and oxygen kits			Crowd control guidelines		
Emergency grab bag			Hygiene standards		
VHF & UHF radio use			Cleaning schedule		
Raising alarm (flood, fire,			Fish feeding guidelines		
Fire panels			Fire drills		
Fire extinguishers			Collision drill		
Fir pumps a& hydrants			Abandon ship drill		
Fire axe, blankets & buckets			Man overboard (MOB) drill		

Date completed		Employee		Master	

Dive / Snorkel Watch Induction (All Crew)

Theory Read lookout and snorkel guide job descriptions/guidelines

Practical Observe a senior staff member performing watch duties for at least two sessions then be observed performing watch duties by a senior staff member for at least two sessions.

Divemaster & Instructor Induction

Dive site orientation – at least three dives at each site		
Briefing familiarisation – listen to at least two briefings and		
Briefing assessment – perform at least two briefs & debriefs		
Guided dive familiarisation – follow at least two guided		
Guided dive assessment – lead at least two guided dives		

Certified Diver Induction

Dive site orientation – at least three dives at each site		
Briefing familiarisation – listen to at least two briefings and		
Briefing assessment – perform at least two briefs & debriefs		
Intro dive familiarisation – follow at least four intro dive		
Intro dive assessment A – lead at least four groups at a ratio		
Intro dive assessment B – lead at least four groups at a ratio		

Date completed		Employee		Master	

KNOWLEDGE DEVELOPMENT EVALUATION FORM

Candidate _____ Evaluator _____ Course _____

Course Topic _____ Lesson Guide _____ Date _____

DIRECTIONS – A scale of 1-5 appears under each item. The scale corresponds to a level of performance ranging from 1 (poor) to 5 (excellent). During the presentation, record the score for each item in the space provided in the right-hand margin that best represents the candidate's performance. To determine the final score, add the subtotals and circle the corresponding final score. Passing performance is a score of 3.5 or higher.

I. INTRODUCTION — SUBTOTALS

1. None attempted or fulfilled only one of the following:
   a) Implied value by giving appropriate contact related to assigned topic; or
   b) Reviewed key point(s) from assigned lesson guide or course outline; or
   c) Gave appropriate conduct (take notes, ask questions, open book to. . .); or
   d) Reinforced eventual value by applying information to actual diving circumstances.
2. Fulfilled two of the four points in item 1.
3. Fulfilled three of the four points in item 1.
4. Fulfilled all four points in item 1.
5. Fulfilled points a), b) and c) in item 1 and reinforced immediate value by applying information to current level of training. _____

II. CONTENT

A. LEARNING OBJECTIVES and SCOPE OF MATERIAL
1. Unsafe or clearly inaccurate information presented.* OR did not fulfill prescribed objective:
2. Fulfilled only one of the following:
   a) Stated measurable objective(s); or
   b) Stayed within the scope of assigned topic; or
   c) Provided specific examples of actual diving circumstances; or
   d) Applied information to local environment and current level of training.
3. Fulfilled two of four points in item 2.
4. Fulfilled three of four points in item 2.
5. Fulfilled all four points in item 2. _____

B. SEQUENCE and RELATIONSHIP OF MATERIAL
1. Sequence was random and confusing.
2. Fulfilled only one of the following:
   a) Sequence followed appropriate lesson guide or course outline; or
   b) Indicated important relationships with other components of this PADI course (other lesson guides, course sections, educational materials, confined water dives, open water dives, etc.); or
   c) Cited specific examples or benefits from PADI continuing education courses; or
   d) Promoted ownership of related dive equipment or dive travel experience.
3. Fulfilled two of four points in item 2.
4. Fulfilled three of four points in item 2.
5. Fulfilled all four points in item 2. _____

*Presenting unsafe or clearly inaccurate information or making a negative or unprofessional impression earns a total presentation score of 1 – regardless of other presentation scores.

III. SUMMARY — SUBTOTALS

1. None attempted or fulfilled only one of the following:
   a) Reinforced value by explaining when and how information would be applied; or
   b) Reviewed key points; or
   c) Restated objectives; or
   d) Promoted PADI continuing education; or
   e) Promoted dive equipment ownership or dive travel experience
2. Fulfilled two of five points in item 1.
3. Fulfilled three of five points in item 1.
4. Fulfilled four of five points in item 1.
5. Fulfilled all five points in item 1. _____

IV. OVERALL HANDLING

A. TRAINING AIDS
1. Used no aids
2. Fulfilled only one of the following:
   a) Effectively used PADI Lesson Guides or displayed another form of outline when product does not exist; or
   b) Effectively used other PADI material; or
   c) Effectively used dive equipment as training aid; or
   d) Effectively used appropriate nondiving aid that clearly benefited learning.
3. Fulfilled two of four points in item 2.
4. Fulfilled three of four points in item 2.
5. Fulfilled all four points in item 2. _____

B. QUALITY VOICE, GESTURES and MANNERISMS
1. Made negative or unprofessional impression.* OR met none of the following:
2. Fulfilled only one of the following:
   a) Effectively used voice and gestures to speak directly to students; or
   b) Presented in a fluid manner with minimal reference to notes; or
   c) Occasionally interacted with students in an effective manner.
3. Fulfilled two of three points in item 2.
4. Fulfilled all three points in item 2.
5. Fulfilled points a) and b) from item 2 and consistently interacted with students in an effective manner _____

Total Points _____
(divide by 6 – see chart below)

FINAL SCORE _____

Total Points:	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Score:	1.0	1.2	1.3	1.5	1.7	1.8	2.0	2.2	2.3	2.5	2.7	2.8	3.0	3.2	3.3
Passing Total Points:			21	22	23	24	25	26	27	28	29	30			
Passing Score:			3.5	3.7	3.8	4.0	4.2	4.3	4.5	4.7	4.8	5.0			

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Appendix F – Medical Statement

PADI padi.com

R·S·T·C

UNDERSEA & HYPERBARIC MEDICAL SOCIETY

MEDICAL STATEMENT

Participant Record (Confidential Information)

Please read carefully before signing.

This is a statement in which you are informed of some potential risks involved in scuba diving and of the conduct required of you during the scuba training program. Your signature on this statement is required for you to participate in the scuba training program offered

by_____and
Instructor

_____located in the
Facility

city of_____, state/province of _____.

Read this statement prior to signing it. You must complete this Medical Statement, which includes the medical questionnaire section, to enroll in the scuba training program. If you are a minor, you must have this Statement signed by a parent or guardian.

Diving is an exciting and demanding activity. When performed correctly, applying correct techniques, it is relatively safe. When established safety procedures are not followed, however, there are increased risks.

To scuba dive safely, you should not be extremely overweight or out of condition. Diving can be strenuous under certain conditions. Your respiratory and circulatory systems must be in good health. All body air spaces must be normal and healthy. A person with coronary disease, a current cold or congestion, epilepsy, a severe medical problem or who is under the influence of alcohol or drugs should not dive. If you have asthma, heart disease, other chronic medical conditions or you are taking medications on a regular basis, you should consult your doctor and the instructor before participating in this program, and on a regular basis thereafter upon completion. You will also learn from the instructor the important safety rules regarding breathing and equalization while scuba diving. Improper use of scuba equipment can result in serious injury. You must be thoroughly instructed in its use under direct supervision of a qualified instructor to use it safely.

If you have any additional questions regarding this Medical Statement or the Medical Questionnaire section, review them with your instructor before signing.

Divers Medical Questionnaire

To the Participant:

The purpose of this Medical Questionnaire is to find out if you should be examined by your doctor before participating in recreational diver training. A positive response to a question does not necessarily disqualify you from diving. A positive response means that there is a preexisting condition that may affect your safety while diving and you must seek the advice of your physician prior to engaging in dive activities.

Please answer the following questions on your past or present medical history with a **YES** or **NO**. If you are not sure, answer **YES**. If any of these items apply to you, we must request that you consult with a physician prior to participating in scuba diving. Your instructor will supply you with an RSTC Medical Statement and Guidelines for Recreational Scuba Diver's Physical Examination to take to your physician.

_____ Could you be pregnant, or are you attempting to become pregnant?

_____ Are you presently taking prescription medications? (with the exception of birth control or anti-malarial)

_____ Are you over 45 years of age and can answer YES to one or more of the following?
- currently smoke a pipe, cigars or cigarettes
- have a high cholesterol level
- have a family history of heart attack or stroke
- are currently receiving medical care
- high blood pressure
- diabetes mellitus, even if controlled by diet alone

Have you ever had or do you currently have...

_____ Asthma, or wheezing with breathing, or wheezing with exercise?

_____ Frequent or severe attacks of hayfever or allergy?

_____ Frequent colds, sinusitis or bronchitis?

_____ Any form of lung disease?

_____ Pneumothorax (collapsed lung)?

_____ Other chest disease or chest surgery?

_____ Behavioral health, mental or psychological problems (Panic attack, fear of closed or open spaces)?

_____ Epilepsy, seizures, convulsions or take medications to prevent them?

_____ Recurring complicated migraine headaches or take medications to prevent them?

_____ Blackouts or fainting (full/partial loss of consciousness)?

_____ Frequent or severe suffering from motion sickness (seasick, carsick, etc.)?

_____ Dysentery or dehydration requiring medical intervention?

_____ Any dive accidents or decompression sickness?

_____ Inability to perform moderate exercise (example: walk 1.6 km/one mile within 12 mins.)?

_____ Head injury with loss of consciousness in the past five years?

_____ Recurrent back problems?

_____ Back or spinal surgery?

_____ Diabetes?

_____ Back, arm or leg problems following surgery, injury or fracture?

_____ High blood pressure or take medicine to control blood pressure?

_____ Heart disease?

_____ Heart attack?

_____ Angina, heart surgery or blood vessel surgery?

_____ Sinus surgery?

_____ Ear disease or surgery, hearing loss or problems with balance?

_____ Recurrent ear problems?

_____ Bleeding or other blood disorders?

_____ Hernia?

_____ Ulcers or ulcer surgery ?

_____ A colostomy or ileostomy?

_____ Recreational drug use or treatment for, or alcoholism in the past five years?

The information I have provided about my medical history is accurate to the best of my knowledge. *I agree to accept responsibility for omissions regarding my failure to disclose any existing or past health condition.*

_____ Signature _____ Date _____ Signature of Parent or Guardian _____ Date

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STUDENT

Please print legibly.

Name _____ Birth Date _____ Age _____
First Initial Last Day/Month/Year

Mailing Address _____

City _____ State/Province/Region _____

Country _____ Zip/Postal Code _____

Home Phone ( ) _____ Business Phone ( ) _____

Email _____ FAX _____

Name and address of your family physician

Physician _____ Clinic/Hospital _____

Address _____

Date of last physical examination _____

Name of examiner _____ Clinic/Hospital _____

Address _____

Phone ( ) _____ Email _____

Were you ever required to have a physical for diving? ☐ Yes ☐ No If so, when? _____

PHYSICIAN

This person applying for training or is presently certified to engage in scuba (self-contained underwater breathing apparatus) diving. Your opinion of the applicant's medical fitness for scuba diving is requested. There are guidelines attached for your information and reference.

Physician's Impression

☐ I find no medical conditions that I consider incompatible with diving.

☐ I am unable to recommend this individual for diving.

Remarks _____

_____

_____

_____ Date _____
Physician's Signature or Legal Representative of Medical Practitioner Day/Month/Year

Physician _____ Clinic/Hospital _____

Address _____

Phone ( ) _____ Email _____

Guidelines for Recreational Scuba Diver's Physical Examination

Instructions to the Physician:

Recreational **SCUBA** (Self-Contained Underwater Breathing Apparatus) can provide recreational divers with an enjoyable sport safer than many other activities. The risk of diving is increased by certain physical conditions, which the relationship to diving may not be readily obvious. Thus, it is important to screen divers for such conditions.

The **RECREATIONAL SCUBA DIVER'S PHYSICAL EXAMINATION** focuses on conditions that may put a diver at increased risk for decompression sickness, pulmonary overinflation syndrome with subsequent arterial gas embolization and other conditions such as loss of consciousness, which could lead to drowning. Additionally, the diver must be able to withstand some degree of cold stress, the physiological effects of immersion and the optical effects of water and have sufficient physical and mental reserves to deal with possible emergencies.

The history, review of systems and physical examination should include as a minimum the points listed below. The list of conditions that might adversely affect the diver is not all-inclusive, but contains the most commonly encountered medical problems. The brief introductions should serve as an alert to the nature of the risk posed by each medical problem.

The potential diver and his or her physician must weigh the pleasures to be had by diving against an increased risk of death or injury due to the individual's medical condition. As with any recreational activity, there are no data for diving enabling the calculation of an accurate mathematical probability of injury. Experience and physiological principles only permit a qualitative assessment of relative risk.

For the purposes of this document, **Severe Risk** implies that an individual is believed to be at substantially elevated risk of decompression sickness, pulmonary or otic barotrauma or altered consciousness with subsequent drowning, compared with the general population. The consultants involved in drafting this document would generally discourage a student with such medical problems from diving. **Relative Risk** refers to a moderate increase in risk, which in some instances may be acceptable. To make a decision as to whether diving is contraindicated for this category of medical problems, physicians must base their judgement on an assessment of the individual patient. Some medical problems which may preclude diving are **temporary** in nature or responsive to treatment, allowing the student to dive safely after they have resolved.

Diagnostic studies and specialty consultations should be obtained as indicated to determine the diver's status. A list of references is included to aid in clarifying issues that arise. Physicians and other medical professionals of the Divers Alert Network (DAN) associated with Duke University Health System are available for consultation by phone +1 919 684 2948 during normal business hours. For emergency calls, 24 hours 7 days a week, call +1 919 684 8111 or +1 919 684 4DAN (collect). Related organizations exist in other parts of the world – DAN Europe in Italy +39 039 605 7858, DAN S.E.A.P. in Australia +61 3 9886 9166 and Divers Emergency Service (DES) in Australia +61 8 8212 9242, DAN Japan +81 33590 6501 and DAN Southern Africa +27 11 242 0380. There are also a number of informative websites offering similar advice.

NEUROLOGICAL

Neurological abnormalities affecting a diver's ability to perform exercise should be assessed according to the degree of compromise. Some diving physicians feel that conditions in which there can be a waxing and waning of neurological symptoms and signs, such as migraine or demyelinating disease, contraindicate diving because an exacerbation or attack of the preexisting disease (e.g.: a migraine with aura) may be difficult to distinguish from neurological decompression sickness. A history of head injury resulting in unconsciousness should be evaluated for risk of seizure.

Relative Risk Conditions

- **Complicated Migraine Headaches whose symptoms or severity impair motor or cognitive function, neurologic manifestations**
- **History of Head Injury with sequelae other than seizure**
- **Herniated Nucleus Pulposus**
- **Intracranial Tumor or Aneurysm**
- **Peripheral Neuropathy**
- **Multiple Sclerosis**
- **Trigeminal Neuralgia**
- **History of spinal cord or brain injury**

Temporary Risk Condition

History of cerebral gas embolism without residual where pulmonary air trapping has been excluded and for which there is a satisfactory explanation and some reason to believe that the probability of recurrence is low.

Severe Risk Conditions

Any abnormalities where there is a significant probability of unconsciousness, hence putting the diver at increased risk of drowning. Divers with spinal cord or brain abnormalities where perfusion is impaired may be at increased risk of decompression sickness.

Some conditions are as follows:

- **History of seizures other than childhood febrile seizures**
- **History of Transient Ischemic Attack (TIA) or Cerebrovascular Accident (CVA)**
- **History of Serious (Central Nervous System, Cerebral or Inner Ear) Decompression Sickness with residual deficits**

CARDIOVASCULAR SYSTEMS

Relative Risk Conditions

The diagnoses listed below potentially render the diver unable to meet the exertional performance requirements likely to be encountered in recreational diving. These conditions may lead the diver to experience cardiac ischemia and its consequences. Formalized stress testing is encouraged if there is any doubt regarding physical performance capability. The suggested minimum criteria for stress testing in such cases is at least 13 METS.* Failure to meet the exercise criteria would be of significant concern. Conditioning and retesting may make later qualification possible. Immersion in water causes a redistribution of blood from the periphery into the central compartment, an effect that is greatest in cold water. The marked increase in cardiac preload during immersion can precipitate pulmonary edema in patients with impaired left ventricular function or significant valvular disease. The effects of immersion can mostly be gauged by an assessment of the diver's performance while swimming on the surface. A large proportion of scuba diving deaths in North America are due to coronary artery disease. Before being approved to scuba dive, individuals older than 40 years are recommended to undergo risk assessment for coronary artery disease. Formal exercise testing may be needed to assess the risk.

* METS is a term used to describe the metabolic cost. The MET at rest is one, two METS is two times the resting level, three METS is three times the resting level, and so on. The resting energy cost (net oxygen requirement) is thus standardized. (Exercise Physiology; Clark, Prentice Hall, 1975.)

Relative Risk Conditions

- History of Coronary Artery Bypass Grafting (CABG)
- Percutaneous Balloon Angioplasty (PCTA) or Coronary Artery Disease (CAD)
- History of Myocardial Infarction
- Congestive Heart Failure
- Hypertension
- History of dysrythmias requiring medication for suppression
- Valvular Regurgitation

Pacemakers

The pathologic process that necessitated should be addressed regarding the diver's fitness to dive. In those instances where the problem necessitating pacing does not preclude diving, will the diver be able to meet the performance criteria?

*** NOTE: Pacemakers must be certified by the manufacturer as able to withstand the pressure changes involved in recreational diving.**

Severe Risks

Venous emboli, commonly produced during decompression, may cross major intracardiac right-to-left shunts and enter the cerebral or spinal cord circulations causing neurological decompression illness. Hypertrophic cardiomyopathy and valvular stenosis may lead to the sudden onset of unconsciousness during exercise.

PULMONARY

Any process or lesion that impedes airflow from the lungs places the diver at risk for pulmonary overinflation with alveolar rupture and the possibility of cerebral air embolization. Many interstitial diseases predispose to spontaneous pneumothorax: Asthma (reactive airway disease), Chronic Obstructive Pulmonary Disease (COPD), cystic or cavitating lung diseases may all cause air trapping. The 1996 Undersea and Hyperbaric Medical Society (UHMS) consensus on diving and asthma indicates that for the risk of pulmonary barotrauma and decompression illness to be acceptably low, the asthmatic diver should be asymptomatic and have normal spirometry before and after an exercise test. Inhalation challenge tests (e.g.: using histamine, hypertonic saline or methacholine) are not sufficiently standardized to be interpreted in the context of scuba diving.

A pneumothorax that occurs or reoccurs while diving may be catastrophic. As the diver ascends, air trapped in the cavity expands and could produce a tension pneumothorax.

In addition to the risk of pulmonary barotrauma, respiratory disease due to either structural disorders of the lung or chest wall or neuromuscular disease may impair exercise performance. Structural disorders of the chest or abdominal wall (e.g.: prune belly), or neuromuscular disorders, may impair cough, which could be life threatening if water is aspirated. Respiratory limitation due to disease is compounded by the combined effects of immersion (causing a restrictive deficit) and the increase in gas density, which increases in proportion to the ambient pressure (causing increased airway resistance). Formal exercise testing may be helpful.

Relative Risk Conditions

- History of Asthma or Reactive Airway Disease (RAD)*
- History of Exercise Induced Bronchospasm (EIB)*
- History of solid, cystic or cavitating lesion*
- Pneumothorax secondary to:
  - -Thoracic Surgery
  - -Trauma or Pleural Penetration*
  - -Previous Overinflation Injury*
- Obesity
- History of Immersion Pulmonary Edema Restrictive Disease*
- Interstitial lung disease: May increase the risk of pneumothorax

* Spirometry should be normal before and after exercise

Active Reactive Airway Disease, Active Asthma, Exercise Induced Bronchospasm, Chronic Obstructive Pulmonary Disease or history of same with abnormal PFTs or a positive exercise challenge are concerns for diving.

Severe Risk Conditions

- **History of spontaneous pneumothorax.** Individuals who have experienced spontaneous pneumothorax should avoid diving, even after a surgical procedure designed to prevent recurrence (such as pleurodesis). Surgical procedures either do not correct the underlying lung abnormality (e.g.: pleurodesis, apical pleurectomy) or may not totally correct it (e.g.: resection of blebs or bullae).
- **Impaired exercise performance due to respiratory disease.**

GASTROINTESTINAL

Temporary Risks

As with other organ systems and disease states, a process which chronically debilitates the diver may impair exercise performance. Additionally, dive activities may take place in areas remote from medical care. The possibility of acute recurrences of disability or lethal symptoms must be considered.

Temporary Risk Conditions

- **Peptic Ulcer Disease associated with pyloric obstruction or severe reflux**
- **Unrepaired hernias of the abdominal wall large enough to contain bowel within the hernia sac could incarcerate.**

Relative Risk Conditions

- Inflammatory Bowel Disease
- Functional Bowel Disorders

Severe Risks

Altered anatomical relationships secondary to surgery or malformations that lead to gas trapping may cause serious problems. Gas trapped in a hollow viscous expands as the divers surfaces and can lead to rupture or, in the case of the upper GI tract, emesis. Emesis underwater may lead to drowning.

Severe Risk Conditions

- **Gastric outlet obstruction of a degree sufficient to produce recurrent vomiting**
- **Chronic or recurrent small bowel obstruction**
- **Severe gastroesophageal reflux**
- **Achalasia**
- **Paraesophageal Hernia**

ORTHOPAEDIC

Relative impairment of mobility, particularly in a boat or ashore with equipment weighing up to 18 kgs/40 pounds must be assessed. Orthopaedic conditions of a degree sufficient to impair exercise performance may increase the risk.

Relative Risk Conditions

- Amputation
- **Scoliosis must also assess impact on respiratory function and exercise performance.**
- **Aseptic Necrosis possible risk of progression due to effects of decompression (evaluate the underlying medical**

cause of decompression may accelerate/escalate the progression).

Temporary Risk Conditions

- Back pain

HEMATOLOGICAL

Abnormalities resulting in altered rheological properties may theoretically increase the risk of decompression sickness. Bleeding disorders could worsen the effects of otic or sinus barotrauma, and exacerbate the injury associated with inner ear or spinal cord decompression sickness. Spontaneous bleeding into the joints (e.g.: in hemophilia) may be difficult to distinguish from decompression illness.

Relative Risk Conditions

- Sickle Cell Disease
- Polycythemia Vera
- Leukemia
- Hemophilia/Impaired Coagulation

METABOLIC AND ENDOCRINOLOGICAL

With the exception of diabetes mellitus, states of altered hormonal or metabolic function should be assessed according to their impact on the individual's ability to tolerate the moderate exercise requirement and environmental stress of sport diving. Obesity may predispose the individual to decompression sickness, can impair exercise tolerance and is a risk factor for coronary artery disease.

Relative Risk Conditions

- Hormonal Excess or Deficiency
- Obesity
- Renal Insufficiency

Severe Risk Conditions

The potentially rapid change in level of consciousness associated with hypoglycemia in diabetics on insulin therapy or certain oral hypoglycemic medications can result in drowning. Diving is therefore generally contraindicated, unless associated with a specialized program that addresses these issues. [See "Guidelines for Recreational Diving with Diabetes" at www/wrstc.com and www.diversalertnetwork.org.]

Pregnancy: The effect of venous emboli formed during decompression on the fetus has not been thoroughly investigated. Diving is therefore not recommended during any stage of pregnancy or for women actively seeking to become pregnant.

BEHAVIORAL HEALTH

Behavioral: The diver's mental capacity and emotional make-up are important to safe diving. The student diver must have sufficient learning abilities to grasp information presented to him by his instructors, be able to safely plan and execute his own dives and react to changes around him in the underwater environment. The student's motivation to learn and his ability to deal with potentially dangerous situations are also crucial to safe scuba diving.

Relative Risk Conditions

- Developmental delay
- History of drug or alcohol abuse
- History of previous psychotic episodes
- Use of psychotropic medications

Severe Risk Conditions

- Inappropriate motivation to dive – solely to please spouse, partner or family member, to prove oneself in the face of personal fears
- Claustrophobia and agoraphobia
- Active psychosis
- History of untreated panic disorder
- Drug or alcohol abuse

OTOLARYNGOLOGICAL

Equalisation of pressure must take place during ascent and descent between ambient water pressure and the external auditory canal, middle ear and paranasal sinuses. Failure of this to occur results at least in pain and in the worst case rupture of the occluded space with disabling and possible lethal consequences.

The inner ear is fluid filled and therefore noncompressible. The flexible interfaces between the middle and inner ear, the round and oval windows are, however, subject to pressure changes. Previously ruptured but healed round or oval window membranes are at increased risk of rupture due to failure to equalise pressure or due to marked overpressurisation during vigorous or explosive Valsalva manoeuvres.

The larynx and pharynx must be free of an obstruction to airflow. The laryngeal and epiglotic structure must function normally to prevent aspiration.

Mandibular and maxillary function must be capable of allowing the patient to hold a scuba mouthpiece. Individuals who have had mid-face fractures may be prone to barotrauma and rupture of the air filled cavities involved.

Relative Risk Conditions

- Recurrent otitis externa
- Significant obstruction of external auditory canal
- History of significant cold injury to pinna
- Eustachian tube dysfunction
- Recurrent otitis media or sinusitis
- History of TM perforation
- History of tympanoplasty
- History of mastoidectomy
- Significant conductive or sensorineural hearing impairment
- Facial nerve paralysis not associated with barotrauma
- Full prosthedontic devices
- History of mid-face fracture
- Unhealed oral surgery sites
- History of head and/or neck therapeutic radiation
- History of temperomandibular joint dysfunction
- History of round window rupture

Severe Risk Conditions

- Monomeric TM
- Open TM perforation
- Tube myringotomy
- History of stapedectomy
- History of ossicular chain surgery
- History of inner ear surgery
- Facial nerve paralysis secondary to barotrauma
- Inner ear disease other than presbycusis
- Uncorrected upper airway obstruction
- Laryngectomy or status post partial laryngectomy
- Tracheostomy
- Uncorrected laryngocele
- History of vestibular decompression sickness

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11. Divers Alert Network (DAN) United States, 6 West Colony Place, Durham, NC www.DiversAlertNetwork.org
12. Divers Alert Network Europe, P.O. Box 64026 Roseto, Italy, telephone non-emergency line: weekdays office hours +39-085-893-0333, emergency line 24 hours: +39-039-605-7858
13. Divers Alert Network S.E.A.P., P. O. Box 384, Ashburton, Australia, telephone 61-3-9886-9166
14. Divers Emergency Service, Australia, www.rah.sa.gov.au/hyperbaric, telephone 61-8-8212-9242
15. South Pacific Underwater Medicine Society (SPUMS), P.O. Box 190, Red Hill South, Victoria, Australia, www.spums.org.au
16. European Underwater and Baromedical Society, www.eubs.org

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Appendix G Ethics Approval

A copy of the letter received from USQ detailing ethics approval to be inserted here.